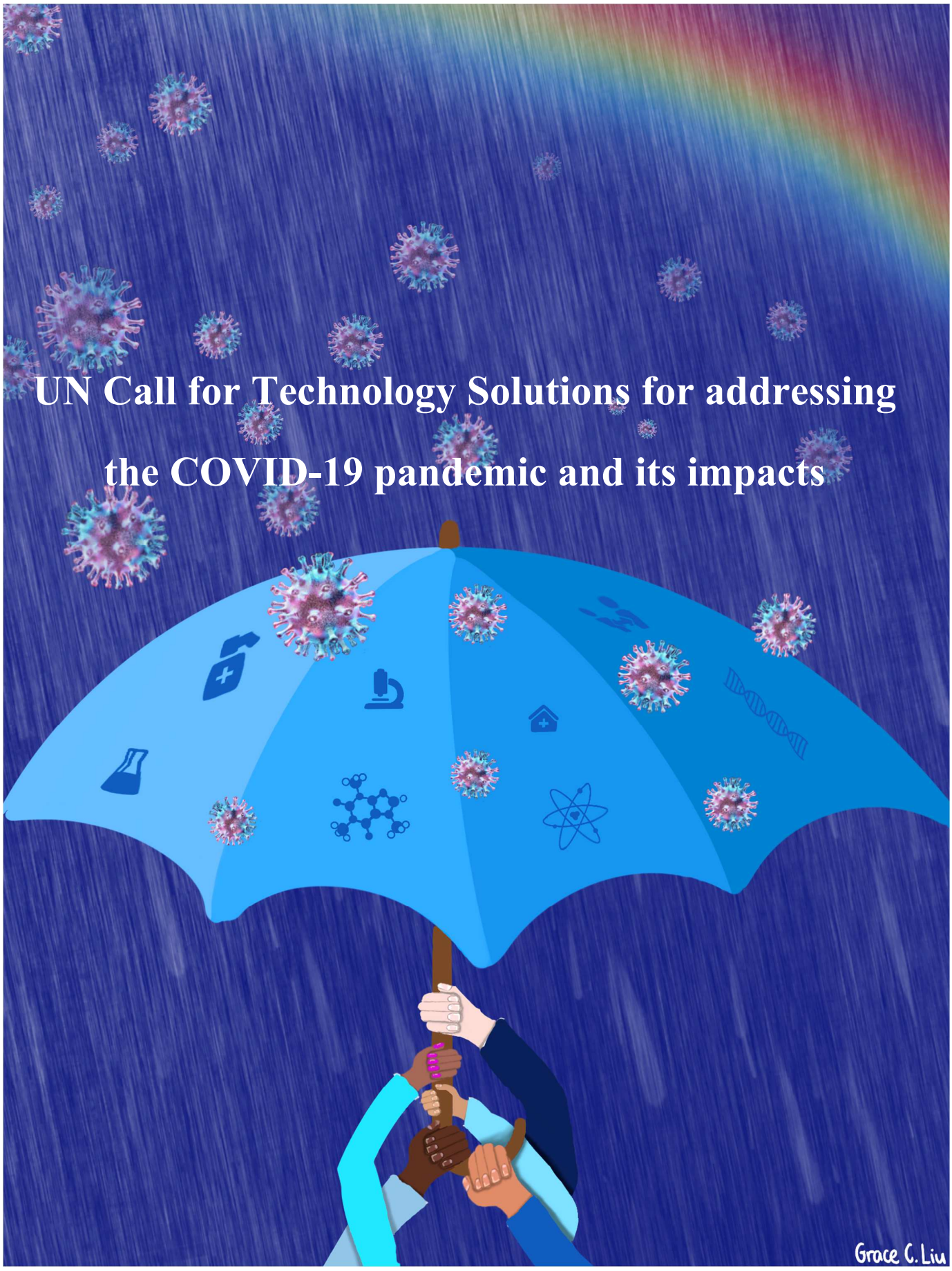
UN Call for Technology Solutions for addressing the COVID-19 pandemic and its impacts


UN Call for Technology Solutions for addressing the COVID-19 pandemic and its impacts
Grace C. Liu

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In support to the UN Secretary-General's initiative in assisting Member States at the COVID-19 crisis, DESA/DSDG has reached out to the UN Inter-agency Task Team on Science, Technology and Innovation for the SDGs (IATT) to request the inputs to the UN Call for Technology Solutions for addressing the COVID-19 pandemic and its immediate impacts. This effort is undertaken in the context of the UN Technology Facilitation Mechanism (TFM), in particular, experts active in its UN Interagency Task Team on Science, Technology and Innovation for the SDGs; and its 10-Member Group for the TFM.

The call looks for proven, affordable and scalable technology solutions that can accelerate progress towards providing basic health functions, especially for vulnerable people. Solutions from diverse sources and communities from all parts of the world are received.

In response to the Call, more than 180 submissions were received. It included several specific categories of technology solutions, such as epidemic prediction model, protective equipment, COVID-19 diagnostic technology, disease analysis and drug design technology, public consultation and governance support technology, medical equipment and technology and other technologies. Selected solutions from each categories and regions are now available on the 2030 Connect - the Online Technology Sharing Platform.

Written comments and feedback to this compilation of solutions will be most welcome and should be addressed to Wei Liu (liuw@un.org).

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Technology Solutions from the UN system

Technology	Organization
1. Field Office Brazil - medical grade refrigerator equipment	UNIDO
2. ICGEBResPage (International Centre for Genetic Engineering and Biotechnology) – open access COVID-19 resource platform)	ICGEB
3. System Dynamics Modelling for vulnerable populations at risk from Covid-19	UNEP
4. Diagnostic detection on COVID-19 by RRT-PCR protocol and preliminary evaluation (RT-PCR test kit)	IAEA
5. Space technologies and geospatial data in responding to the COVID-19, e.g. Coronavirus COVID-19 Global Cases Dashboard	UNOOSA
6. Telemedicine PPPs to reach all, including the most vulnerable	ILO
7. Enhanced use of geospatial technologies for improved facilities for hand washing	FAO/UN-Habitat/UNEP/WHO/UN-GGIM/
8. iSDG Model	UNEP
9 ASYCUDA	UNCTAD
10. Food Project	FAO
11. Humanitarian Access Project	WFP
12. Grain ATM	WFP

Technology Solutions from non-UN Entities

1. Epidemic prediction model

Technology	Organization	Region
1.1 System Dynamics Simulation Model	System Dynamics Italian Chapter (SYDIC)	Europe
1.2 Epidemic Prediction Technology	Alibaba Group	Asia
1.3 Six Stages & Nine Rates" model of COVID-19	FinTech4Good	North America

2. Protective equipment

Technology	Organization	Region
2.1 Respirator decontaminate machine	OCM Canada Medical Group Inc.	North America
2.2 Organic cotton "surgical-type" masks	dba PolygenX Idea Corporation	North America

2.3 Breath4Life prototype respirator	Breath4Life	Europe
2.4 M-steryl	AMB Ecosteryl	Europe
2.5 Validation techniques of disinfection products and strategies	Eurecat	Europe
2.6 FreeBreath reusable protective mask	Eurecat	Europe
2.7 Foot Pedal Operated Hand Washing System	Woxsan Technology	Africa

3. COVID-19 diagnostic technology

Technology	Organization	Region
3.1 IgA/IgM/IgG rapid test kits	Connected Things Scientific Inc.	North America
3.2 iAMP PCR Kit	CoVelocity	Europe
3.3 diagnosis technique	Namur University, Belgium	Europe

4. Disease analysis and drug design technology

Technology	Organization	Region
4.1 Alibaba CT Image Analytics for COVID-19	Alibaba Group	Asia
4.2 Alibaba Whole Genome Sequencing Analysis for COVID-19	Alibaba Group	Asia
4.3 AI-Assisted diagnostic system for COVID-19 Pneumonia based on Chest X-ray and CT Images	Guangzhou Regenerative Medicine and Health Guangdong Laboratory	Asia
4.4 Database to classify normal, viral and bacterial pneumonia	Qatar University	Asia
4.5 Alibaba Elastic High Performance Computing Technology for AI-driven drug design and bioinformatics metatranscriptomics	Alibaba Group	Asia
4.6 Computational Modelling, Screening and Molecular Dynamics Analysis	Tech Mahindra	Asia
4.7 Human derived monoclonal antibodies (HD-mAbs)	Totient	Europe
4.8 Covid-19 respiratory system pane	FullDNA	South America

5. Public consultation and governance support technology

Technology	Organization	Region

5.1 AliHealth Online COVID-19 Consultation Platform	Alibaba Group	Asia
5.2 TraceCovid	Abu Dhabi Department of Health (DoH)	Asia
5.3 Consumer Sentiment Tracke	IPSOS	Asia
5.4 AI temperature tool	Kronikare	Asia
5.5 AarogyaSetu	Ministry of Electronics and IT, Govt. of India	Asia
5.6 COVID-19 Chatbot	IQVIA India	Asia
5.7 VigilantGantry	GovTech	Asia
5.8 Travel and Health Declaration System	GovTech	Asia
5.9 AI-enhanced, IoT-connected, eco-friendly hygiene micro station	Soapy	Asia
5.10 Remote examining system	TytoCare	North America
5.11 Rock Art Enhancer App	Manote Arpornsuwan	Asia
5.12 Technology Stack, home service, project diya	DoctorC	Asia
5.13 CLOUDMAKER platform	Vulcan Augmetics	Asia
5.14 WellteQ App	WellteQ	Asia
5.15 Secure and personal cloud storage	MyHealp	Asia
5.16 Place Checkup - White Label Platform	Infraspeak	Europe
5.17 LazioDoctor per Covid	Regione Lazio	Europe
5.18 Movendos Health Platform	Movendos	Europe
5.19 Olwel platform	Olwel	Europe
5.20 VideoVisit remote care system	VideoVisit	Europe
5.21 THOR UVC Disinfection System	Finsen Technologies	Europe
5.22 Firegent's Qwikidata	Firegent iASP Sdn Bhd	Europe
5.23 G2k COVID Control System	G2K Group	Europe
5.24 iVH HIT	Beginning SAS	Europe
5.25 online course	Generation	Europe
5.26 eSHIFT Partner Network	eSHIFT Partner Network	Europe
5.27 Panic Attack & Anxiety Relief	Rootd App	North America
5.28 COVID-19 Navigator	PwC	North America
5.29 Brave's mobile app, Brave Buttons, Overdose Washroom Sensor monitors	Brave Coop	North America

5.30 IBM-High Performance Computing Consortium for COVID-19	IBM	North America
5.31 rayTech	Raybaby	North America
5.32 Web-Based and Mobile Applications	Dimagi	North America
5.33 GreenPass	FinTech4Good	North America
5.34 Iktos AI technology platform	FinTech4Good	North America
5.35 VERSES HEALTH	FinTech4Good	North America
5.36 Open Source Medical Supplies	FinTech4Good	North America
5.37 TrustLink	FinTech4Good	North America
5.38 biometric ID systems	Simprints	Africa
5.39 PrimeCare Website	PrimeCare	Africa
5.40 YouMeda	YouMeda	Africa
5.41 VIDA vs. COVID	Village Data Analytics (VIDA)	Africa
5.42 Emergency Telecommunications Cluster (ETC)	ETC	Africa
5.43 ehCOS Remote Health	Eduardo Llinares Legido	South America

6. Medical equipment and technology

Technology	Organization	Region
6.1 Intelligent Distribution Robot	Guangzhou Saite Intelligent Technology Co., Ltd.	Asia
6.2 CLEW-AI-based tele-ICU	Tel Aviv Sourasky Medical Center (Ichilov Hospital) and Sheba Medical Center	Asia
6.3 DebioJect: microneedles for intradermal injections	Debiotech	Europe
6.4 Uoma	Unitary Healthcare	Europe
6.5 Care-O-bot	Aida-1	Europe
6.6 temperature monitoring	SixSq Sàrl	Europe
6.7 Portable Ventilator	First-off PROTOTYPE	North America
6.8 Karuna Health Platform	Karuna	North America

6.9 Critical care Protocol Solution	Qualtrics	North America
6.10 Semi / fully autonomous robot for aircraft disinfection equipped with ultraviolet lights	Lighthouse – Disruptive Innovation Group, LLC.	North America
6.11 Solawash Automated Hand Washer	Solawash	Africa
6.12 The RNME ventilation system	Ministry of Energy, Industry, and Mining, the National Investigation and Innovation Agency and CEIBAL in Uruguay	Africa
6.13 Air heating and humidifiction system for mechanical ventilation of intensive care unit(ICU) patients	Dept of Mechanical Engineering Universidade Federal do Parana – UFPR	South America
6.14 Hydrogen peroxide vapor (HPV) technology	UTFPR, Brazil	South America
6.15 Surface functionalisation	Technallium Engineering & Consulting	Europe

7. Other technologies

Technology	Organization	Region
7.1 UVC LEDs	KAV Technology Limited	Asia
7.2 e- Platform	Turn Your Concern Into Action Foundation (TYCIA)	Asia
7.3 Protein and greens powders	dba PolygenX Idea Corporation	North America
7.4 Foot Pedal Operated Hand Washing System	Ezabo Baron Woxsan Technology	Africa
7.5 Fortified supplementary food product	McCarron University, School of Public Health	Africa
7.6 Village Data Analytics (VIDA) with “VIDA vs. COVID”	Village Data Analytics	Africa
7.7 E-Shop Somalia	E-Shop	Africa
7.8 H.A.R.D disaster management system	Evandro Holz	South America

Technology Solutions from UN system

1. UNIDO Field Office Brazil - medical grade refrigerator equipment

Description and rationale	This proposal is to supply refrigerator of medical grade powered through grid power supply / battery / solar energy / hybrid systems, to store medical goods such as vaccines, tests, reagents and medicines, in disadvantaged areas in urban environment as well as remote areas where there is unreliable or lack of electric power. This equipment will ensure the effectiveness of the cool chain for medical products so to be able to delivery of quality lifesaving services to communities, reducing needs for displacement, and cost for the services. The high-energy efficiency, reliability and flexible energy source applied represent a step forward to the provision of lifesaving medicals services in remote and disadvantaged areas in Brasil and Latin America. The project will supply, free of charge, a number of units to kick off the service to key beneficiaries across Brasil and will provide the engineering plan and guidelines to a network of refrigerators manufacturers across Brasil. All of them are well-known and trained by UNIDO as they are part of the ongoing Refrigeration and Air Conditioning project implemented by UNIDO and will be able to fulfil quickly government procurement.
When and where was it demonstrated?	Brazil has numerous refrigeration equipment manufactures that already produce standard medical grade refrigerator equipment sold in Brasil therefore, the product is assembled based on existing technologies and expertise mastered by the UNIDO/Montreal Protocol team in Brasil and participating manufacturing companies and service providers. Local manufacturer and suppliers of key components such as engineering design, compressors, evaporators, condensers, cabinets, battery, solar power solutions, etc. are available in Brazil to fulfil the entire value chain necessary for the manufacturing and delivering of the refrigerator in Brasil and Latin America. Flexible power source have been tested and are commercially available, including car plug at 24V, solar power, battery backup for up to 48h, and of course regular grid power supply.
Where was it used?	Everywhere at hospital and medical premises in Brasil.
What were the results?	Present equipment meet national and international standards for medical grade refrigerators. The equipment

	to be produced through this project represent a step forward in terms of energy efficiency, reliability, flexibility of power supply, etc. This equipment will best cope with the present crisis and so the medical services will be able to provide quality services in disadvantaged areas in urban environment as well as remote areas where there is unreliable or lack of electric power.
Validation/endorsements	The product meet the national and international standard and will be further tested at testing unit available in number enterprises in Brasil.
Approximate cost	35,000 USD for engineering design, first prototypes assembly and testing. 35,000 USD for procurement of components and consumable for prototypes. 35,000 USD for online training and technical assistance for manufacturing companies. 800,000 USD to produce and distribute between 180 to 200 prototypes to kick off the programme and distributed selected medical units in Brasil.
Funding sought	905,000 USD
Contact details and further information (please specify, which elements could be published)	UNIDO FIELD OFFICE BRAZIL Centro Empresaria Brasil 21 SH-SUL, Quadra 6 Conjunto A, Bloco A-Sala 612 Brasilia-DF, CEP 70.316-102 BRAZIL Email: office.brazil@unido.org Tel: +55 61 3037-8440; +55 61 3037-8441; HQ: 81582

2. ICGEBResPage (International Centre for Genetic Engineering and Biotechnology) – open access COVID-19 resource platform

Description and rationale	ICGEB mission foresees on site educational and tech transfer activities in its Member States. Yet, travels and shipment of samples are extremely difficult in the course of the pandemic emergency. To overcome these limitations, on March 28, the ICGEB launched an online, Open Access Covid-19/SARS-CoV-2 Resource Platform to provide Resources, Tools and Know-how to fight the SARS-CoV-2 virus that causes Covid-19, free of charge, to its Member States The ICGEB COVID-19/SARS-CoV-2 Resource Page provides information on procedures and essential reagents that can be developed 'in house', without bought in kits. Information is also provided for isolating and working with the virus and for sequencing for subsequent surveillance purposes. In particular, three Protocols downloadable in pdf format are made available for: i. Preparation of Sars-CoV-2 multitarget RNA; ii. Detection of Sars-CoV-2 RNA by RT-qPCR; iii. Isolation of viral RNA from samples. In addition, positive control reagent can be shipped upon request. Protocols are backed up by direct technical assistance with on-line video tutorials on the isolation and detection of Sars-CoV-2 RNA. If needed, additional remote Technical Assistance can be provided upon the signature of an Agreement between the requesting institute/company and the ICGEB. Finally, upon request, the ICGEB is making available its protocols for interferons (IFN beta 1 a, IFN beta 1 b, IFN alpha 2a/2b) as developed by the ICGEB Biotechnology Development Unit. Rationale is to assist ICGEB Member States to organise their own diagnosis protocols for COVID-19 according to their own clinical regulations and to provide any additional support.
When and where was it demonstrated?	All protocols and procedures have been developed and tested at the ICGEB Molecular Virology laboratory during February / March 2020.

Where was it used?	At the moment the protocols and positive control reagents have been shipped to three companies active across ICGEB constituency.
What were the results?	Not available yet
Validation/endorsements	ICGEB
Approximate cost	
Funding sought	ICGEB has requested funding to be able to provide dedicated/personalized remote technical assistance to requesting laboratories (with current staffing thsisi and to develop additional tools to be made available to members, including E-Learning modules on Epidemiology and Surveillance. 100,000 Euro.
Contact details and further information (please specify, which elements could be published)	All the information displayed above can be published. Alessandro Marcello Group Leader, Molecular Virology International Centre for Genetic Engineering and Biotechnology Padriciano 99 34149 Trieste, Italy E-mail: covid_resources@icgeb.org Tel: +39-040-3757384/85

3. UNEP - System Dynamics Modelling for vulnerable populations at risk from Covid-19

Description and rationale	Transparent System Dynamics model-based strategy development, policy design and decision making for vulnerable populations at risk from COVID-19. This proposal addresses a need for preparedness and response of vulnerable populations to the COVID-19 pandemic through the development of generic online accessible System Dynamics models (SD-COVID) that will assist national health authorities in various countries in sub-Saharan Africa to understand and plan customized responses for the COVID-19 pandemic at a national level. It has been observed that African countries face varying levels of risk that will require adapting a diversified set of response strategies to the coronavirus (Africa Centre for Strategic Studies April 3, 2020). The SD-COVID models will be based on the System Dynamics modelling paradigm, that allows for the modelling, simulation, analysis and visualization of non-linear, accumulating feedback processes, such processes characterize epidemics such as COVID-19. What distinguishes SD-COVID models from more traditional pandemic models is that they enable a more intuitive understanding of causation, thereby allowing a wider range of users to benefit from the learning. The models are portrayed in an intuitively understandable, graphical language that also allows for the inclusion of specialists across a variety of disciplines in model building and analysis. SD-COVID models can be adapted to the specific countries to which they will be applied and capture explicitly the capacities of the nation-wide health care system, based on a representation of the workforce and equipment available, so as to portray the consequences of such capacities. SD-COVID models will exist at various levels of aggregation / granularity. The most aggregate level is applicable when data and supplementary assumptions

	are scarce. The most granular level is applicable when data is readily available to allow for a detailed initialization and parameterization. The co-existence of various levels of aggregation / granularity, allows for the assessment of the appropriate level required to address the challenges facing strategy developers, policy designers and decision makers in the health care system. SD-COVID models also allow for the development and assessment of policies, including the sensitivity of the epidemic to various policies and the robustness of such policies in view of the uncertainties existing. SD-COVID models are knowledge repositories that allows for the transparent interpretation of empirical data and for learning and that informs strategy development, policy design and decision making. SD-COVID models also allow for the visualization of the relationship between the dynamics of the epidemics and the underlying, structural origin of such dynamics. Based on the model, a variety of interactive learning environments, targeting a variety of audiences, e.g. specialists, politicians, and the public at large, may be developed and deployed on the web.
When and where was it demonstrated?	In 2007 similar System Dynamics modelling influenced the global health policy related to effective polio management. (Using system dynamics to develop policies that matter: global management of poliomyelitis and beyond. Kimberly M. Thompson and Radboud J. Duintjer Tebbens (www.interscience.wiley.com) DOI: 10.1002/sdr)
Where was it used?	Worldwide. In 1988 the World Health Assembly committed to the global eradication of wild polioviruses by the year 2000. Toward the end of 2005, a debate began about abandoning the goal of eradication. In 2006 a prominent editorial questioned whether polio eradication is “realistic” and expressed concern that “international assistance for polio could have negative effects on other public health efforts”. The editorial

	suggested that "the time has come for the global strategy for polio to be shifted from 'eradication' to 'effective control'". In February 2007, the WHO Director-General, Dr Margaret Chan, convened an urgent stakeholder consultation to discuss the option of switching from eradication to control. The preliminary results of the modelling work were presented by Thompson and Duintjer Tebbens and they demonstrated the dynamics that helped key stakeholders appreciate the options quantitatively and with a much longer time horizon.
What were the results?	The same journal as the editorial mentioned earlier noted that the system dynamics based analysis provided "a nail in the coffin for the idea that there is a cheap and painless way out". Since then, efforts have continued to focus on finding the resources needed for the complete eradication of polio and on dealing with the other complex challenges that remain. National and global health leaders and financial supporters have recommitted to completing eradication, and this has led to further funding resources.
Validation/endorsements	The United Nations Environment Programme in collaboration with the University of Bergen in Norway, and other partners, have developed competency in System Dynamics modelling that provide systemic insights into policy options for complex ecosystems problems in sub-Saharan Africa. This competency can be further extended to develop SD-COVID models that will help policy makers understand and plan customized responses for the COVID-19 pandemic at a national level. This initiative would also draw on joint collaborations with the High-Level Committee on Programmes Strategic Foresight Network as well as the United Nations Geospatial Network.
Approximate cost	Staff time & modelling consultants: US$250,000
Funding sought	Modelling consultants: US$180,000
Contact details and further information (please specify, which elements could be published)	alexandre.caldas@un.org sandor.frigyik@un.org

4. IAEA - Diagnostic detection on COVID-19 by RRT-PCR protocol and preliminary evaluation (RT-PCR test kit)

Description and rationale	The Polymerase Chain Reaction (PCR) and its second generation development, that allow to see the PCR reaction amplicon accumulation in real time (the so called Real-Time PCR), are a molecular diagnostic technique, originally derived from nuclear technology, based on detecting specific sequences in the genetic material of humans, animals and disease pathogens such as bacteria and viruses. This technique allows for the specific and sensitive rapid identification and characterization of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes the COVID-19 disease. Real-time (RT)-PCR is the most sensitive technique currently available for detecting pathogens, and one of the most accurate laboratory methods for identifying, tracking, characterizing and studying viruses. Originally, the method applied photo-stimulated luminescence using Phosphorus-32 (P32) or Sulfur-35 (S35) radioactive isotopes. In the early 2000, this methodology was widely replaced by fluorescent dyes that do not require the use of a dedicated laboratory and the use of radioactive isotopes, thus providing a more user-friendly analysis. Real-time PCR has therefore become the gold standard method for validating results obtained from array analysis or gene expression changes on a global scale, permitting scientists to see the results in real-time, while the process is still ongoing (conventional RT-PCR only provides results at the end of the reaction). In the case of the SARS-Cov2 COVID-19 coronavirus, the real-time PCR is employed after a reverse transcription step and is called real-time Reverse Transcription PCR or RT-PCR. A virus is a microscopic package of genetic material, either DNA or RNA, surrounded by an envelope. Some viruses, such as the SARS-Cov2 COVID-19 coronavirus, only contain RNA, which means they rely on infiltrating healthy cells to multiply and survive: once inside the cell, the virus uses its own genetic code (RNA in the case of the coronavirus) to take control of and ‘re-programme’ the cells so that they become virus-making factories. In RT-PCR, the RNA template is first converted into a complementary DNA (cDNA) using a reverse transcriptase; the cDNA is then used as a template for exponential amplification using PCR. At the end, detection is performed.

	Scientists amplify a specific part of the transcribed viral DNA billions of times. Amplification is important so that, instead of trying to spot a minuscule amount of the virus among billions of strands of genetic information, scientists have a large enough quantity of the target sections of viral DNA to accurately confirm that the virus is present. The first step for an accurate diagnosis is the collection of an adequate sample, its rapid transport to the laboratory and the adequate storage before laboratory testing. In the case of COVID-19 the sample is typically collected from the respiratory system, most commonly nose or the throat, using specific swabs. The sample is then treated with several chemical solutions to remove substances such as proteins and fats, and extract only the RNA present; this extracted RNA is a mix of a person's own genetic material and, if present, the coronavirus' RNA. The RNA is reverse transcribed to DNA using a specific enzyme; scientists then add short fragments of DNA that are complementary to specific parts of the transcribed viral DNA. These fragments attach themselves to target sections of the viral DNA if the virus is present in a sample (some of the added genetic fragments are for building DNA strands during amplification, while the others are for building the DNA and adding marker labels to the strands, which are then used to detect the virus). The mixture is then placed in a RT-PCR machine. The machine cycles through temperatures that heat and cool the mixture to trigger specific chemical reactions that create new, identical copies of the target sections of viral DNA. The cycle repeats over and over to continue copying the target sections of viral DNA. Each cycle doubles the previous amount: two copies become four, four copies become eight, and so on. A standard RT-PCR setup usually goes through 35 cycles, which means that by the end of the process, around 35 billion new copies of the sections of viral DNA are created from each strand of the virus present in the sample. As new copies of the viral DNA sections are built, the marker labels attach to the DNA strands and then release a fluorescent dye, which is measured by the machine's computer and presented in real time on the screen. The computer tracks the amount of fluorescence in the sample after each cycle. When the amount goes over a certain level of fluorescence, this confirms that the virus is present.

	Scientists also monitor how many cycles it takes to reach this level in order to estimate the severity of the infection: the fewer the cycles, the more severe the viral infection is. The RT-PCR technique can deliver a reliable diagnosis as fast as three hours, though usually laboratories take on average between 6 to 8 hours. Compared to other available virus isolation methods, RT-PCR is significantly faster and has a lower potential for contamination or errors as the entire process can be done within a closed tube: it continues to be the most accurate method available for detection of the coronavirus. While RT-PCR is now the most widely used method for detecting coronaviruses, many countries still need support in setting up and using the technique for identification of SAR-COV2. As part of its response to the emergency, the International Atomic Energy Agency (IAEA) is dispatching a first and second batch of equipment/kits to more than 75 countries to enable them to use a nuclear-derived technique to rapidly detect the coronavirus that causes COVID-19 (more than 105 IAEA's Member States have requested support in controlling the increasing number of infections worldwide). Dozens of laboratories in Africa, Asia, Europe, Latin America and the Caribbean will receive RT-PCR machines, biosafety cabinets, other lab equipment and consumables. They will also receive biosafety supplies, such as personal protection equipment and laboratory cabinets for the safe analysis of collected samples, and, as detection kits, reagents, primers and personal protection equipment to speed up national testing, which is crucial in containing the outbreak.
When and where was it demonstrated?	The specific diagnostic kit uses three techniques: the one established by Charité Virology, Berlin, Germany, the one established by the Hong Kong University (both recommended by WHO) and the new, validated and certified BGI ready to use RT-PCR kit.
Where was it used?	In recent weeks, the IAEA, in collaboration with the FAO, has provided guidance on coronavirus detection to 124 laboratory professionals in 46 Member States through VETLAB, a network of veterinary laboratories in Africa and Asia originally set up by the two organisations to combat the cattle disease rinderpest. The support included the provision of Standard Operating Procedures to identify the virus following WHO recommendations.

What were the results?	The capacity of the equipment depends on the experience of the laboratory in the use of molecular diagnostic platforms. If the laboratories have no or limited experience, the capacity will be between 20 and 40 samples per day. Experienced laboratories can process between 100 and 200 samples per day. Each standard IAEA package of RT-PCR kits is sufficient for approximately 2,000 tests.
Validation/endorsements	Diagnostic detection on COVID-19 by rRT-PCR protocol and preliminary evaluation – January 17, 2020
Approximate cost	-
Funding sought	The IAEA is using its own resources as well as extrabudgetary funding for its emergency COVID-19 assistance. Showing strong support for the initiative, several countries have announced major funding contributions for the IAEA's efforts in helping to tackle the pandemic.
Contact details and further information (please specify, which elements could be published)	IAEA, Department of Technical Cooperation/Strategy and Partnership Section Ms. Emma Webb, e.webb@iaea.org Ms. Laura Vai, l.vai@iaea.org

5. UNOOSA - Space technologies and geospatial data in responding to the COVID-19, e.g. Coronavirus COVID-19 Global Cases Dashboard

Description and rationale	Space technologies and geospatial data can support governments in improving situational awareness and responding to the COVID-19 outbreak.
When and where was it demonstrated?	Several institutions have published information products, such as web maps of confirmed infections and deaths, that are making use of remote sensing images. Yet others are using remote sensing combined with global navigation satellite systems technologies which allow better geo-location to map the position of critical infrastructure in geographical areas where there are reported cases.
Where was it used?	The United Nations Office for Outer Space Affairs, through its UN-SPIDER programme, has created this COVID-19 emergency response overview page to facilitate the discovery of examples of contributions of space technologies to addressing COVID-19 that are being published by government agencies, international and regional organizations, academia, civil society and the private sector: http://www.un-spider.org/advisory-support/emergency-support/covid-19
What were the results?	Examples: Africa Dashboard for Tracking the COVID-19: The dashboard provides an overview of cases, countries affected, total deaths and total recovered in Africa. It is maintained by the United Nations Economic Commission for Africa. Coronavirus COVID-19 Global Cases Dashboard by CSSE at JHU The Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, Baltimore, MD, USA, developed an interactive dashboard to visualise and track reported cases of coronavirus disease 2019 (COVID-19) in real time. The dashboard shows the location and number of confirmed COVID-19 cases and deaths. COVID-19: Luxembourg grants access to the SATMED platform free of charge In light of the COVID-19 outbreak, the Government of Luxembourg will make access to the SATMED platform available free of charge for healthcare

	professionals' community of selected health organisations to fight the pandemic. SATMED is a multi-level software-as-a-service eHealth platform owned by the Government of Luxemburg aimed to help healthcare providers make better use of information technology and mobile health solutions specifically in remote and underdeveloped areas. It has been in operation since 2014 in hospitals, remote medical centers and hospital ships in multiple locations across Africa and Asia Pacific, after its initial roll out in Sierra Leone during the Ebola outbreak. FAO's Big Data tool on food chains under the COVID-19 pandemic This open-access tool developed by the Food and Agriculture Organization of the United Nations (FAO) Data Lab gathers and analyses real time information on the impact of the COVID-19 pandemic on food and agriculture, value chains, food prices, food security and undertaken measures, with the aim of providing countries with facts and information to build their decisions. The maps provided by FAO represent some of the daily analyses that this tool enables: a hunger map combined with covid-19 incidence, a map of food chain disruptions highlighted by newspapers' tweets worldwide, a map of food prices variations and a trend line of the COVID impact on food chains in the newspapers' tweets. GNSS Apps for COVID-19 response Since the outbreak of the coronavirus earlier this year, a number of apps have been developed that use Global Navigation Satellite Systems (GNSS) precise location to monitor the global spread of the virus. The European GNSS Agency (GSA) is maintaining a list of location-GNSS-Galileo based applications that, in GSA's view, may be useful in response to the outbreak of COVID-19. The applications cover a wide range of uses, from the support to public authorities in understanding the dynamics of the outbreak to the support of citizens in their everyday life, for example by checking and possibly limiting queues at supermarket. Developers who have developed an app that is already working and being used to map the spread of the coronavirus, to monitor incidences of the disease, or to alert users about possible risky contacts,

	can forward information about it to GSA for inclusion in their list.
Validation/endorsements	UNOOSA
Approximate cost	
Funding sought	
Contact details and further information (please specify, which elements could be published)	Markus.woltran@un.org A link to the UNOOSA and UN-SPIDER page with a generic description of the importance of space technology in combating COVID-19 can be provided and included in any reference on the website.

6. ILO - Telemedicine PPPs to reach all, including the most vulnerable

Description and rationale	Telemedicine PPPs to reach all, including the most vulnerable Description of stakeholders: Given the COVID-19 pandemic, time is of the essence. A concrete practical approach builds on the infrastructure available – bringing together key stakeholders in the public and private sectors that, together, can get the job done. While these solutions will be helpful in the current crisis, this will also lay the foundation for improved access to healthcare in the long run. Using its convening power, the ILO will bring together stakeholders from the following sectors/industries: telemedicine, telecommunications, financial services and relevant government institutions. Each industry brings something different but complementary to the table: Telemedicine: Telemedicine is defined by the European Commission as "healthcare services, through the use of information and communication technology, in situations where the health professional and the patient are not in the same location. It involves the secure transmission of medical data relating to prevention, diagnosis, treatment and follow-up consultations". In the current crisis, where face-to-face consultations are best avoided, telemedicine can play a crucial role. Telemedicine ranges from simple medical help-lines to diagnostics and the delivery of care over the phone. In a world without COVID-19, telemedicine offers convenient medical care to the user, as less time is wasted traveling to clinics and in waiting rooms and critically, less time is needed away from work, which is especially important for those working in the informal sector, where time away from work means lost income. Telemedicine also offers the possibility of extending access beyond primary care to specialists in resource-poor settings, which is advantageous in remote areas. Ultimately, telemedicine can support efforts to achieve UHC and could be impactful given the dramatic shortage of healthcare workers in developing countries and especially in rural areas. It may also be cheaper to provide care through telemedicine than in person. Telecommunications industry: It is often said we are more connected than ever before, and given the latest

	statistics, it is likely to be true. According to the latest data from GSMA Intelligence, there are 5.19 billion unique mobile phone users in the world today. This means that telecommunication organisations have the ability to communicate and transmit information and services, such as telemedicine and health advice, to the far corners of the earth. Financial services sector: The financial services industry also has a highly developed network for reaching, communicating and serving people in the informal sector through microfinance and other such institutions. The question of how to set up distribution partnerships to reach low-income populations with financing services such as savings, credit and insurance, has long been the preoccupation of many working on the inclusive finance agenda. There are many examples of this "last mile distribution", especially where those with mobile phones do not necessarily have smart phone. The financial services sector also works closely with the telecommunications sector to deliver mobile money solutions, which are becoming increasingly popular in developing countries. The innovation to focus on here is telemedicine that is bundled with financial services. Relevant government bodies: These bring the authority to communicate information about COVID-19 and primary healthcare to all citizens. In such partnerships and for global health crises, governments can also help pay for the health services delivered through telemedicine as part of their UHC initiatives, delivering on promises of access to healthcare as a human right. Description of solution The partnerships work as follows: the financial services provider is a key stakeholder, bringing together telecommunications, telemedicine and public sector partners. Telecommunications organisations provide the communication technology and telemedicine organisations, the remote medical services. Furthermore, financial services partners use their marketing and distribution expertise to deliver the medical services to the end users while also laying the foundation for possible flows of finance and other financial services between stakeholders (with the end user also being a stakeholder). Of particular importance

	is the distribution experience and capability of the financial services partner. How this could be extended in the current COVID-19 Crisis? The solution suggested could be adapted to the current global environment. The examples given are mostly voluntary and paid for solutions, but could be sponsored by government, with the financial services partners acting as third party administrators, enrolling members into government schemes and/or doubling up to deliver social security and other payments. These payments could potentially linked to COVID-19 key indicators (akin to parametric insurance, of which we have much experience at the ILO's Impact Insurance Facility). Telemedicine is an inexpensive and efficient solution to the global health crisis. A COVID-19 symptom checker, such as those developed elsewhere, could easily be disseminated and testing kits distributed through networks already established.
When and where was it demonstrated?	Tonic – a mobile phone delivered health package in Bangladesh Tonic is a mobile phone distributed health insurance product (with other bundled health benefits) operating of a bespoke digital platform. They have 5 million "freemium" users and half a million paid for. Tonic is offered to Grameenphone customers (with a reach of 60 million potential users). Established in 2015, Telenor Health aims to use technology to help make quality health and wellness information, advice and services accessible to people, particularly in emerging markets. Launched in June 2016, Tonic provides the following services: Consultations and advice: Personalised health content (SMS, app, web) including advice on preventative health Telemedicine, namely mobile-based consultations with doctors (calls and in-app chat) – called "Tonic Doctor" Healthcare services: Nationwide appointment booking service Discounts on health tests and specialist care, called "Tonic Discount", through Tonic's country-wide network of partners providing discounts on services (health checks, labs, medications, procedures) Financial coverage: Hospital cash insurance called "Tonic Cash"

	AXA Indonesia and Alodokter The ILO's Impact Insurance Facility recently worked with AXA Indonesia to develop a telemedicine product. This involved setting up all partnerships as listed above. AXA Indonesia partnered with Alodokter, one of the leading mobile health companies in Indonesia, that provides doctors' consultations through a chat function embedded in its mobile application. Since the relatively recent launch, there are currently 30,000 customers. Cheaper versions of the product are being developed for lower-income populations.
Where was it used?	In Indonesia with AXA Indonesia. See Case Study, written in November last year. Since then, the product has enjoyed huge success. Also watch our webinar: "Making inclusive insurance work" webinar series: Health (part 1): Telemedicine, insurance and Universal Health Coverage" Paper: Financial inclusion and health Paper: Value-added services in health microinsurance
What were the results?	Tonic Bangladesh: 5.5 million users of telemedicine AXA Indonesia: recent telemedicine product already reaching 30,000 customers.
Validation/endorsements	Milliman, Microinsurance Network (MIN), GIZ Pakistan
Approximate cost	The cost of the project diagnostic and advisory functions (see next section for more information) is from USD 100k to USD 150k per country (countries to be decided). This would not pay for the actual telemedicine services, but for the cost of setting it up.
Funding sought	Funding is being sought for a package of support services. The ILO would bring together different consortia of partners and assist with partnership establishment and project management. The ILO's Impact Insurance Facility provides a one-stop-shop for technical advice and information on how to implement telemedicine systems, establish the necessary partnership ecosystems and reach unreached populations.
Contact details and further information (please specify, which elements could be published)	Lisa Morgan morgan@ilo.org +41795586388

7. FAO/UN-Habitat/UNEP/WHO/UN-GGIM/ - enhanced use of geospatial technologies for improved facilities for hand washing

Description and rationale	In light of the COVID-19 crisis, the need to address unsafe sanitation globally has become more urgent than ever especially in developing countries. COVID-19 is a global humanitarian crisis, which requires concerted action as indicated Mr. António Guterres, UN Secretary General's statement: "This human crisis demands coordinated, decisive, inclusive and innovative policy action from the world's leading economies – and maximum financial and technical support for the poorest and most vulnerable people and countries." For this purpose, FAO, UN-Habitat, UNEP and WHO have developed a collective response to support Member States in addressing the COVID- 19 crisis through enhancing water and sanitation availability with a focus on youth. Currently, approximately 2.2 billion people lack access to safely managed drinking water services and 4.2 billion people lack safely managed sanitation services affecting people's health and access to safely produced food worldwide. Addressing this issue is at the heart of SDG6 Water and Sanitation. Water, Sanitation and Hygiene (WASH) are essential to combating the spread of COVID-19. Without clean water, hand washing is not possible therefore largely affecting quarantine measures advised by governments. Basic WASH practices such as hand washing can diminish the spread of the virus with youth as central advocates for this. The use of geospatial technologies can help locate vulnerable areas in developing countries where unsafe sanitation is a widespread problem. The role of location in human health studies is vital and considered an important and useful factor to test etiological theories. Combining the spatial and demographic analyses can help locate areas in need and adequately distribute the essential resources required for prevention. These elements can also help researchers in public health in developing appropriate databases to identifying and analysing areas of COVID-19 cases. This joint UN project proposal aims to address the current crisis by enhancing the rapid response of the UN to COVID-19 through enhanced use of geospatial technologies for improved facilities for hand washing through youth-driven involvement. The proposed project will focus on enhancing

	access to handwashing station in the slums of two pilot countries - Kenya and Pakistan. According to the United Nations World Cities Report 2016, around a quarter of the world's urban population lived in slums in 2014, and this figure is on the rise. To prevent COVID- 19 from spreading in slums, geospatial technology will be a key element combined with information sharing. Today, COVID-19 is mapped in real- time, from global to local level and must be taken into consideration for an efficient response plan. The project proposal will use geospatial technologies for vulnerability assessment, prioritising area of intervention, geolocation of handwashing stations (e.g. to support the implementation of 200 handwashing options), using very high-resolution satellite images and involving the youth through the geospatial open data community. Access to water in the slums is limited by many factors including lack of legal rights to land which makes the struggle worse, threatening people's homes and efforts to invest in essential services. In addition, the quality of the water used in slums is often problematic, leading to human health issues, which can make communities more susceptible to disease. The available water is not enough to ensure handwashing with soap many times a day and shared toilets in slums and informal settlements can further increase the spread of disease. COVID-19 has clearly demonstrated that safe water and sanitation are crucial to saving lives. In parallel, the proposal builds off of the work undertaken by UN- Habitat in the informal settlements of Kenya, where youth-led organizations have been engaged to set up handwashing and COVID-19 information stations, These station address the immediate need of allowing residents of informal settlemens a chance to wash their hands, while as well receiving masks to stop the spread of the virus. The stations will also raise awareness on basic water, sanitation and hygiene information to prevent the spread of COVID-19 according to the advice issued by the World Health Organization (WHO) on basic protective measures including: a) washing your hands frequently; b) maintaining social distancing; c) avoiding touching eyes, nose and mouth; and d) practicing respiratory hygiene. Kenya Kenya is home to some of the largest slums in Africa. Kenya's Kibera and Mathare slums, account for about 600k to 1.5M people. Why youth? Kenya is a country with a

	young population where approximately 75 percent of the percentage of population is aged between 18 and 35. A high number of Kenya's population is unemployed. Pakistan Pakistan is home to some of the largest slums globally. Orangi town in Karachi was named among the largest slums worldwide according to the United Nations World Cities Report 2016. Orangi town is home to more than 2 million people (Habitat for Humanity). Pakistan's slum lack basic sewage systems and social distancing in times of COVID-19 is not a reality, which could be a fatal combination for the spread of the virus. Why youth? Pakistan has a young population where UNDP estimates that 64 percent of the nation is younger than 30 and 29 percent of Pakistanis are between 15 and 29. The project will have the following components (all involving youth): 1) Geo-spatial analysis to prioritize best geographic locations for handwashing stations considering people's vulnerability to COVID-19. Innovative geospatial technologies will be used with very high-resolution satellite images in close collaboration with the open data community such as open street map to assess the most vulnerable and priority areas considering population density, infrastructure, access to water among others. 2) Improve access to water, sanitation and hygiene by building 200 point of use washing stations in 20 slums in each country considering the results from above, and establish handwashing and information stations. 3) Improve awareness raising initiatives using social media and popular apps (e.g. tik tok) on basic hygiene and COVID-19 prevention practices such as: social distancing, food production sanitary precautions and food handling, hand washing and use of masks and gloves based on WHO guidelines and any other relevant guidelines to help preventing the spread of COVID-19.
When and where was it demonstrated?	In response to the declaration of a COVID-19 global pandemic on March 11, 2020, the Mathare Environmental One Stop Youth Centre (One Stop)1 partnered with UN-Habitat and other partners to establish the Exponential Potential campaign to engage and empower youth from the informal settlements of Nairobi in the fight against the spread of the Corona virus. The campaign brings together local

	action – the establishment of handwashing stations, the provision of masks and the COVID-19 information – with community and remote sensor geo-spatial data. The first stage of the campaign was to establish two pilot handwashing stations in the Mathare slum in Nairobi, Kenya. Starting on March 23rd, handwashing stations were staffed by volunteers from the One Stop, supported by UN-Habitat In the following 10 days an average of 800 handwashes a day were done between the two sites totalling 8000 handwashes per day, with people traveling to the sites from all over Mathare. With the success of the pilot, UN-Habitat through its Participatory Slum Upgrading programme committed to increasing the number to 10 sites, 5 in Mathare and 5 in the largest slum in East Africa, Kibera. Following this the Kenyan Embassies of Norway and Canada committed to fund 20 more sites. It is conservatively projected that the 30 sites over the 4 months of the project will undertake 937,500 handwashes with the goal of lessening the transmission of the virus. I added innovation at the programmatic level will be the provision of masks, now recommended by WHO as a way to prevent the spread of the virus, and a clear way for those living in slums to "socially distance" themselves. FAO's Land and Water Division Geo-Spatial Unit has access to global data and is experienced in geospatial mapping and remote sensing to carry out vulnerability assessments. FAO has more than 30 years of experience in the development and use of geospatial data, methods and tools, which are applied to national, regional and global sustainable development planning and implementation. FAO supports countries implement appropriate geospatial solutions that can assist their efforts to create sustainable food systems. This work is organized and delivered to developing countries through projects and programs carried out both at Head Quarters and regional, sub-regional, and national offices to ensure that best practices and standards are adopted and implemented. FAO has a myriad of databases and tools for with access to data and remote sensing vulnerability assessments. FAO's large country presence and relationship building experience can facilitate communications with its joint UN partners.
Where was it used?	The Mathare Informal settlement, village of Mlango Kubwa. There are approximately 2.5 million slum dwellers in about 200 settlements

	in Nairobi, representing 60% of the Nairobi population and occupying just 6% of the land. The Mathare Informal Settlement is one of approximately 22 slums that are found in Nairobi. Mathare has a population of approximately 500,000 people, and is made up of 13 "villages", one of which is Mlango Kubwa, population approx. 50,000. Mathare, as of most of sub-Saharan Africa, is predominantly made up of children and youth, who make up approximately 70% of the population. Thirty handwashing stations have been placed in Mathare and Kibera at the entrance to youth and community centres, bus and matatu stands, markets and other public venues. Community Driven and Remote Data Strategy One of the greatest challenges of working in slums is the informality of both the interventions as well as the knowledge that drives the intervention. Often national and international agency will set up projects adjacent to one another that service the same need, yet have no jointly coordinated planning. Additionally, there is very little formal knowledge within slums on basic habitation – information that often comes from Demographic and Health Surveys (DHS) that are perceived cannot be done because most people have no fixed address. The mapping will include vulnerability assessments to determine locations of vulnerable populations (elderly, children, persons with medical conditions, or low-income groups) and their access to healthcare facilities, water and sanitation points, food distribution facilities etc. to plan for temporary/emergency facilities in collaboration with service providers, private sector actors, NGOs etc. Data will include institutional and stakeholder mapping where relevant. The mapping of assets/ facilities like libraries, schools, community centers, sports facilities etc. to support the expansion of services like centers for testing, quarantine facilities, confinement places, shelters for homeless people, food distribution centers, etc. in areas of need. The Geospatial analysis will produce a rapid planning assistance in different cities/neighbourhoods. The rapid planning assistance will include: data collection (using primary and secondary sources, including open sources and data collection through cell phones)

	risk assessments to individuate potential hot-spots for disease transmission; vulnerability assessment (localize most vulnerable population based on age, income, gender) and their access to specific facilities (food/water distribution, healthcare facilities, ...) maps of assets (libraries, schools, sport facilities, etc...) that can be used as temporary facilities for quarantine, food distribution, additional shelters, etc... Strategic advice to partners and Community Driven response on the field in order to increase impact and efficiency Explore appropriate strategies and solutions to allow temporary social-distancing, as for example temporary expansions of markets and determined facilities. FAO's specialized land and water management as well as geospatial units, use distribution and temporal dynamics of natural resources as well as human activities to identify land and water management interventions, particularly in zones with protracted crises and severe environmental challenges (e.g. inefficient management of natural resources, frequent natural hazards and displacement of people). Competition for natural resources such as water, grassland and wood among different stakeholders with multiple visions and interests is not only responsible for land degradation but often a driver of tensions and violent conflicts. Working with Geographic Information Systems (GIS) remote sensed imagery and thematic maps, supports a participative process where different stakeholders and communities are invited to discuss their needs and develop an understanding of the causes and dynamics of conflicts in a transparent and inclusive environment. FAO's One Water One Health Initiative has also quickly responded to the COVID-19 crisis to continue the work on making water more safely accessible and to ensure food security during the pandemic. FAO has a dedicated website that reflects the work of FAO throughout its various specialized divisions on its rapid response to fight COVID-19 and the role of key food supply workers: http://www.fao.org/2019-ncov/q-and- a/en/. In addition, FAO has a Framework for the Urban Agenda to work on improving food systems and that make the linkages between urban, peri- urban and rural settings. COVID-19 requires a concerted approach recognizing the need for action to develop sustainable cities with WASH facilities. Together with the other UN agencies collaborating in this proposal the

	knowledge base is expanded, and a concerted response is guaranteed and strengthened.
What were the results?	Handwashing Stations The results are demonstrated through self-monitoring by the youth groups. The current total handwahses are in Appendix B. A projected total for the current project with 30 sites (5 in Kibera, 25 in Mathare) is 937,500. Actual to date (April 13, 2020) handwashes is 58,250. . The projected number of handwashes per site if we expand to 15 new informal settlements in Kenya (5) and Pakistan (10), 200 new handwashing sites in total over 4 months are in Appendix C. Total handwashes are 9,600,000. For geo-spatial data, the following outcomes will be sought: ● Short-term outcomes o Support local and national governments to control the spread of the infection by containing the virus in high-risk areas through effective response strategies o Limit vulnerable populations' exposure to the virus by minimizing social interactions and movement and preparing the communities with improved access to basic services. ● Longer-term outcomes o Improve the urban environment to mitigate adverse effects of urbanization and widespread disease outbreaks through improved landscape, urban design and planning o Reduce health inequalities through inclusive design and equitable distribution of services and response strategies FAO's geospatial analysis and One Water One Health Initiative - in support of member countries – provides the following: FAO has a global database on water resources as well as a specialized geospatial unit, which has provided land cover datasets, vulnerability datasets, food security assessments. etc. throughout FAO projects worldwide; Access to data and maps to visualize areas of land and water use distribution and therefore assess food security levels; FAO's One Water One Health concept provides an integrated water resources management approach that embraces the value of water in all its forms and recognizes the intrinsic role of water in protecting human, animal and ecosystem health;

	FAO has offices in both project countries with a long-standing history of experience as well as a solid relationship with Member Countries such as Kenya and Pakistan; Solid and consolidated FAO wide response to COVID-19: http://www.fao.org/2019-ncov/q-and-a/en/
Validation/endorsements	See Appendix A: Media Coverage Mathare / Kibera Handwashing Stations Project
Approximate cost	Kenya – 5 slums – 50 stations 300,000 USD Pakistan – 10 slums – 150 stations 900,000 USD Provision of Masks – 500,000 500,000 USD Geospatial data 300,000 USD Total 2,000,000 USD
Funding sought	2,000,000 USD
Contact details and further information (please specify, which elements could be published)	Douglas Ragan, Children and Youth Specialist, UN-Habitat douglas.ragan@un.org +254706110135 FAO: Eduardo Mansur, Director, Land and Water Division, Eduardo.Mansur@fao.org Sasha Koo Oshima, Deputy Director, Land and Water Division, Sasha.Koo@fao.org Doug Muchoney, Head of Geospatial Unit, Doug.Muchoney@fao.org UN-GGIM: Kyoung-Soo Eom, Chief UN Geospatial Information Section, UN-GGIM Secretariat, eom@un.org Guillaume Le Sourd, Geospatial Information Officer UN-GGIM, lesourd@un.org UNEP Alexandre Caldas, Chief, Country Outreach, Technology, Innovation and Big Data Branch, Director of the United Nations Organisation, alexandre.caldas@un.org WFP: Lara Prades, Head of WFP geospatial unit, lara.prades@wfp.org

8. UNEP：**iSDG Model**

Description and rationale	**Support for policymakers in sub-Saharan Africa to build sustainable and resilient futures post COVID-19 with the iSDG Model** *The COVID-19 crisis presents an opportunity to address systemic issues that worsened the pandemic's impacts and to institute policies that foster inclusive and equitable sustainable development, and enhance our resilience to future shocks.* The coronavirus pandemic has disrupted societies in ways that were unimaginable just a few months ago, and the impacts will be with us long after the immediate crisis is over. Many governments have responded to the predicted reduction in global economic output resulting from COVID-19 with fiscal stimulus plans meant to mitigate the economic and social impacts. In addition to these short-term reactionary planning to peaks in infection and developing strategies to control and/or mitigate the effects of future new infections, we must also plan for a post-COVID-19 future. The decisions we make today directly impact that future. What are the broad and longer term impacts and consequences of the pandemic on our lives and societies beyond the economic sphere? What are the impacts on efforts to achieve SDG 3 for good health and well-being and its connections to other SDGs? What impacts will there be on the future landscape of work in sub-Saharan Africa? What effective and cost efficient solutions should we adopt to increase the resilience of our social and economic systems to the present and future shocks, and protect our finite environmental resources? These are some of the questions policymakers in government and the international community must also confront as part of a holistic response to this crisis. The Integrated Sustainable Development Goals (T21-iSDG) model is a policy simulation tool well suited for examining the whole-of-society impacts of the COVID-19 pandemic in the short to long term, and for designing country-specific policy responses that mitigate negative impacts and enhance societies' resilience to future shocks. The tool allows policy makers and country planners to define and conduct foresight analysis and simulations of different future scenarios, assess their synergies, and find the best solutions within acceptable trade-offs. The tool

	is particularly useful for testing innovative policy proposals that are needed, but for which little or no history exists from which to assess their potential impact. This strategic development approach is essential for establishing a coherent cross-sectoral policy response for efficient budget (re)allocation decisions within limited financial resources, and to monitor implementation and adjust strategies based on new data. The iSDG modeling framework features 30 interacting sectors that closely align with the dimensions of the of the STEEP analysis horizon scanning approach. Some iSDG sectors or structures directly relevant to STEEP are: *Social* (e.g., demographics including one year age/sex cohorts, mortality and fertility; health; education; gender equality; income distribution; and poverty), *Technological* (e.g., renewable energy; adoption of electric vehicles; knowledge-based ecological agriculture and R&D), *Economic* (e.g., industry, employment, services and agricultural production; international trade; taxation; household consumption and savings;), *Environmental* (e.g., GHG emissions and warming; PM2.5; water quality and quantity; soils; biodiversity; fisheries; and forest), and *Political* (e.g., rule of law; voice and accountability; political stability; regulatory quality; and control of corruption). Due to its modular structure, existing sectors can be revised and new specialized sectors can be developed and readily integrated into the iSDG framework. This will be instrumental in incorporating environment-related COVID-19 responses, for example COVID-19 related medical waste management and zoonotic risks and response policies, into the model structure. The current iSDG features environmental factors that can predispose to COVID-19 such as drinking water quality and particulate air pollution. The model can also examine investments in climate adaptive infrastructure, renewable energy and energy efficiency, sustainable agriculture and food security, sustainable consumption and how these relate to human health and livelihoods, and post COVID-19 development. Furthermore, in conjunction with UNEP as lead agency and with expertise in foresights, dynamic modeling, simulation, analysis and systems thinking initiatives, the proposed modeling framework featuring 30 interacting sectors allows for extensive cross-cutting collaboration on the UN System Strategy on the Future of Work with other HLCP informal Strategic Foresight networked entities in the UN system (e.g. ILO, FAO, WHO,

	UNESCO, UNCTAD, UN-WOMAN, UNDP and others) interested in collaborating. The modeling framework also recognizes that adapting to the changing landscape of jobs is critical to the achievement of the SDGs, and provides an ideal tool to explore, through the foresight lens, simulations of the future landscape of work in sub-Saharan Africa that will inform and orient a regional, context-specific plan for the Strategy's roll-out in a post-COVID-19 future
When and where was it demonstrated?	T21-iSDG has been demonstrated at various international forums, including the High Level Political Forum, SDGs Summit, and African Forum on Sustainable Development.
Where was it used?	T21-iSDG has been used in countries including Cameroon, Cote d'Ivoire, Guinea Bissau, Malawi, Namibia, Nigeria, Senegal, Uganda; and the Sahel Region of West Africa. Previous to iSDG the T21 model was developed for Kenya to examine policies for climate change impacts and for environmentally sustainable agricultural systems.
What were the results?	Policy recommendations derived from testing different options with the iSDG model help identify priority investments for faster achievement of policy objectives. Due to the synergetic nature of policy interventions, the recommendations typically focus on combinations of interventions, rather than on individual policies. Accordingly, results from our studies have been used to prepare holistic strategic plans. In Senegal, the Ministry of Economy, Finance and Planning used the iSDG model to develop the country's SDG roadmap. Similarly, in Kenya, the Green Economy and Implementation Strategy produced by the Ministry of Environment and Natural Resources relied on analysis conducted with the T21-iSDG. In Eswatini, the Ministry of Economic Planning and Development produced its Economic Recovery Strategy (2011), Budget Analysis (2012), National Development Strategy (2014 & 2016) using T21-iSDG. The ECOWAS Commission used the model's analysis to identify 230 priority projects representing over $48 billion investment towards achieving the objectives of its Vision 2020; and UNECA used the analysis to identify coherent strategic orientations for the transformation agenda of the Sahel Region.
Validation/endorsements	The iSDG model is included in the OECD *Policy Coherence for Sustainable Development Toolkit* and the UNDG *SDG Acceleration Toolkit* as integrated policy planning tools. Several peer reviewed papers about the application of the model have

	been published in academic journals, including the *Proceedings of the National Academy of Sciences*, *Nature Sustainability*, and *Sustainable Development*. T21-iSDG was ranked highest among 80 policy planning models in a review published in *Environmental Science and Policy* journal.
Approximate cost	$300,000 (two pilot applications, one in Nigeria and one in Kenya)
Funding sought	$300,000
Contact details and further information (please specify, which elements could be published)	ao@millennium-institute.org alexandre.caldas@un.org sandor.frigyik@un.org

9. UNCTAD: ASYCUDA

Description and rationale	ASYCUDA is a customs automation and capacity building programme delivered by UNCTAD. The programme brings IT solutions to improve customs clearance and accelerate customs processes and transit in a paperless environment, including for medical equipment. The programme allows for a number of administrative processes to be carried out through computers and online, replacing numerous face to face contacts and minimizing the use of paper. The ASYCUDA IT solution is designed in the context of developing countries, transition economies, LDCs, LLDCs and SIDS. Since the beginning of the COVID pandemic, many user countries have issued instructions to accelerate and reinforce the use of ASYCUDA to ensure business continuity and replace face to face interactions with online ones within the context of a 100% paperless environment.
When and where was it demonstrated?	Over 100 countries and territories run ASYCUDA to support their customs operations. ASYCUDA has evolved since the early 1980's mirroring technological progress and developments in IT. Its application now includes single windows that coordinate trade-related operations from numerous government agencies, as well as e-payment facilities, further cutting the needs for face to face interactions and use of paper.
Where was it used?	Over 100 developing countries and territories (see www.asycuda.org for details).
What were the results?	• Improved and faster customs clearance processes, boosting economic competitiveness from beneficiary developing countries • Increased revenues from custom tariffs and other trade related taxes for countries for beneficiary countries, providing additional budgetary resources to beneficiary developing countries • Increased transparency at customs, trade facilitation reforms • Reduced needs for face to face interactions through electronic exchange features • Reduced use of paper by implementing paperless trade-related processes, e-forms and exchange of electronic data between agencies.

Validation/endorsements	Many transition economies and developing countries, including LDCs, LLDCs and SIDS provide their own funds to implement ASYCUDA nationally, demonstrating ownership and their sense this is a national priority.
Approximate cost	Varies according to project size, scope, country etc.
Funding sought	
Contact details and further information (please specify, which elements could be published)	asycuda@unctad.org www.asycuda.org

10. FAO

Description and rationale	The project proposal is part of the Food and Agriculture Organization's response to reduce the impact of disruption to food systems due to COVID- 19. The proposal focuses on providing in vulnerable urban and peri-urban areas impacted by the pandemic in eight countries across the globe. The overall objective is to accelerate digital transformation by providing geospatial technologies in support to proven, affordable and scalable digital transformation technology solutions related to improved food systems. The ultimate goal of the proposal is to contribute to basic health functions through improved systems for vulnerable people impacted by the disruption of the food value chain. The novel coronavirus (COVID-19) is a virus that causes respiratory illness and has fast-rates of contagion. It was first identified at the end of 2019 and by March 2020, the World Health Organization (WHO) declared it a pandemic. In this context, FAO is aware that immediate priority is given to health systems response. In parallel, FAO is focusing on the need to maintaining healthy food systems and access to water resources as they are essential to containing the impacts of the pandemic on vulnerable populations. Maintaining healthy food value chains are essential to reducing collateral effects of COVID-19 by protecting livelihoods, and enabling access to food and water resources. As part of its priority work areas, FAO is supporting countries to address the pandemic's impacts on agri-food systems by scaling-up interventions to meet immediate food needs – support through digital transformation technologies is one of its support priority areas. The project proposal focuses on - at risk cities – that are densely populated and therefore can easily become hot spots for the spread of COVID-19 and that in parallel, can rapidly become food insecure due to either a disruption in the food chain or through immediate loss of income. The proposed project targets vulnerable cities in eight countries in: Africa, Latin America and the Caribbean, and Asia and the Pacific. The objective of the proposal is to identify different vulnerable situations, help local authorities gain a better understanding of context specific situations through digital transformation, and maximise

knowledge and experience sharing between countries (see Box 1.)1

Box 1. Selection Criteria

- Food crisis
- Hand in Hand Initiative countries (HiH)
- High population density
- Landlocked Developing States (LLDS)
- Small Island Developing States (SIDS)

The selection for the indicators were based on a series of criteria that make these selected areas vulnerable to shocks. Under these criteria, cities were selected in the below-listed countries (Box 2):

Box 2. Project Countries

Africa: Democratic Republic of Congo (food crisis), Nigeria (hig population density);

Latin America and the Caribbean: El Salvador (Non HIH), Haiti (SIDS)

Asia and Pacific: Indonesia (Non HIH), Pakistan (food crisis Bangladesh (food crisis), Vanuatu (SIDS).

The following text describes the proposed project outcome, outputs and activities.

Outcome: COVID-19 response plans in vulnerable cities have access to digital transformation in immediate service delivery through high spatial resolution geospatial information in support to improved water accessibility and food security for enhanced cities' resilience

Output 1: COVID response plans supported with improved digital transformation in immediate service delivery to save lives and build community/cities' resilience through geospatial information about urban and peri-urban vulnerability related to food security, clean water and sanitation

This Output will enhance digital transformation through innovative geo- spatial technologies to carry out a geo-spatial analysis to identify vulnerable households and/or people in selected cities in each of proposed countries. The project will work with the open data community, government partners and local administration authorities in the use of very high-resolution satellite imageries and updated information about access to food, clean water and sanitation. Vulnerability will be assessed and mapped, response plans will be supported with geospatial

	data and information (e.g. vulnerability, suitability, prioritization) for short and long term responses. **Activity 1.1**: Update geospatial data and information to enable digital transformation of key urban areas in the selected cities and countries (data collection, harmonization, preparation) using newly available high spatial resolution satellite images and cloud computing platforms e.g. GEE (https://earthengine.google.com/) and SEPAL (https://sepal.io/); **Activity 1.2**: Conduct an assessment on water accessibility, food security and map vulnerability areas in close collaboration with local authorities and the open data community; **Activity 1.3**: Disseminate information to relevant stakeholders (city council, private sector companies, government entities, local authorities and civil society organizations, etc.). ***Output 2: Local administration response plans supported with digital transformation innovative solutions prioritising the most vulnerable areas*** With the data obtained from Output 1, this Output has been designed to support local authorities design and prepare response plans to address their specific water accessibility and food security needs. The following activities have been panned out: **Activity 2.1**: Support local authorities in the preparation of response plans with the identified vulnerability data and information; **Activity 2.2**: Propose innovative solutions for data acquisition (e.g. mobile apps for water food, and other related identified needs as per the response plans), improved access to water (e.g. improved soil and water management including soil and water decontamination and remediation, enhanced access to water e.g. rainwater harvesting) and safe access to nutritious food (e.g. urban and peri-urban food production systems such as communal garden rooftops, peri-urban farming tool kits); **Activity 2.3**: Assess key solutions in support of national response plans. ***Output 3: Enhanced knowledge on resilient response plans in urban and peri-urban areas*** **Activity 3.1**: Enhance knowledge sharing on existing platforms (e,g. Governmental, UNs and others) through promotion south-south cooperation **Activity 3.2**: Promote local research and innovations on

	improved food security and water accessibility through improved public-private partnerships **Activity 3.3**: Document lessons learnt and recommendations in support to response plans for improved access to food and water in vulnerable areas **Timeframe: 2 years Budget: US$2 Million**
When and where was it demonstrated?	FAO's Land and Water Division (CBL) has the knowledge and expertise in digital transformation and has been using geo-spatial technologies, and has expertise in land and water management practices. CBL promotes the One Water One Health approach and integrates its knowledge to design tailor-made technical assistance for the countries in need of support. FAO's water programme is responding decisively to the needs of its member countries in key areas such as water quality and water scarcity while supporting an integrated food systems approach to all its interventions. More recently the Division has quickly responded to COVID- 19 needs by developing policy briefs (e.g. http://www.fao.org/3/ca8712en/ca8712en.pdf), technical reports, designing projects and partnering with other agencies to support the implementation of the Sustainable Development Goals (SDGs).
Where was it used?	Digital technology has been incorporated into FAOs work agenda to accelerate cities' resilience. FAO uses geospatial tools developed, and the organization has developed its own tools, which are in use in several countries where it provides technical assistance and by the geospatial community for land, water and agriculture monitoring. They are being used in a number of humanitarian response programs for safe access to fuel and energy, drought, flood and fire monitoring, forest monitoring, impact on agriculture production e.g. Locust crisis. FAO has more than thirty years' experience in the implementation of geo-spatial data. In addition, FAO's Land and Water Division's One Water One Health Initiative directly addresses water availability and quality issues and incorporates WASH. The Land and Water Division has been implementing project to enhance food security by increasing water use efficiency and making water more accessible.
What were the results?	Digital transformation has been enabled through in-country geospatial platforms are made operational and geospatial data and information used in support to

	national statistics, land use planning, land cover monitoring, water management, food security, as well as humanitarian response (early warning, impact assessment and recovery) among others. The One Water One Health Initiative works with the use of nonconventional waters in urban, peri-urban and rural areas.
Validation/endorsements	FAO is a specialized agency of the UN with specialized skills in agriculture and extensive experience in digital transformation in urban, peri-urban and rural settings in support of sustainable food systems.
Approximate cost	**US$2 Million**
Funding sought	US $2 Million
Contact details and further information (please specify, which elements could be published)	Sasha Koo Oshima, Deputy Director, Land and Water Division, FAO Sasha.Koo@fao.org ; CBL-Director@fao.org Dough Muchoney, Senior Officer, Land and Water Division, FAO Doug.Muchoney@fao.org

11. WFP: Humanitarian Access Project

Description and rationale	The "Humanitarian Access Project" aims to cut traffic and reduce the number of visitors to the world's biggest refugee camp, Cox's Bazaar in Bangladesh. With 860,000 refugees living in overcrowded conditions, physical distancing is difficult. After multiple coronavirus cases were confirmed in Bangladesh, access to the camps was severely restricted to mitigate the risk to Rohingya refugees. The Humanitarian Access Project is designed only to let authorized vehicles through. Initially, the Refugee Relief and Repatriation Commissioner would approve a list of vehicles each day. Using this list, local and national law enforcement agencies would manually check each vehicle to ensure access was approved, a process that created waiting times of up to three hours, leaving less time to deliver the humanitarian assistance needed in the camps. The Logistics Sector, the World Food Programme (WFP), and the Inter Sector Coordination Group (ISCG) came up with the Humanitarian Access Project to reduce waiting times and to make the process efficient. The project leverages processes previously developed for WFP's Building Blocks project, which allows authorities to digitize the entire approval and tracking process for entry using blockchain technology. Each organization and vehicle is given a digital identity that is encoded into a QR code. Authorities simply need to scan each QR code to validate the driver and let them through — this does away with the time-consuming hassle of juggling paperwork, putting workers at higher risk of transmitting COVID-19.
When and where was it demonstrated?	The Humanitarian Access Project was developed in April 2020, in the span of 48 hours, to help the Government regulate vehicles' access to the camps and for the humanitarian community to continue critical work.
Where was it used?	Cox's Bazaar refugee camp, Bangladesh
What were the results?	Previously, there were lines of cars up to five kilometres and it took five to 15 minutes per car to get through, but now it takes 15 to 30 seconds.

	At present, there are eight checkpoints where 13 WFP staff are crosschecking the vehicles alongside the Bangladeshi army and police.
Validation/endorsements	The system is currently in use in cooperation with local and national authorities.
Approximate cost	
Funding sought	
Contact details and further information	Mohammad Dabdab, Building Blocks Operations Manager at WFP: mohammad.dabdab@wfp.org

12. WFP: Grain ATM

Description and rationale	GrainATM is an automated dispensing machine to provide people with any-time access to the grains of their choice, quickly, hygienically and accurately. Typical dispensed grains include: wheat, maize, rice and soybeans. GrainATM allows people to get the exact amount of grains that they should receive, without any manual interference. WFP's digital SCOPE smartcards can be used for verification. Faced by the COVID-19 pandemic, GrainATM's potential to reduce face-to-face interactions while still providing access to rations could be a game-changer for WFP and other humanitarian agencies.
When and where was it demonstrated?	WFP's India Country Office. After having participated in a WFP Innovation Bootcamp in San Francisco in October 2019, the project is developing and testing six GrainATMs, providing a proof of concept for the Government of India to scale-up. The first prototype GrainATM has already been built and is currently being tested in a factory setting.
Where was it used?	India
What were the results?	The project is developing and testing six GrainATMs, providing a proof of concept for the Government of India to scale-up. The first prototype GrainATM has already been built and is currently being tested in a factory setting.
Validation/endorsements	Government of India has approved pilot project.
Approximate cost	
Funding sought	US$244,680
Contact details and further information	Team Lead: Ankit Sood, Head, Systems Reform Unit, WFP India Sponsor: Bishow Parajuli, Country Director, WFP India.

Technology Solutions from non-UN Entities

1. Epidemic Prediction Model

Technology	Organization	Continent
1.1 System Dynamics Simulation Model	System Dynamics Itlian Chapter (SYDIC)	Europe
1.2 Epidemic Prediction Technology	Alibaba Group	Asia
1.3 Six Stages & Nine Rates" model of COVID-19	FinTech4Good	North America

1.1 System Dynamics Simulation Model

Description and rationale	The current ways in which the Covid-19 pandemic is described, mostly publicly but also by some scientists, is not coherent with the true dynamics of most types of epidemics. Covid-19 makes non exception, apart from a particularly aggressive infectious rate, and for other characteristics which we could define as pertinent to the logistics of the disease. The idea is to show, through a systemic approach, and namely by means of a systems thinking description and through a system dynamics simulation model, the real dynamics of the variables of interest, their behaviour over time, and particularly of the following ones: -number of new infections x day (infection rate) -total number (stock) of infected people (including potential asymptomatic) from the beginning of the infection -number of deaths x day (death rate) -total number (stock) of deaths from the beginning of the infection -number of recovered x day (recovery rate) -total number (stock) of recovered from the beginning of the infection Rates and Stocks are most of the times misinterpreted, which provides for an unclear and confusing communication to the population. Also, the dynamics of recoveries as well as deaths is coherent with the expected behaviour if the infection, so in other words, there is no surprise (as instead happens in the news) that infections per day are first growing and then (apart from some stochastic fluctuations) decrease after the tipping point (typical of the rate, and not of a stock), in a “similar to a gaussian” curve and so is no surprise that recoveries per day and deaths per day are behaving similarly (but with different time lags and delays and with different magnitudes). So, by means of an SD-model (see example attached) we are able to simulate the way the pandemic behaves (not only globally, but most importantly at local level and with local parameters) and what can be the response to it, in terms of applied policies and the potential results coming from the application of those policies.
When and where was it demonstrated?	The System Dynamics Community (of which I am an officer of the Board of Directors and President of the Italian chapter) has been very active on this issue from the very beginning of the pandemic. The underlying general epidemics model (SIR —> Susceptible, Infected,

	Recovered) is pretty well known and established in the scientific literature and especially in system dynamics terms. The current models we have are reproducing the case of the Lombardy region in Italy with a high degree of fidelity.
Where was it used?	Of course, it is a very new model so there is yet no IT application behind it, rather it is a mathematical model which is being simulated in various simulation environments. Also, as the global situation is completely unprecedented over the last 100 years, it was not evidently possible to use it somewhere else. However, Bird Flu and Swine Fever cases allowed for an application of the SIR model widely, as well as the general concepts of system dynamics. https://www.sciencedirect.com/science/article/pii/S0167587717304452 https://proceedings.systemdynamics.org/2007/proceed/papers/ESKIC371.pdf https://www.hindawi.com/journals/complexity/2019/4161287/
What were the results?	Results show that by means of system dynamics (inherently based on differential equations but much more easy to communicate and understand) it was possible to recreate effectively the behaviour of the current epidemics in the Lombardy region and in other countries. This has allowed for investigating on possible response policies which will surely come handy in the next waves of infections, especially in the absence of a vaccine.
Validation/endorsements	Many scientists from the System Dynamics Society
Approximate cost	To be determined. An application to a specific case is sensitive to the acquisition of related data and of course would be time intensive for its tailoring and testing. We do believe, however, that the average cost would be in the range 100k-300k.
Funding sought	Any funding from the UN or other funding institutions to allow for an extensive application of these models.
Contact details and further information (please specify, which elements could be published)	Prof. Stefano Armenia (Eng., PhD, MBA) - s.armenia@unilink.it .Scientific Lead of the System Dynamics Group and the Modeling & Simulation Lab at Link Campus University, Rome .Policy Council Member and VP Chapters & SIGs of the System Dynamics Society (2019-2021)

	.President of SYDIC, the System Dynamics Italian Chapter (http://www.systemdynamics.it/) .Co-Editor in Chief of Kybernetes (Emerald-Insight) .Associate Editor of IJSS, the International Journal of Systems & Society (IGI Global) .Guest Editor of IJASS, JOS, SYSTEMS, AGSY

1.2 Epidemic Prediction Technology

Description and rationale	This technology can be used to predict the spread of COVID-19 and help decision makers evaluate the impact of various prevention and control measures on the development of the epidemic. Machine learning and deep learning are used to establish a modified SEIR model to predict the spreading trend of COVID-19 and evaluate the risk of infection increases of a specific region. Specifically, quarantined compartment in the model is added to reflect the common practices in most public health systems, on top of the susceptible, exposed, infectious and recovered compartments. The key parameters, such as transmissibility and death rate, are estimated from public government data and epidemiological statistics.
When and where was it demonstrated?	China January 2020 to present
Where was it used?	China
What were the results?	This technology for epidemic prediction is proven to achieve 98% prediction accuracy based on the data in China. This 98% is the averaged difference between predicted curve and existing data. We will forecast about 2 months basing on the hypothesis of current situation to see the curve peak or other features. Please be noted that any important change to the situation will have impact on curves. This algorithm model has been tested on 31 provincial data in China.
Validation/endorsements	Alibaba
Approximate cost	It is currently free for public research institutions
Funding sought	None
Contact details and further information (please specify, which elements could be published)	William Cheng longhai.cx@alibaba-inc.com All the information provided can be published

1.3 Six Stages & Nine Rates" model of COVID-19

Description and rationale	By collecting public information from hospital, transportation, community and some other related data in real-time, the project can iteratively optimize the prediction results and trend deduction in various dimensions based on the monitored real-time feedback information. And it can be displayed on big dashboard for a better insight. When necessary, information on protection and medical treatment can be pushed to the public and relevant institutions. In addition to monitoring and forecasting of epidemic, the project also provides intelligent detection distribution. By providing the most efficient detection strategies according to different stages of the epidemic, the project can distribute limited detection resources accurately to the target population, which can avoid big volume of waste and maximize coverage of High-risk groups to reduce the numbers of missed inspection cases. By then, this project will greatly enhance the capacity in different countries and regions for epidemic prevention and control.
When and where was it demonstrated?	The Axon big data team has built a "Six Stages & Nine Rates" model of COVID-19 and created PandemicMap a real-time dashboard for the prediction. It made an accurate prediction of the Chinese epidemic trend in January. On February 21st this prediction article has take the risk coefficients of South Korea as 2 and Italy as 5, and the total confirmed cases in Italy at that time was 3 confirmed cases. By clicking on the map area or the national flag PandemicMap can show the country's forecast numbers based on "Six Stages & Nine Rates" analysis. For now, the trend prediction charts and detailed data of Italy, Spain, Germany, France, the United States and the United Kingdom have been on line. http://www.axon.com.cn/PandemicMap/ http://www.axon.com.cn/PandemicMap/en
Where was it used?	Nanjing / Italy / Germany / France / Britain / Turkey / Philippines
What were the results?	1. Accurately predicted the outbreak and peak time of Italy / Germany / France / United States / Brazil / Turkey 2. Provided the thematic forecast analysis report for more than 30 countries including Italy / Brazil / Philippines, which was highly recognized by the local government and relevant public welfare organizations

Validation/endorsements	China Development Research Foundation, East-West Charity Forum, Nanjing Government
Contact	zxc@fintech4good.co

2. Protective equipment

Technology	Organization	Continent
2.1 Respirator decontaminate machine	OCM Canada Medical Group Inc.	North America
2.2 Organic cotton “surgical-type” masks	dba PolygenX Idea Corporation	North America
2.3 Breath4Life prototype respirator	Breath4Life	Europe
2.4 M-steryl	AMB Ecosteryl	Europe
2.5 Validation techniques of disinfection products and strategies	Eurecat	Europe
2.6 FreeBreath reusable protective mask	Eurecat	Europe
2.7 Foot Pedal Operated Hand Washing System	Woxsan Technology	Africa

2.1 Respirator decontaminate machine

Description and rationale	We are developing a new product for hospitals that can allow the reusing of medical masks. The respirator decontaminate machine works by vapor phase hydrogen peroxide and UV light to sterilize biological contaminants such as SARS-CoV-2. Acting as a humidifier in a way, we are able to create a scalable solution to various hospitals and care facilities. Processing volume is scalable and depends on the type of machine, which can vary between 1-1000 face masks per cleaning process/per machine.
When and where was it demonstrated?	Similar function with container decontamination unit in Ohio via Battelle https://abc6onyourside.com/news/local/battelle-machine-can-clean-80000-surgical-masks-per-day-still-awaiting-fda-approval
Where was it used?	It is to be used in hospitals, care facilities, and anywhere needed.
What were the results?	With the use of a decontamination unit, Face Masks (including surgical masks, N95, KN95) can be reusable without damaging protection performance after decontamination. This would lower the need for N95 mask import considerably.
Validation/endorsements	FLUX BIOSCIENCE (Magnet portfolio company, POC for small molecule) HealthTensor (Magnet portfolio company, AI for Clinical Diagnosis) INNFOS (Magnet portfolio company, Robotic Technology, acquired by Cloudminds Inc, providing service robots in hospitals for COVID-19 treatment last few months in China) 16 Years of Experience designing, manufacturing, characterizing advanced materials/novel devices, and their application in biomedical. (Dr. Zhao) Published Researcher in high impact journals including: Nature nanotechnology, Nature communications, Small, ACS nano, Chemistry–A European Journal (Dr. Zhao) 8+ Years in Advanced Manufacturing, Freight Forwarding, and Warehousing in Richmond, BC. (OCM CANADA MEDICAL GROUP INC.)

Approximate cost	Not Available (Need more information from end user) Initial questions that we need to understand before pricing: 1. How many masks are needed to be processed daily 2. How long is the preferred duration process
Funding sought	$0 for our initial stages. We are currently backed by Magnet Portfolio Company. Once we have the ideal machine type, and passed all required testing and certifications, we are able to accept pre-orders.
Contact details and further information (please specify, which elements could be published) Company name, contact name, and email can be published	OCM Canada Medical Group Inc. Nick Bolton 7783206476 info@oneclickmasks.com

2.2 Organic cotton “surgical-type” masks

Description and rationale	Description Researchers have identified proteins that may be useful in COVID-19 treatment. Capacity is necessary to deliver drug treatments economically and efficiently to densely urbanized populations and rural, remote communities. Low cost delivery agents can be especially useful in less developed countries (LDCs) that have inequitable access to basic sanitation, nutrition and medication and in areas of urban crowding, homeless or vulnerable populations. Current thinking about delivery modalities for CRISPR-based treatments includes the use of ventila- tor-type aids (neubulizers). Neubulizers require plastic-based, injection mold manufacturing and supply chain management for distribution, as well as access to a stable electrical supply and training for users. WHO has estimated 70% of medical devices designed for developed countries are unusable in LDCs. An inexpensive alternative is proposed that would consist of medication-infused, non-bleached organic cotton “surgical-type” masks that patients could place over their mouth and nose to inhale nanoparticulate-based treatments. Rationale Access to invasive (mechanical) ventilators for critically ill COVID-19 patients with acute respiratory distress syndrome (ARDS) is limited even in developed countries, as are trained health care personnel to manage and monitor the devices. This time-to-manufacture, training curve and personnel crunch is heightened in LDCs that have insecure health care infrastructures and among densely crowded urban communities and vulnerable populations. While mechanical ventilation is assistive for ARDS, researchers have identified that it can cause or worsen lung injury, contributing to morbidity and mortality. Immune system hyper-responsiveness to the COVID-19 virus may cause lesions in lung tissue and consequent stiffening of the lungs. Once cytokines proliferate in an infected patients’ lungs, their blood vessels may become more permeable, causing fluid to accrete in the alveoli and reducing blood oxgenation. This cytokine overload and comprised ability to breathe efficiently due to ARDS can give rise to multi-organ failure, resulting in mortality. The goal of nanoparticulate-based treatments is to reduce mortality rates by intervening early to prevent the development of

	ARDS. Early stage treatment is essential to improving recovery rates.
When and where was it demonstrated?	The concept is untested. However, chemical infusion of nanoparticulates on cotton gauze was successfully achieved in 2008 by the U.S. Naval Medical Research Centre at Silver Spring, ND, in partnership with Z-Medica (www.z-medica.com).
Where was it used?	No applications have occurred to date. Comparisons are made to transdermal drug treatments, which have been in use since 1979 in the United States and are a Federal Drug Administration approved treatment modality. In differentiation to transdermal modalities, which have proven challenging for DNA-based treatments, the proposed concept is an inhalant that delivers treatment directly to the lungs instead of via the bloodstream.
What were the results?	No results are available due to the treatment modality being in the initiation phase. Anticipated outcomes are: Easier to use than a neubulizer, requiring no training or access to stable electricity. Uses readily accessible technologies to manufacture a proven medical product (cotton surgical masks). Packs flat for shipping, reducing packaging waste and transportation and storage costs. Can be distributed by community partners (village councillors, midwives, local volunteers and aid agencies), relieving the burden on health care practitioners. Although surgical masks may be considered medical waste, they are potentially more recyclable than plastic waste associated with neubulizers and inhalers. Has minimal economic value, making it less valuable as a medical asset for theft or resale.
Validation/endorsements	No endorsements are available due to the treatment modality being in the initiation phase. As a general commentary on its potential efficacy: • Use of mechanical ventilators may induce or increase damage to lung health. Early stage treatments are needed that reduce reliance on mechical ventilators. Panic over access to COVID-19 testing and treatment is disruptive to delivery of health care services, supply chain management and business recovery. It contrib- utes to civil unrest, which is exacerbated in countries with unstable political regimes. A low cost treatment that reduces dependence on later-stage, potentially inaccessible medical devices can assist in reassuring patients they have access to treatment.

	Public health and safety risks are increased if public service delivery is perceived to be vulnerable. Failures of health care delivery systems and high rates of illness or death among public servants expose disadvantaged groups such as homeless people, migrant workers and incarcerated offenders to infection and can contribute to an upsurge in criminal activity. • COVID-19 has world-wide economic repercussions that could compromise the financial willingness of developed countries and private donors to assist LDCs. Widescale distribution of an easy to use device for treatment management could serve to reduce the socioeconomic impacts of COVID-19.
Approximate cost	Cotton surgical masks cost between $0.68 and $2.44 CAD per unit. Medication infusion costs are unknown, as the treatment is in the initiation phase.
Funding sought already and challenges for scaling up	A licensing agreement is sought with a medical device manufacturer able to develop and bring the concept to market. This could be achieved through partnering with a research partner and/or private sector manufacturer.
Contact details and further information (please specify, which elements could be published)	Linda M. Mueller, CEO dba PolygenX Idea Corporation 1 250 203-5042 lin.m.mueller@gmail.com Endnotes 1 Stephanie Pfaender et al, LY6E impairs coronavirus fusion and confers immune control of viral disease (7 Mar 2020), bioRxiv. doi: https://doi.org/10.1101/2020.03.05.979260. 2 Tim Abbott et al, Development of CRISPR as a pro- phylactic strategy to combat novel coronavirus and influenza (14 Mar 2020), bioRxiv. doi: https://doi. org/10.1101/2020.03.13.991307. 3 Staff, “Medical Equipment in Developing Nations” (14 Jun 2014), Borgen Magazine, accessed April 12, 2020, https:// www.borgenmagazine.com/medical-equipment-develop- ing-nations/. 4 Robert A. Malkin, “Barriers for medical devices for the developing world”, Expert Rev. Med. Devices 4 (6) (2007), accessed April 12, 2020, https://www.tandfonline.com/ doi/pdf/10.1586/17434440.4.6.759. 5 Lorraine N Tremblay et al, “Ventilator-induced lung injury: from the bench to the bedside”. Applied Physiology in Intensive Care Medicine, January 2006, 357-366. doi: 10.1007/3-540-37363-2. 6 Aaron Rowe, “Nanoparticules Help Gauze Stop Gushing

	Wounds", (24 Apr 2008) Wired, accessed April 13, 2020, https://www.wired.com/2008/04/nanoparticles-help- gauze-stop-gushing-wounds. 7 Mark R. Prausnitz and Robert Langer, "Transdermal drug delivery", Nat Biotechnol. 2008 Nov; 26(11): 1261–1268. doi: 10.1038/nbt.1504. 8 Pfaender. 9 Glenn Steinberg, COVID-19: How to forge a supply chain that withstands severe shocks (2 Apr 2020), EY Global, accessed April 12, 2020, https://www.ey.com/en_gl/advi- sory/how-to-forge-a-supply-chain-that-withstands-severe- shocks. 10 UNDOC, COVID-19 preparedness and responses in pris- ons (31 Mar 2020), accessed April 12, 2020, https://www.unodc.org/documents/justice-and-prison-reform/UNO-DC_Position_paper_COVID-19_in_prisons.pdf. 11 John Bluedorn, Gita Gopinath, and Damiano Sandri, An Early View of the Economic Impact of the Pandemic in 5 Charts (6 Apr 2020), IMF, accessed April 12, 2020: https://blogs.imf.org/2020/04/06/an-early-view-of-the-economic-impact-of-the-pandemic-in-5-charts/. 12 United Nations, Shared Responsibility, Global Solidarity: Responding to the socio-economic Impacts of COVID-19 (March 2020), accessed April 12, 2020: https://www.un- .org/sites/un2.un.org/files/sg_report_socio-economic_im- pact_of_covid19.pdf.

2.3 Breath4Life

Description and rationale	**"Breath4Life" is a prototype respirator** that was designed and tested at the OpenHub of UCL Louvain in Belgium. Its objective is **to provide a simplified model of respirator to Belgian and foreign hospitals in response to shortages**. Numerous tests have been carried out over the last few weeks on successive iterations of the prototype, which has reached sufficient maturity and reliability. In the meantime, the slow improvement of the situation in Belgium has enabled our hospitals to meet the demand for intensive care with the available equipment, making these emergency respirators less indispensable for our country for the time being. Unfortunately, the situation is not as encouraging in other countries, where the need for emergency respirators is acute. Some of them do not have artificial respirators available. Breath4Life volunteers have therefore taken the initiative to start manufacturing an industrial pre-series of **twenty-five devices that will be made available to countries in need** to adapt them to local conditions and obtain approval on site. The **Open Source approach** will enable local partners to take ownership of the project and adapt it more easily to the reality of their field, while benefiting from the ongoing development of the project.
When and where was it demonstrated?	It was first successfully tested in a UCLouvain creative lab on Wednesday 24 March 2020, on an artificial lung.
Where was it used?	Several tests have been run successfully in labs in Belgium.
What were the results?	Several tests have been run successfully in labs in Belgium.
Validation/endorsements	In the process of being validated by the Agence fédérale des médicaments et des produits de santé (AFMPS/FAGG) in Belgium. The Open Source approach to building this respirator makes it available to any country and thus could be validated anywhere.
Approximate cost	25 prototypes are being made available for free and the conception plans are open source.
Funding sought	No specific funding sought although donation are welcome to support scientific research: https://uclouvain.be/fr/chercher/fondation-louvain/actualites/coronavirus-soutenez-la-recherche.html
Contact details and further information	Vassil Kolarov, Conseiller scientifique, v.kolarov@wbi.be ; geneve@delwalbru.be

(please specify, which elements could be published)	Régis Lomba, OpenHub de l'UCLouvain, regis.lomba@uclouvain.be https://uclouvain.be/fr/decouvrir/presse/actualites/breath4life-le-nouveau-respirateur-concu-par-l-uclouvain.html https://uclouvain.be/fr/chercher/fondation-louvain/actualites/breath4life-un-respirateur-open-source-simplifie.html

2.4 M-steryl

Description and rationale	The first-line healthcare personnel needs masks and PPE for their protection. There are inconveniences associated with this: **a lack of supply, a significant cost and excess waste due to these items being used only once**. Indeed, in the midst of the Covid-19 health crisis, medical waste doubled on average. Even in Belgium, **medical waste treatment systems have been overloaded**. A sustainable solution would be to enable healthcare staff to decontaminate the masks and reuse them several times. This track has been followed since March 2020 by **the Walloon Government who encouraged sustainable development solutions** to be developed through different selected companies and research centres to test decontamination possibilities. AMB Ecosteryl (Mons, Belgium) succeeded all the scientific test requirements, and worked out a technological solution to decontaminate masks and coveralls under dry heat. This machine is called **"M-steryl" and it can decontaminate 2000 surgical masks per day** or 1400 KN95 or 860 FFP2 masks or 150 coveralls (single-used personal protective clothings). It is an economical, ecological solution that could provide all the scientific guarantees of decontamination.
When and where was it demonstrated?	April-May 2020, demonstrated in several cities in French-speaking Belgium (Liège, Mons).
Where was it used?	The University Hospital Center Ambroise Paré, the biggest hospital in the city of Mons – Belgium, already acquired the first machine.
What were the results?	2000 surgical masks can be decontaminated per day or 1400 KN95 or 860 FFP2 masks or 150 coveralls.
Validation/endorsements	Tests were analysed by Centexbel in Belgium. Centexbel is a worldwide acknowledged expert in the evaluation of protective clothing against infectious diseases.
Approximate cost	The machine costs 6,000 euros.
Funding sought	No funding sought.
Contact details and further information (please specify, which	Vassil Kolarov, Conseiller scientifique, v.kolarov@wbi.be ; geneve@delwalbru.be https://www.wallonie.be/fr/actualites/covid-19-production-et-decontamination-de-masques

elements could be published)	http://ecosteryl.com/m-steryl-a-covid-19-decontamination-machine-of-masks-surgical-and-ffp2/

2.5 **validation techniques of disinfection products**

Description and rationale	The service consists in **validation techniques of disinfection products and strategies.** Briefly, a surrogate microorganism (virus, bacteria, fungi, etc.) is selected considering its resistance to the disinfection method applied compared to the target microorganism (i.e. Sars-CoV-2). Surfaces or objects to be disinfected are inoculated with a known concentration of the surrogate microorganism, then the disinfection methodology is applied. Quantification of viable microorganisms after disinfection allows for the evaluation of the disinfection degree in log-reduction units. Positive and negative controls assure the validity of the results.
When and where was it demonstrated?	It has been successfully applied at Eurecat's premises in Manresa, Spain during the months of April and May 2020 for a variety of disinfection systems, such as respirator masks, ironing systems, etc.
Where was it used?	It has been used by Eurecat to evaluate performance of disinfection products/strategies developed by various Spanish companies.
What were the results?	Results allowed to quantify the log-reduction of microorganisms for a variety of products, ranging from 3 to 9 log.
Validation/endorsements	**E. Vila Projects, Spain.** https://www.lavanguardia.com/vida/20200419/485828226 09/coronavirus-ciencia-valida-sistema-desinfeccion-mascarillas-ultravioleta.html Corporate web: https://www.evilaprojects.com/en/ **B&B Trends, Spain.** https://www.europapress.es/catalunya/noticia-bb-trends-fabrica-plancha-desactiva-coronavirus-cualquier-tejido-20200509142520.html Corporate web: https://www.bbtrends.es/en/
Approximate cost	From 10.000€ to 15.000€; this price covers inoculation of two surrogate microorganisms in 5 several points/surfaces to be disinfected. Implementation of the disinfection process and further analysis of the viable microorganisms via culture techniques. Cost includes three replicates of each sample and positive/negative samples for quality assurance. Certainly, the price is indicative and varies in particular depending on the microorganism and number of samples

	evaluated. A personalized budget can be developed upon identified necessities and agreement on specifications.
Funding sought	Support for validation of other systems, especially those developed for vulnerable people or by NGOs
Contact details and further information (please specify, which elements could be published)	Fundació Eurecat Dr. Xavier Martinez-Lladó Address: Plaça de la Ciència, 2. 08242 Manresa. Spain. E-mail and Skype: xavier.martinez@eurecat.org Copy to Mrs. Grabenbauer-Nagl: gra@eurecat.org

2.6 **FreeBreath reusable protective mask**

Description and rationale	**FreeBreath reusable protective mask** Nowadays, there is a huge demand worldwide for Individual Protection Equipment due to the Covid-19 emergence. We need to produce the equipment and materials locally to ensure its supply, as at the same time we care about cost and material efficiency. This project addresses the **production of a modular adaptable mask that can be easily produced** for different providers in each country. The mask can be produced by 3D-printing or injection moulding with replaceable filtration cartridge and exhalation valve. This mask can adapt to different filtration (FFP2 and FFP3) and can be supplied very quickly to the hospitals. We work on to further development of the filtration cartridge and its testing. Our foremost priority now are the professionals in the healthcare centers who must be in close contact with patients admitted by COVID19.
When and where was it demonstrated?	It has been **successfully designed, developed and tested** by Eurecat in Spain during the months of March and April 2020.
Where was it used?	It has been used by Eurecat team and also tested by professionals in contact with the virus as emergency staff.
What were the results?	Results is a protective mask with a very fast time-to-market, outstanding time of use and reusability and significantly lower environmental impact than currently common, available masks.
Validation/endorsements	CORFO, Chilean Economic Development Agency: https://www.youtube.com/watch?v=QLgSf7mvD8U Comberplast, Chilean manufacturer: https://www.capital.cl/comberplast-en-modo-covid-crea-escudos-reutilizables/ corporate web: www.comberplast.cl Further reference contacts upon request: Institut Català de Salut - Hospital Germans Trias i Pujol, Spain. *Catalan Health Institute – Germans Trias i Pujol Hospital* http://www.hospitalgermanstrias.cat/web/guest

	COMG Col·legi Oficial de Metges de Girona, Spain. *Union of Physicians, Girona/Spain*. https://www.comg.cat/ca
Approximate cost	Cost example of the current model of 1 mask of significant longevity and reusability; price can vary upon production capacities and customization. Mask cost：25,00 € Cartridge cost：12,00 € **Total cost per mask：37,00 €**
Funding sought	Production and commercial exploitation capacities needed; licencing agreements. Financing for development of further variations, customization or adaptions for further applications can be sought.
Contact details and further information (please specify, which elements could be published)	Fundació Eurecat Irene Ràfols Ribas Address: Av. Universitat Autonoma, 23 08290 Cerdanyola del Vallès. Spain. E-mail and Skype: irene.rafols@eurecat.org Copy to Mrs. Grabenbauer-Nagl: gra@eurecat.org

2.7 Foot Pedal Operated Hand Washing System

Description and rationale	Foot Pedal Operated Hand Washing System for Vulnerable Communities in Uganda We propose to design and install improved, low cost Foot Pedal Operated Hand Washing System consisting of Soap, Water and Sanitizer Dispensers for the vulnerable communities in Uganda. The system will be installed in over-crowded community market places, public bus and commuter parks, schools, universities, health centres, street food vending points, places of worship, sports and entertainment venues, and public leisure parks among others. These places usually contain great number of vulnerable population who meet and socialize hence, making them prone to the exposure to COVID-19 and other viral diseases transmitted through body fluids from infected persons. According to the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO) and Health Ministries across the world including Uganda, keeping hands clean is one of the most important steps we can take to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean, running water. Hands are the main pathways of germ transmission and its hygiene is therefore the most important measure to avoid the transmission of harmful germs However, the current hand washing systems used in Uganda by the community are Hand Operated which makes it easy for Cross-Transmission of germs from one infected person to another since they all have to touch the water taps and soap with their hands. For this reason we propose to automate the process with Simple Mechanical Foot Pedal Operated System that does not require electricity. It can be installed and used by remote Off-Grid Communities who do not have access to electricity. The system is also easy to maintain and will be made using locally available materials.

When and where was it demonstrated?	Similar foot pedal operated hand washing systems have already been setup in countries like South Africa, India, Nepal among others and touchless commercial hand sanitizer dispensers are already in existence in many countries, however not commonly used in Uganda. In India for example Special Foot Operating Hand Washing Kiosks are installed in Railway Stations and Grain Markets to address CIVID-19 cross- transmission from per to per through hand contacts. Its also used in large scale food production factories and some high risk biological science laboratories.
Where was it used?	South Africa, India, Nepal, Commercial Food Production Factories, High Risk Biological Science Laboratories among others
What were the results?	Hand hygiene has many health benefits hand washing with soap is life-saving. The most cost-effective public health intervention, it also protects people from life-threatening illnesses such as cholera, other diarrhoeal diseases, pneumonia and intestinal worms. It has been linked to: • 16–23% reduction in incidence of acute respiratory infection • 50% reduction in pneumonia • Substantial reduction in neonatal infections • Up to 48% reduction in risk of endemic diarrhoea (reference 1; reference 2). Infection-related infant deaths could be reduced by 27% by improving hand washing practices in healthcare facilities, and a further 40% by hand washing in the postnatal period.
Validation/endorsements	According to a report by WaterAid, availability of hand washing facilities in low- and middle- income countries is poor. Globally, 40% of households still don't have hand washing facilities with soap and water, and just 19% of people wash their hands with soap after visiting restrooms. Almost half of healthcare facilities (43%) lack basic hand washing facilities with soap and water,

	and nearly half of schools (47%) in developing countries lack hand washing facilities. This makes good hand hygiene impossible for millions of people, contributes to the spread of infections and makes tackling pandemic very difficult.
Approximate cost	Our project approximate cost is US Dollars 50,000 to be used for designing and building 100 durable high quality hand washing system involving portable water tanks, its stands, hand washing sink system and transport and communication facilitations during the project.
Funding sought	We sought about US Dollars 30,000 or LESS in kind support to enable us to build 60 durable and high quality system for our vulnerable communities such as markets, schools, health centers, universities etc.
Contact details and further information (please specify, which elements could be published)	EZABO BARON WOXSAN TECHNOLOGY Kampala, Uganda Email: ezabobaron@outlook.com

3. COVID-19 diagnostic technology

Technology	Organization	Continent
3.1 IgA/IgM/IgG rapid test kits	Connected Things Scientific Inc.	North America
3.2 iAMP PCR Kit	CoVelocity	Europe
3.3 diagnosis technique	Namur University, Belgium	Europe

3.1 IgA/IgM/IgG rapid test kits

Description and rationale	Diagnosis of COVID-19 is crucial for disease treatment and control. Knowing that significant portions of the population will not present any signs of COVID-19 infection is likely to spread fast and silently. The Connected Things Scientific Inc. IgA/IgM/IgG rapid test offers simultaneous anti-COVID-19-IgG and -IgM+IgA antibody detection that is highly sensitive (90%) and specific (93.5%) from one drop of blood. IgM is the first antibody to be produced in the body in response to an infection and when present in high numbers, indicates a current or very recent infection. IgA antibodies appear in blood almost a week after IgM and stays several days longer than IgM in the blood. IgG antibodies take longer to produce but last longer. The IgA/IgM/IgG RT kit can assist in early diagnosis of COVID-19, but most importantly is very useful in screening asymptomatic individuals. Our proprietary IgA/IgM/IgG test utilizes an Antibody Assay to detect antibodies which other test do not. Many of the limitations facing other antibody tests are a result of their reliance on IgM/IgG antibodies. Ours is the first and only antibody test to include IgA and analyze a full humoral immune response profile, providing an accurate timeline of infection, an accurate date of initial exposure, current infection status, as well as whether a previously infected person has recovered. This can be discerned based on the body's natural response timeline, in when these mechanisms are deployed. Not only is our test-kit far superior to existing antibody tests, it has a higher efficacy and accuracy than PCR tests (Ours is 93.5%). Existing PCR tests may claim close to 90% efficacy, however, this is untrue as it is based on false testing criterion, as this has bean measured based on their ability to detect known viral samples, so the measurement is based on test-failure rate, not test limitations. Physical limitations of PCR swab tests mean many unknown infections may in fact go unnoticed and undetected, lowering their efficacy to 70% or less, as they are only capable of detecting infections in the upper respiratory tract, whereas most COVID-19 infections affect the lower respiratory tract and lungs. Utilizing an assay from blood samples, our test does not have this point of failure.

When and where was it demonstrated?	Evaluation of the sensitivity of the test kits was performed by the Centers for Disease Control and Prevention in China (CDC China) and also internally. Connected Things Scientific offered IgA/IgM/IgG rapid tests kits to CDC China as an independent external evaluation organization. In the CDC China laboratory, Connected Things Scientific test kits were compared with another rapid test kit of a similar kind which is accepted and used by the Chinese authorities as reference test kit. Blood serum of 59 clinically confirmed SARS-CoV-2 patients which were positive from the reference rapid test kits were used to evaluate the sensitivity of the tests. Due to CDC China limitations and heavy workload, the organization was only capable of testing the positive cases and they could not perform the tests on negative samples as control. Therefore, another set of evaluations were planned and conducted in the quality control laboratory of ANTAI Co. Blood plasma samples from 112 clinically confirmed COVID-19 patients and 200 randomly selected control samples were obtained from CDC China for use in the laboratory under the supervision of Connected Things Scientific. Product Specificity Test: 200 randomly selected control samples which were obtained from CDC China, were tested using Connected Things Scientific COVID-19 IgA/IgM/IgG RT kits. The number of false positive cases were recorded and the percentage of negative results was calculated as product specificity. Asymptomatic Population Screening: 218 healthy-looking volunteers were screened in different countries (Belgium, China, Germany, Iran, Turkey) using the Connected Things Scientific rapid tests. The number of positive cases were recorded.
Where was it used?	Belgium, China, Germany, Iran, Turkey
What were the results?	Product Sensitivity Test: In the test group, which was evaluated by CDC China, Connected Things Scientific test kits were able detect 53 samples out of 59 (90%) which would be either or both anti-COVID-19 IgM+IgA (T1) or IgG (T2) positive. The detection rate of the test kit was 26 of 59 (44.1%) in

	the T1 group and 51 of 59 (86.4%) in the T2 group. The internal evaluation demonstrated slightly different results. The results showed that 75 out of 120 samples (62.5%) were positive in the T1 group and 99 out of 120 (82.5%) were positive in the T2 group. In general, 114 samples out of 120 were positive either in T1 or T2 or both of the T1 and T2 groups indicating 95% sensitivity of the IgA/IgM/IgG RT kits. Product Specificity Test: 6.5 % (n=13) of the samples in the negative control group (n=200) showed false-positive either in T1 (3.5%, n=7) or T2 (3%, n=6) groups of which none showed false positive for both of IgG and IgM+IgA at the same time. With a specificity of 93.5% the test shows a high rule disease in ratio. Asymptomatic Population Screening: From 208 asymptomatic and healthy-looking individuals in the age range of 15 to 63 years old who were tested using the Connected things Scientific rapid test, 9 showed positive IgM+IgA (4,3 %), 14 had positive IgG (6.3 %) and 12 showed both IgM+IgA and IgG positive (5.76%). In another similar study 32 doctors and nurses who were in direct contact with COVID-19 infected patients, 13 had positive results.
Validation/endorsements	Evaluated by CDC China
Approximate cost	The actual cost of manufacture: $7.50/ kit
Funding sought	$4,200,000
Contact details and further information (please specify, which elements could be published)	mkeikha@connectedthings.ca mahsa@ct-scientific.ca +17782514550 www.ct-scientific.ca

3.2 iAMP PCR Kit

Description and rationale	CoVelocity can offer two approaches to screening and triage: a PCR kit set apart from others in that it needs no RNA purification, and an antibody lateral flow assay that enables point of care testing for antibodies in 20 minutes or less. CoVelocity's iAMP PCR Kit simplifies the screening process by removing two key bottlenecks: the viral medium (UTM), and RNA purification. By enabling labs to go from sample-to-result in less than an hour -- and at large batches from 1-382 tests at a time depending on the number of the RT-PCR wells available -- the iAMP PCR kit is ideal for both ramping up mass screening as well as smaller batch, rapid testing in 16 or 32 well machines in rural clinics and low-resource settings. In comparison, large batch tests by Roche or Abbott can take 3.5 - 8 hours to process 400 samples, and small batch tests such as Abbott's ID Now or Cepheid's Xpress can only do 1-4 samples every 15 minutes. CoVelocity's iAMP has the best of both worlds: high throughput potential and low-cost of rapid diagnosis. Similarly, CoVelocity's COVID-RAPID antibody test enables point-of-care testing for past infection and the existence of antibodies, enabling healthcare providers and members of society to quickly assess if they may have already recovered from the virus without noticeable symptoms, and are therefore at a low enough risk to enable them to return to work.
When and where was it demonstrated?	Both the PCR and the Antibody Assays have been validated by 3rd parties. The PCR test has been validated at Stanford University Hospital, Dartmouth, and Wisconsin Medical; the Assay has been validated at Leuven in Belgium and INSERM European Laboratory (French National Institute for Health and Medical Research).
Where was it used?	The PCR and Antibody kits were used in China, Europe, and the United States for validation and testing purposes. They are both on the verge of being commercially available.
What were the results?	The PCR test showed 100% concordance with the CDC test, in under 1 hour from sample collection to processing. The Antibody test showed the following results in Belgium and Switzerland:

<table>
<tr><td></td><td>
<table>
<tr><th></th><th colspan="2">Percent of People Testing Positive</th></tr>
<tr><th>Days symptomatic</th><th>Belgium</th><th>Switzerland</th></tr>
<tr><td>Covid Day 0-6</td><td>28%</td><td>20%</td></tr>
<tr><td>Covid Day 7-11</td><td>62%</td><td>60%</td></tr>
<tr><td>Covid Day 12 and beyond</td><td>100%</td><td>95%</td></tr>
<tr><td>Sensitivity</td><td>60%</td><td>90%</td></tr>
<tr><td>Specificity</td><td>97%</td><td>100%</td></tr>
</table>
</td></tr>
<tr><td>Validation/endorsements</td><td>Dartmouth University, Wisconsin Medical, Stanford University, University of Leuven (National Reference Center for Respiratory Pathogens), INSERM European Laboratory (French National Institute for Health and Medical Research)</td></tr>
<tr><td>Approximate cost</td><td>Prices for the PCR and the Antibody test are tiered by resource setting, to balance affordability and sustainability. The PCR test ranges from $20 - $36 per kit, and the Antibody test ranges from $12 - $20 per test.</td></tr>
<tr><td>Funding sought</td><td>$2.6M in an inventory loan to build up stock for fulfillment</td></tr>
<tr><td>Contact details and further information (please specify, which elements could be published</td><td>screening@covelocity.health</td></tr>
</table>

3.3 **diagnosis technique and a new working method**

Description and rationale	Namur University in Belgium developed a **diagnosis technique** and a new working method that **works even with the shortage of reagents.** The technique allows more diagnosis to be made, in support of reference laboratories. **This technique can be implemented in laboratories all over the world**. Its implementation depends on the chemistry. This RNA extraction protocol eliminates the need for scarce reagents in order to increase the capacity of COVID-19 tests. In Belgium it has received approval from the Federal Agency for Medicines and Health Products (FAMHP). The method can be implemented in the context of a molecular biology research laboratory to be used for diagnostic purposes on clinical samples. **It requires few technological developments** and makes it possible to overcome the shortage of reagents or the availability of automated systems. However, it is necessary to have access to certain equipment and logistical means, which are well described in the protocol. **The protocol can be shared with any organization interested** in setting it up to help slow down the progression of the disease.
When and where was it demonstrated?	Demonstrated in Namur, Belgium, scientific paper from 26 March 2020.
Where was it used?	In Belgium.
What were the results?	Increasing testing capacity in a given country.
Validation/endorsements	Validated by the Federal Agency for Medicines and Health Products (FAMHP) in Belgium.
Approximate cost	Cost not mentioned in the study, although the aim is to do with the means already available in most labs, which reduces costs of diagnosis.
Funding sought	None
Contact details and further information (please specify, which elements could be published)	Vassil Kolarov, Conseiller scientifique, v.kolarov@wbi.be ; geneve@delwalbru.be And corresponding authors : damien.coupeau@unamur.be , benoit.muylkens@unamur.be, nicolas.gillet@unamur.be **See publication in attachment** for additional information on the protocol described. As well as this press article : https://www.rtbf.be/info/regions/detail_l-unamur-presente-une-nouvelle-technique-pour-diagnostiquer-le-

	covid-19-nous-pourrions-realiser-500-tests-par-jour-rien-qu-a-namur?id=10460208

4. Disease analysis and drug design technology

Technology	Organization	Continent
4.1 Alibaba CT Image Analytics for COVID-19	Alibaba Group	Asia
4.2 Alibaba Whole Genome Sequencing Analysis for COVID-19	Alibaba Group	Asia
4.3 AI-Assisted diagnostic system for COVID-19 Pneumonia based on Chest X-ray and CT Images	Guangzhou Regenerative Medicine and Health Guangdong Laboratory	Asia
4.4 Database to classify normal, viral and bacterial pneumonia	Qatar University	Asia
4.5 Alibaba Elastic High Performance Computing Technology for AI-driven drug design and bioinformatics metatranscriptomics	Alibaba Group	Asia
4.6 Computational Modelling, Screening and Molecular Dynamics Analysis	Tech Mahindra	Asia
4.7 Human derived monoclonal antibodies (HD-mAbs)	Totient	Europe
4.8 Covid-19 respiratory system pane	FullDNA	South America

4.1 Alibaba CT Image Analytics for COVID-19

Description and rationale	This technology for CT image analysis, powered by deep learning algorithms, was trained on 5000 CT volumes and has been tested in hospitals throughout China. The process of CT Image Analysis training includes training and analyzing. It learns the differences between COVID-19 pneumonia, common pneumonia, and other situations. It is able to predict the probability of COVID-19 pneumonia and common pneumonia based on the input CT images. This CT Image Analysis technology can also output the lesion masks and affected lung volume ratio, helping doctors to effectively measure the development or treatment of COVID-19 patients. The service is cloud-based and can be deployed within three working days.
When and where was it demonstrated?	China January 2020 to present
Where was it used?	More than 160 public institutions in China are currently using this technology. As of March 14, 2020, the system has already analyzed more than 240,000 CT image volumes (around 13,000 per day on average).
What were the results?	It normally takes 5-15 minutes for a doctor to interpret each CT scan. Alibaba's technology for CT image analysis can assist in identifying characteristics of coronavirus pneumonia in CT scans with about 96% accuracy, and the entire test only takes 3 to 4 seconds. It is at least 60 times faster than human detection, therefore, making the virus detection procedure more efficient while maintaining high accuracy.
Validation/endorsements	Algorithm Accuracy Index ● Accuracy = 0.96 ● F1-Score = 0.97 ● Precision = 0.97 ● Recall/Sensitivity = 0.98 ● Specificity = 0.98 Algorithm Speed Index ● Thin-section chest CT scan in about 10 seconds. ● Thick-section chest CT scan in about 5 seconds.
Approximate cost	It is currently free for public research institutions
Funding sought	None
Contact details and further information	William Cheng longhai.cx@alibaba-inc.com All the information provided can be published

4.2 Alibaba Whole Genome Sequencing Analysis for COVID-19

Description and rationale	On February 5, 2020, the National Health and Medical Commission of China issued Pneumonitis Diagnosis and Treatment Program for New Coronavirus Infection (Trial Fifth and Later Edition), which highlighted that the recommended medical evidence for the diagnosis of pathogens are real-time fluorescent RT-PCR of respiratory specimens or blood specimens for detection of novel coronavirus nucleic acid; and sequencing of viral genes in respiratory specimens or blood specimens, highly homologous to known new coronaviruses. The technology for whole genome sequence analysis is a technology for virus genome sequencing from sample to report. It establishes virus screening and analysis capabilities for local disease control centers and customs agencies that need to manage COVID-19. It provides viral genetic data screening, automated analysis and report generation, and can also work as a research platform for laboratories with experimental and sequencing capabilities.
When and where was it demonstrated?	China January 2020 to present
Where was it used?	China
What were the results?	This technology greatly reduces the data analysis time to 0.5 hours for an experiment of 20 samples in parallel, and is able to test one sample within 43.5 minutes. The time of 43.5 minutes is calculated based on a sample size of 30-100GB tests and on NextSeq 500. The total test time is 14.5 hours for every experiment of 20 samples in parallel, in which 3 hours for laboratory building; 11 hours for gene sequencing; and 0.5 hours for data analysis powered by this technology for whole genome sequence analysis technology. The time of completing one sample test is 43.5 minutes by dividing the 14.5 hours by 20 samples. This test result shows a variable time, depending on sample size and sequencing throughput.
Validation/endorsements	Alibaba
Approximate cost	It is currently free for public research institutions
Funding sought	None
Contact details and further information	William Cheng longhai.cx@alibaba-inc.com All the information provided can be published

4.3 AI-Assisted diagnostic system for COVID-19 Pneumonia based on Chest X-ray and CT Images

Description and rationale	AI-Assisted diagnostic system for COVID-19 Pneumonia based on Chest X-ray and CT Images Based on our analysis of more than 500,000 clinical imaging data through deep learning, transfer learning and semantic segmentation, we developed an AI system by using a large database to serve as an aid to assist a radiologist in image processing and image analysis. This AI system can distinguish viral pneumonia from bacterial pneumonia using chest X-ray images and can diagnose COVID-19 Pneumonia and differentiate it from other viral pneumonia. It can be used as a primary screening tool for COVID-19 Pneumonia in an area where medical access is limited. The accuracy rate of diagnosis of COVID-19 Pneumonia and other viral pneumonia based on chest X-ray images is more than 90%, and the accuracy of diagnosis of COVID-19 Pneumonia based on CT images is 95%. It takes about 15 to 20 minutes for an experienced imaging doctor to read and interpret chest CT images of a patient, while the AI system can complete the detection and diagnosis process within 20 seconds. In combination with lung lesion features and key clinical parameters, the AI system can correlate lung lesions with clinical parameters such as patient's blood oxygen saturation, the degree of injury to other organs and multiple organ failure, predict the probability of critical illness requiring ICU admission.
When and where was it demonstrated?	This system was released online use on 25th Feb of 2020 on the Cloud platform of Chinese Academy of Science, and published at News of Guangzhou Daily on 9th March, at the press conference on 12th March of 2020 in Guangzhou, Guangdong province, China, in Macau University of Science and Technology on 17th March.
Where was it used?	This system is used in China National Center of Bioinformation, Chinese Academy of Science. On March 10, this system was implemented in the Wuhan Jinyintan hospital for frontline deployment, at the same

	time being deployed and tested in the Sun Yat-Sen University Memorial Hospital, the Third Affiliated Hospital of Sun Yat-Sen University, Remin Hospital of Wuhan University, the Central People's Hospital in Yichang of Hubei province, the First Affiliated Hospital of Anhui Medical University and the First People's Hospital in Kashgar, Xinjiang, West China Hospital of Sichuan University, and other medical institutions. For worldwide deployment, Macau, Iraq, Iran, Ecuador are tested well, and South Korea and USA are under communication and deployment.
What were the results?	All testing is good with over 90% accuracy rate of diagnosis of COVID-19 Pneumonia.
Validation/endorsements	This system is used in China National Center of Bioinformation, Chinese Academy of Science. And Guangzhou Regenerative Medicine and Health Guangdong Laboratory.
Approximate cost	Free access by cloud weblink
Funding sought	Guangzhou Regenerative Medicine and Health Guangdong Laboratory; Department of Science and Technology of Guangdong Province
Contact details and further information (please specify, which elements could be published)	kangwei@kangruichina.com zhihuan.li@kangruichina.com Guangzhou Regenerative Medicine and Health Guangdong Laboratory

4.4 Database to classify normal, viral and bacterial pneumonia

Description and rationale	Following COVID19 viral infections, secondary bacterial infections are commonly occurring which associate with higher mortality especially during pandemics. During the 1918–1920 global influenza pandemic, a large proportion of patients died not from the virus itself but from secondary bacterial pneumonia. A study of 191 patients in two Wuhan hospitals at January 2020 showed that 50% of those who died tested positive for secondary infections compared to only one of the 137 survivors. Therefore, early detection of secondary bacterial pneumonia would help in mitigating deleterious consequences and save lives. Bacteria develops antibiotic resistance and treatment failure.
When and where was it demonstrated ?	We created a large database (500+ COVID-19 positive, 1500 Normal, and 4000 Community acquired Pneumonia x-ray images) and submitted initial outcome of the research to reliably identify COVID-19 pneumonia from X-ray images in the Scientific Report ().
Where was it used?	We have conducted a research on classifying normal, viral and bacterial pneumonia, which is accepted for publication in the applied science and available in preprint server (https://arxiv.org/abs/2004.06578). Classification of COVID-19 pneumonia from normal and viral pneumonia images were submitted to the Scientific Report, which is also made available to the preprint server (https://arxiv.org/abs/2003.13145).
What were the results?	The classification accuracy of COVID-19 from normal patient and viral pneumonia was 98.3%, while viral and bacterial pneumonia can be distinguished with 95% accuracy. Both of the studies shows excellent sensitivity.
Validation/endorsements	To accomplish the targeted objective of secondary bacterial infection detection in COVID-19 pneumonia, we need to acquire labelled clinical data and ground truth X-ray images for the COVID-19 patients with and without secondary bacterial infection. Machine learning algorithm will be trained and validated on the labelled dataset. Early co-existing bacterial and COVID-19 viral infections will be tested using unseen cases, which can help in reducing mortality significantly.
Approximate cost	This requires a researcher to collect data and work on machine learning algorithms. The approximated cost is following: Personnel Cost: Researcher: 3×$3500 = $10,500 Consultation (Four Investigators) : 4×10×$500 = $20,000 High Performance Laptop (1 piece) : $5000 Transportation Cost for Data Collection: $2,000 Miscellaneous : $2500

	Total: $40,000
Funding sought	$40,000
Contact details and further information (please specify, which elements could be published)	Prof. Sumaya Al-Maadeed, Head of Computer Sciences Department, Professor of Computer Sciences, Qatar University Dr. Muhammad E. H. Chowdhury, Electrical Engineering, Qatar University Dr. Susu Zughaier, Infectious Diseases Theme Coordinator, QU Health Associate Professor of Microbiology & Immunology, Qatar University Dr. Ali Ait Hussain, Consultant intensivist and ECMO team at the ICU-HMC, Hamad general Hospital, Qatar

4.5 Alibaba Elastic High Performance Computing Technology for AI-driven drug design and bioinformatics metatranscriptomics

Description and rationale	Elastic High Performance Computing (HPC) technology is now available to worldwide researchers to accelerate drug and vaccine discovery and public health development efforts against worldwide outbreak of new coronavirus disease (COVID-19). So far, this technology has supported around 20 research groups implementing their research on COVID-19 with solutions such as AI-driven drug design and bioinformatics metatranscriptomics. Elastic High Performance Computing (E-HPC) technology presents an HPC+AI platform for researchers on life sciences applications and solutions running on cloud, especially for Computational- Driven-Drug-Design (CDDD) and AI-driven-Drug-Design (AIDDD) for COVID-19, and helps researchers to focus solely on research
When and where was it demonstrated?	China January 2020 to present
Where was it used?	China
What were the results?	The bioinformatic dataset transfer rate is speeded up by 5 times, and the performance of gene assembly is accelerated by 25% for Sun Yat-sen University. Jingtai technology has speeded up the drug virtual screening time from more than one month to one week, which has greatly accelerated the drug in vitro test process.
Validation/endorsements	Sun Yat-sen University; Jingtai technology; and Alibaba
Approximate cost	It is currently free for public research institutions
Funding sought	None

Contact details and further information (please specify, which elements could be published)	William Cheng longhai.cx@alibaba-inc.com All the information provided can be published

4.6 Computational Modelling, Screening and Molecular Dynamics Analysis

Description and rationale	1. Computational modeling and screening, analysis of FDA approved drugs to identify COVID-19 antagonists to be achieved in 0-1 month timeframe 2. Computational modeling and possible biological screening of FDA approved GRAS agents. This can be attained in a medium-term timeframe of 6-9 Months 3. Molecular dynamics analysis of force fields and energy between different atoms in the Covid virus and finding a vibrational frequency in 0- 1 month timeline 4. Computational modeling analysis of Ayurvedic Drugs to find COVID-19 antagonists in about two months timeframe
When and where was it demonstrated?	During COVID-19 phase, State – local government, Tech Mahindra
Where was it used?	India
What were the results?	Leveraged Computational Modelling and Analytics to address COVID-19 epidemic
Validation/endorsements	Local and State Government of India
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.nasscom.in/computational-modelling-screening-and-molecular-dynamics-analysis Tech Mahindra Nikhil Malhotra : nikhilrm@TechMahindra.com

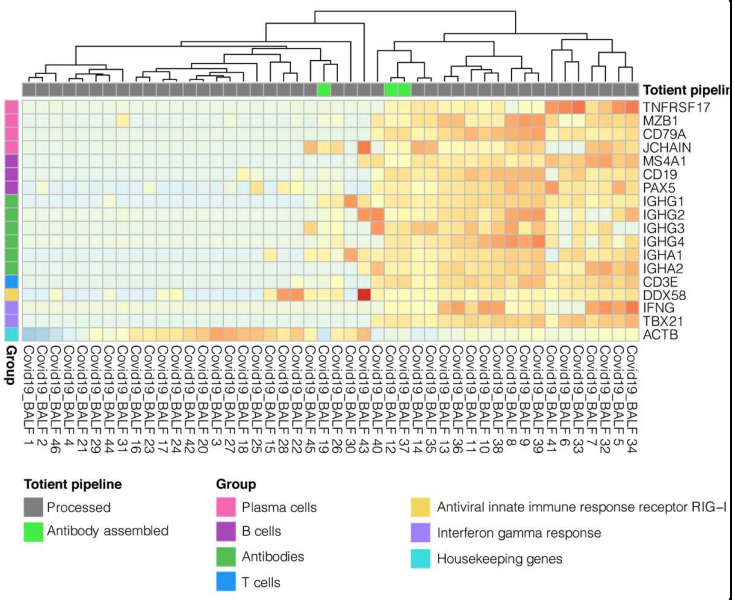
4.7 Human derived monoclonal antibodies (HD-mAbs)

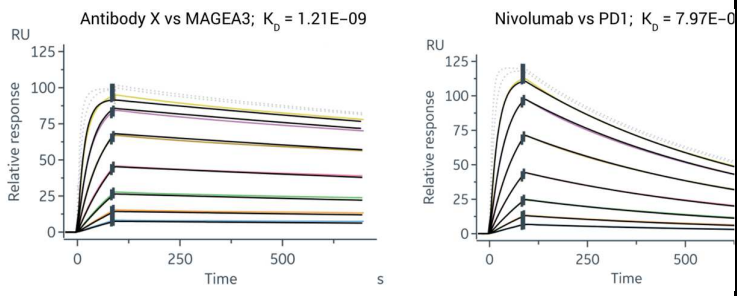
Description and rationale	No specific treatments are currently available against COVID-19. While testing and approval of vaccines for SARS-CoV-2 virus are predicted to take at least a year, identifying a safe and effective antibody treatment to neutralize the virus in a shorter time frame has the potential to save many lives. A successful antibody-based treatment can be given as a preventive option to healthcare workers and other high-risk individuals exposed to the virus, as well as be used to treat and prevent disease progression in already infected patients.

	Eight out of the top fifteen selling drugs by worldwide revenues are monoclonal antibodies (mAbs). Although they are mainly used to treat cancer and autoimmune diseases, mAbs are gaining momentum as antiviral agents1. Antiviral mAbs are usually selected based on their ability to neutralize the virus or kill infected cells. However, there is accumulating evidence that they can also interact with different components of the host immune system and induce long-lasting protective antiviral immunity, similar to vaccines2. Human derived monoclonal antibodies (HD-mAbs) are a new type of mAbs sequenced directly from patients who experience positive clinical outcomes. The therapeutic use of HD-mAbs is expanding due to their particularly favorable safety profile. Totient assembles human antibodies expressed in tertiary lymphoid structures (TLS) from tissues affected by autoimmunity, cancer and viral infections. Our confidence in this approach has been greatly reinforced by the simultaneous publication of three studies in Nature in January 2020 showing that B cells in TLS promote clinical response to cancer immunotherapy 3,4,5. This human data provides further confirmation of the recent mouse study published in Cell, which established that generation of antibodies is key to immunotherapy response6. Totient developed and validated a population-scale antibody discovery engine for reconstructing paired antibody sequences from patient RNA sequencing data (RNASeq). Using advanced machine learning techniques, this workflow takes under two hours per sample, yields paired sequences of both the heavy and the light chain and does not require targeted Ig sequencing. It works using directly standard RNASeq data from clinical samples, which is readily available. Leveraging the power of cloud computing we are able to process hundreds of samples in parallel. We then use gene synthesis to incorporate the resulting sequences in an appropriate expression vector, optimised to express human antibodies with very high yield. These vectors are then used to transiently transfect human HEK293 cells, which express the corresponding

	monoclonal antibody in the supernatant. The resulting antibody is then purified at the desired level using protein A. Once protein expression and purification is completed, we screen each antibody on the most comprehensive protein array currently available. Such screening exposes each antibody to 20,000 full length human proteins in duplicate, covering about 80% of the entire human proteome. We use proprietary statistical methods, together with our in-house database of protein arrays generated using human antibodies, to distinguish true hits from noise. This allows us to identify the target antigen with unprecedented accuracy. In most cases, we observed that the antibodies we reconstructed show high affinity and high specificity for a single human target. Providing the world's first bulk RNA-to-antibody solution, Totient is uniquely positioned to reconstruct antibodies from bronchoalveolar lavage fluid (BALF), one of the most common means of collecting samples from COVID-19 patients. Totient has found that samples of this kind are more likely to have antibodies that are disease-relevant. We have already processed the first set of publicly available BALF samples with promising results. By collecting and sequencing more BALF samples from COVID-19 patients and reconstructing the most functionally important fully human antiviral mAbs from them for further validation and lead optimization, Totient aims to identify and develop a safe and effective antibody treatment to help in the fight against COVID-19. REFERENCES 1. Walker LM, Burton DR. Passive immunotherapy of viral infections: 'super-antibodies' enter the fray. Nat Rev Immunol. 2018;18(5):297-308. 2. Pelegrin M, Naranjo-Gomez M, Piechaczyk M. Antiviral Monoclonal Antibodies: Can They Be More Than Simple Neutralizing Agents? Trends Microbiol. 2015;23(10):653-665. 3. Helmink BA, Reddy SM, Gao J, Zhang S, Basar R, Thakur R, et al. B cells and tertiary lymphoid structures promote immunotherapy response. Nature. 2020;577: 549–555.

	4. Cabrita R, Lauss M, Sanna A, Donia M, Larsen MS, Mitra S, et al. Tertiary lymphoid structures improve immunotherapy and survival in melanoma. Nature. 2020. pp. 561–565. 5. Petitprez F, de Reyniès A, Keung EZ, Chen TW-W, Sun C-M, Calderaro J, et al. B cells are associated with survival and immunotherapy response in sarcoma. Nature. 2020;577: 556–560. 6. Hollern DP, Xu N, Thennavan A, Glodowski C, Garcia-Recio S, Mott KR, et al. B Cells and T Follicular Helper Cells Mediate Response to Checkpoint Inhibitors in High Mutation Burden Mouse Models of Breast Cancer. Cell. 2019. pp. 1191–1206.
When and where was it demonstrated?	Throughout 2019, as a proof of concept of our population-scale antibody discovery engine, Totient expressed and purified 274 human monoclonal antibodies obtained from TLS in cancer samples and reconstructed with our antibody discovery engine. In order to identify the target antigens of Totient antibodies, we used proteomic technologies to screen each antibody against 20,000 human proteins in duplicate. We identified human antibodies binding to both known and novel therapeutic targets. Totient's library includes human antibodies against well known cancer-specific antigens (MAGE-A3, NY-ESO-1, GAGE2A, LIVIN) and important immunomodulatory molecules expressed in the tumour microenvironment (ANXA1, C4BPB, and others).
Where was it used?	Having demonstrated our ability to reconstruct antibodies from tissues affected by cancer or autoimmunity, we have begun to apply the same immunological principles and computational techniques to viral infection, as part of Totient's Population-scale COVID-19 Antibody Rapid sEquencing program (CARE). We have applied our antibody discovery engine to currently available BALF samples from the National Genomics Data Center of China. Now we are seeking to scale this approach. For this reason, we are actively reaching out to our partners in an effort to secure access to sequencing data from COVID-19 infected patients in order to reconstruct the most functionally important antibodies.

What were the results?	Totient reconstructed nine clonal COVID-19 antibodies from three BALF samples of moderately symptomatic patients (the total number of analyzed samples is 64), and access to more samples will greatly increase lead generation. Two of these BALF samples are in a cluster with BALF samples that contain a large amount of B and T cells, plasma cells and express immunoglobulin genes and interferon gamma (Figure 1). This is a proof of concept that bronchoalveolar lavage fluid is a source of plasma cell generated natural antibodies, and that those can be reconstructed. In order to accelerate translational applications, we will make the antibody sequences publicly available and encourage researchers to express the candidate and commence follow-on experiments. Moreover, any candidate antibody sequences we reconstruct from contributed partner data will be published whenever related-consents enable us to do so.  Figure 1. Expression of genes associated with innate and adaptive immune responses across a subset of BALF samples. Two of these samples are in a cluster with high expression of plasma cell, B cell, T cell and immunoglobulin genes, and interferon gamma (IFNG).

Validation/endorsements	Validation experiments using Biacore surface plasmon resonance (SPR) assay demonstrated that a significant proportion of our antibodies bind their target with very high affinity, with KD (the equilibrium dissociation constant between the antibody and its antigen) in the low nanomolar range (none of the antibodies were edited or optimized, Figure 2). For this reason, Totient is the first research group to have successfully paired, expressed and validated human antibodies from bulk RNA sequencing data of clinical samples, without the need of specialized targeted or single-cell sequencing.  Figure 2. Comparison of Biacore SPR results for antibody X vs MAGEA3 and nivolumab vs PD1. Totient human antibody X binds to cancer testis antigen MAGEA3 with higher affinity than nivolumab, a FDA-approved anti-PD1 antibody. While Totient antibody targeting ANXA1 is being tested using Biacore SPR, high affinity and high specificity binding between Totient antibody and ANXA1 has been already identified using a human protein array containing 20,000 human proteins. The binding signal was subsequently replicated in a second and third experiment using higher antibody concentration (Figure 3). ANXA1 is a membrane-localized protein that is involved in many biological processes including inflammation, endocytosis/exocytosis and cell signaling, and has been implicated in cancer development and progression. Moreover, ANXA1 has been shown to play a role in influenza A viral replication, binding and endosomal trafficking of the virus to the nucleus, as well as apoptosis mediated by the virus. Given the contribution of ANXA1 to inflammation and influenza A infection, this protein could

be also involved in the pathogenesis of COVID-19, which makes Totient antibody targeting ANXA1 a potentially promising therapeutic option for SARS-CoV-2 infection that needs further validation and optimization.

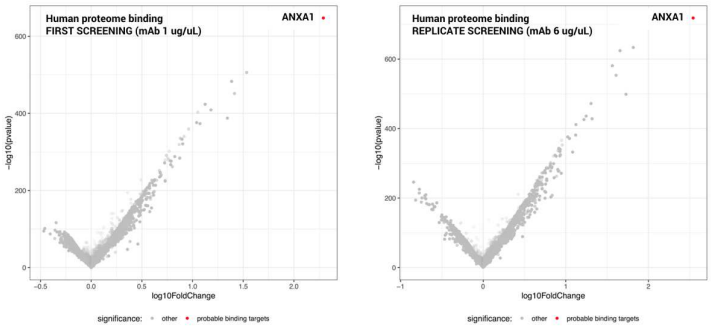


Figure 3. Results from two protein array experiments to confirm antibody binding to ANXA1. Totient antibody binds with high affinity and high specificity to ANXA1 in both experiments.

To scale antibody production and validation, Totient has formed partnerships with two companies:
Viva BioInnovator, a collaborative platform for innovative biotech companies. So far all Biacore experiments have been conducted by Viva.
Ginkgo Bioworks, one of the pioneers in next generation synthetic biology. Given a set of Totient antibodies, Ginkgo is responsible for antibody expression, antigen screening, optimization and IND enabling studies.
Totient is a JLabs - Johnson & Johnson Innovation company.

Totient's investors include Mission BioCapital, Jonathan Milner (co-founder and Deputy Chairman of Abcam), and Sands Capital.

In 2019, Totient's machine learning team has demonstrated their expertise by finishing fourth out of 2,749 teams in the prestigious Kaggle CHAMPS competition. The team built deep neural networks to predict magnetic interactions between a pair of atoms.
Totient is a spin out from Seven Bridges Genomics, Inc., a global leader in bioinformatics software development.

	Seven Bridges was chosen as one of MIT Technology Review's 50 Smartest Companies in 2016, one year prior to the Totient team leaving to start the sister company.
Approximate cost	Collection of 1,000 BALF samples from COVID-19 patients across multiple institutions, RNA sequencing and identification of lead antibodies: $1,000,000. Totient is in discussions with institutions in the U.S., China, Singapore, and Italy to collect and sequence samples.
Funding sought	Totient is seeking additional funding of $6,000,000 for manufacturing of lead antibodies for antigen screening, validation, optimization, and both pre-clinical and clinical studies.
Contact details and further information (please specify, which elements could be published)	James Sietstra, Chief Business Officer 1 Alewife Center, Suite 120, Cambridge, MA 02140 +1.309.912.0885 james@totient.com

4.8 Covid-19 respiratory system pane

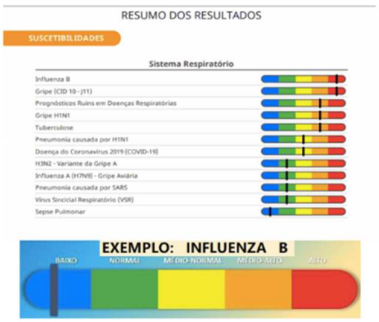
Description and rationale	1.1. Project summary FullDNA operates in the healthcare industry and offers complete of transcriptome (RNA-Seq) exams to help healthcare professionals assess patients' genetic characteristics and risks through a simple collection of saliva or oral cells. Its team consists of 4 managers, specialists among the largest in Brazil in the health field and, in Israel, 31 people (6 geneticists, 4 bioinformatics, 3 biochemists, 2 oncologist, 1 cardiologist, 3 family doctors, 2 pediatricians, 1 neurologist and 9 senior programmers). With the COVID-19 pandemic, the company decided to designate a team of researchers to develop an algorithm capable of identifying the susceptibilities of each person to develop Coronavirus Disease. As a result, they created a system that interprets genetic data and shows the index of susceptibility to COVID-19 and other susceptibilities of each person, through a panel of the respiratory system. The general objective of this proposal is to carry out a scientific and comparative study between the level of susceptibility obtained in genomic tests and the occurrence in real cases of contamination by COVID-19 in state of Paraná, in a random sample of 300 people, inferring for the Brazilian population. The methodology will use techniques such as stratified random sampling, genome extraction through genome sequencing transcriptome (RNA-Seq), advanced AI (artificial intelligence) mechanisms and Bioinformatics in the collection and interpretation of genomic data, with two unique algorithms - one for research using thousands of scientific data and another predictive algorithm using artificial intelligence, to search and compare with global and national genomic data. With all this, it will issue detailed reports with predispositions, characteristics and needs of each person analyzed. With this it is expected to demonstrate the effectiveness of genetic tests in the case of pandemics, to generate a probabilistic database that can be used in the future, to indicate a broader risk group than only old citizens or people with diseases, to expand access to a study with 99.5% reliability predictability, in the case of new pandemics. The term of the project is 6 months, with a budget of $ 133,630,00. 1.2. Description

	The FullDNA FullDNA – Diagnósticos e Serviços Médicos Ltda, CNPJ is CNPJ 32.922.779/0001-99, sector is the Genetics and Health, seu site é www.fulldna.com.br, e seus contatos principais são: Roberto Grobman – CEO, email roberto@fulldna.com.br e phone +972 58 400 3657 (Israel). José Irineu Golbspan - CMO- email irineu@fulldna.com.br and phone is (51)- 99981-7935 (Brasil) Their addresses are: Curitiba – PR – FullDNA - Aceleradora do Sistema FIEP, Av. Cândido de Abreu, 200 - Centro Cívico, Curitiba - PR, 80030-060,Tel: (41) 3271-9000 Porto Alegre: Av. Carlos Gomes, 75, sala 401-403 Israel: TRANSCEPTAR TECHNOLOGIESand FULLDNA, 150 Menachem Begin Blvd, WE Tower, 12th Floor, Tel Aviv, ISRAEL The FullDNA FullDNA - Diagnósticos e Serviços Médicos Ltda, CNPJ is CNPJ 32.922.779 / 0001-99, sector is the Genetics and Health, its website is www.fulldna.com.br, and its main contacts are: Roberto Grobman - CEO, email roberto@fulldna.com.br and phone +972 58 400 3657 (Israel). José Irineu Golbspan - CMO- email irineu@fulldna.com.br and phone is (51) -99981-7935 (Brazil) Their addresses are: Curitiba - PR - FullDNA - FIEP System Accelerator, Av. Cândido de Abreu, 200 - Centro Cívico, Curitiba - PR, 80030-060, Tel: (41) 3271-9000; Porto Alegre: Av. Carlos Gomes, 75, sala 401-403; Israel: TRANSCEPT TECHNOLOGIESand FULLDNA, 150 Menachem Begin Blvd, WE Tower, 12th Floor, Tel Aviv, ISRAEL. The product that FullDNA places in this notice is the covid-19 respiratory system panel, where it has already passed the testing phase. More than 2 million data were processed that FullDNA has in its database. This system interpreted genetic data and made available the susceptibility index of people from Israel and Brazil separated. FullDNA operates in the genetics and health sector, through the collection and analysis of human genome sequencing and transcriptome (RNA-Seq) tests, resulting in detailed (predictive) reports (panels) with individual characteristics, with more than 1,500 predispositions to pathologies, characteristics and personal needs, present in the DNA of each

	person. This exam is done with a simple collection of oral cells or saliva and assesses about 40,000,000 genetic markers. FullDNA's technology includes: a proprietary system for the interpretation of genomic data, research algorithms using thousands of scientific data, a unique predictive algorithm using artificial intelligence, for intelligent search and comparison of genomic data, using complete of genome sequencing transcriptome (RNA-Seq). But what about the world? Several coronaviruses circulate around the world and constantly infect humans, which usually caused only mild respiratory diseases. Currently, however, we are witnessing the worldwide spread of a new coronavirus with almost 2,000,000 confirmed cases and more than 125,000 deaths. The new virus was named SARS coronavirus-2 and was transmitted from animals to humans. It causes a respiratory disease called COVID-19 that can take a serious course. The SARS-2 coronavirus has been spreading since December 2019 and is closely related to the SARS coronavirus that caused the SARS pandemic in 2002/2003. Currently, intensive studies are being done to create vaccines and drugs effective in combating this virus. 1.3. Justification When observing the current world situation, FullDNA, faces the following problem: • is there any technology in which it is possible to predict how likely it is that a person will be infected with the coronavirus? The justification to solve this problem comes from the need to carry out predictive and consequently preventive medicine, placing genomic technology for the benefit of humanity. And analyzing all this capacity, FullDNA appointed, a few months ago, a team of researchers to develop an algorithm capable of identifying the susceptibilities of each person to develop COVID 19. As a result, a system was developed that interprets genetic data and shows each person's susceptibility index. With this, the startup hopes to raise awareness of those who have a greater susceptibility so that they can adopt the necessary precautions according to their risk. The test, which is carried out by FullDNA, will also allow people to bring their genetic results from genealogy tests performed by other companies to obtain their report quickly, without having to wait for DNA extraction.

	Its main product is genetic testing using complete genome sequencing technology - WGS. These results are presented in the form of detailed and predictive reports (panels) presenting individual characteristics, needs and predispositions. Shows the probabilities, present in the DNA of each person. It is a product of disruptive innovation that aims to transform a health market, by effectively reintroducing the concept of predictive and preventive health. The main product of this project is a scientific and comparative study in a sample of approximately 300 inhabitants of the Brasilia region, contaminated with COVID-19 who will perform the RNA-Seq exams of their genomes (respiratory panel of susceptibilities and contamination to COVID-19) with the risk analysis. The general objective is to carry out a scientific and comparative study between the level of susceptibility obtained in genomic tests and the occurrence in real cases of contamination by COVID-19 in the contaminated brazilian population, focusing on state of Parana or Rio Grande do Sul. Specific objectives: • seek partners to carry out and expand the research, our target is 1200 people; o Goal: 3 partners • modify algorithms with the insertion of new variables contained in recent studies; o the goal: all possible insertions; • conduct studies on contaminated humans following the processes of collection, extraction, genome analysis; o Goal: 300 people; o issue reports of exams and statistics, with the results available on the website www.fulldna.com.br. Goal: 300 reports. The main techniques of the methodology to be used in the project are: • Data collection: in a population of people infected by COVID-19, in the city of Curitiba PR, a sample of 300 people, divided into a stratified random sample of three extracts considering the state of health evolution in: o the light state; o the moderate state; and o the serious state and consequent death. Genome collection: it is done through the collection of saliva or oral cells with two swabs. They are collected one by one,

	first on one side, rubbing it on the cheek, on the inside, on the right side and then on the left side about 20 times each side. Genome extraction: use of technology Genome Sequencing – RNA-seq which consists in steps: o Post-extraction: RNA is analyzed to ensure sufficient integrity and quantity to obtain optimal post-library preparation chemicals; o Post-library preparation: The size and quantity of the fragment are rechecked to ensure optimal loading into the cell. A cDNA library for sequencing have steps: RNA Isolation; RNA selection / depletion; cDNA synthesis o NGS execution: quality scores (Q), along with cluster densities, percentage of readings that pass the filter, number of readings generated and average reading duration o Sequencing is performed on a platform using V4 chemistry, which allows you to receive the maximum value from your samples. Results are delivered via secure drive in the cloud or delivery via external hard drive. o Data analysis report that includes quality control metrics, alignment files and variations • Analysis of the results of the genome test - done through the application of an algorithm that combines dozens of scientific databases with bioinformatics and an Artificial Intelligence mechanism to obtain important and relevant information about the genome of each individual.
When and where was it demonstrated?	The product exists and has already been tested and demonstrated, and several genome analysis panels are available on the website www.fulldna, com, being used in Israel for studies and for preventive medicine. There are also deals with Canada to perform statistics on raw data from DNA and Genome analyzes, with FullDNA's intelligent system that has powerful algorithms possible to obtain the individual probability of each person being contaminated with covid19. These algorithms are the result of 10 years of research by Dr. Roberto Grobman in conjunction with the University of TellAviv. The development stage of the products (panels) of the FullDNA genomic exam is • Algorithm for the respiratory system with the degree of susceptibility, needs and characteristics ready and being automatically updated daily, tested on more than 2 million people worldwide. It is also dynamically updated product - database updated daily with new research, as shown in Figure 1.

	 Figure 1. Degree of susceptibility, needs and characteristics – Respiratory System Panel
Where was it used?	All panels tested on about 2 million people or 23% of the population in ISRAEL, including the Respiratory System Panel, enabling the benefits of better public health. In addition, the panels are available to customers who have their data on FullDNA platforms. Today, genetic testing is available at MACCABI and CLALIT health plans in Israel, in a study with 10 more plans, jointly by the Israeli government. Today FullDNA is developing new products at an early stage - system for testing neurodegenerative diseases, neoplasms and autoimmune diseases.
What were the results?	The results were and are monitored by the MACCABI and CLALIT health plans. In Brazil FullDna in a few months of operation, already has in its register about 400 health professionals, who use genetic tests in their patients to work in a systemic and preventive medicine.
Validation/endorsements	The validation of this Respiratory System panel, and consequence of the prediction of COVID19, was obtained at first, through: the realization of preventive medicine of diseases in about 2 million people, through an early diagnosis of trends of diseases such as cancer, diabetes, cardiac and neurodegenerative, psychological and behavioral. For that, the solution on the part of FullDNA was to offer the solution through a unique algorithm that makes a personal analysis of the occurrence of more than 1,500 diseases, based on scientific and probabilistic data, personal characteristics and needs presented. These diseases analyzed are divided into different and different panels for each area of medicine. And today there are more than 400 doctors registered in Brazil alone. In addition, for the extraction of the genome, FullDNA uses the genome sequencing transcriptome (RNA-Seq) technique, which is an exceptional technological innovation for performing the genome sequencing with expressive efficiency. It has been revolutionizing biology and medicine

	in recent years, providing unique baseline level accuracy for our understanding of nucleic acid sequences in a high-throughput manner. RNA-Seq, also called RNA sequencing, is a sequencing technique based on specific technology that uses next generation sequencing (NGS) to reveal the presence and amount of RNA in a biological sample at a given time, analyzing the ever-changing cellular transcriptome. For the analyze the Genome data, to obtain relevant information for a predictive and preventive medicine- as for the study of algorithms using AI (artificial intelligence) and Bioinformatics mechanisms in the collection and interpretation of genomic data focused on the combination of input with activation of ACE2 and TMPRSS2 that determines how much a certain person can be infected and become sick compared to others. To select and collect research on predispositions in genetics, FULLDNA has developed procedures for choosing publications. Thus, more relevant and statistically significant publications are chosen to be taken into account by the algorithm with artificial intelligence rules. Despite being a future perspective of the competition in developing algorithms based on research done and using them to predict predispositions, characteristics and needs, fulldna is many steps ahead as it is the only one that does this in the whole world. For being a study and research work for 12 years with major research centers in israel, which is one of the exponents in medical research. It is assumed that it may take time to access all this knowledge. In addition, there is a secret of the algorithms, the use of artificial intelligence, that is, powerful technological instruments for the issuance of reports. In addition, they are protected on servers inside bunkers in israel. FullDNA obtains a very high 99.5% accuracy rate, due to its unique predictive algorithm based on artificial intelligence and its research (collection and comparison) is updated permanently with data from reliable genomic sources of the individual results with databases (Ensembl, GWAS , dbSNP (Single NucleotidePolymorphism), GAD (Genetic Association Database), NCBI, NHGRI (National Human Genome Research Institute), Clingen, OMIM, UCSC and others), information, publications and scientific works. Patient data is stored in the form of an unidentifiable code, in order to protect the patient's identity. This data is constantly updated with new discoveries and scientific publications. FullDNA is

	developing an online system in which patients will be able to monitor their health results throughout their lives.
Approximate cost	Table 1 shows the costs to carry out the research proposed in this project, that is, UNVEILING COVID - STUDYING PROBABILITY OBTAINED IN TESTING GENOMICS x OCCURRENCE OF CONTAMINATIONS.

Expense	Quantity	Unit Price in dollar	Total In dollar
Travel: Porto Alegre - Brasília: round trip	3	150.00	450.00
Travel: Curitiba - Brasília: round trip	3	135.00	405.00
Coordination of project	6 months	2,300.00	13,800.00
Trainees - assistance in the collection and packaging of materials	2 6 months	440.00	2,640.00
Expenses with mail - dispatch of genetic material to ISRAEL	10 sets with 30 exams each	67.00	670.00
Permanent material - notebook	1	1,200.00	1,200.00
Genome Collection Kits	330	4,50	1,485.00
Consultancy and various technical services, statistician, geneticist, etc ...	3 months	800,00	2,400.00
Health technician to collect exams	3 months	800.00	2,400.00
Genome extraction and sequencing – RNA-Seq*	330	200.00	66,000.00
Genetic analysis**	330.00	75.00	24,750.00
TOTAL			**116,200.00**
15% forecasting error and design errors			17,430.00
Total general			**133,630.00**

Table 1. Research costs, for the collection, analysis and processing of 300 people contaminated by COVID 19, in Curitiba, in 2020.

Funding sought	The full amount of the research, that is, about $ 133,630.00.
Contact details and further information (please specify, which elements could be published)	The contacts additional are: Roberto Grobman CTO Cel: +972 58 400 3657 roberto@fulldna.bio and Cleusa Rocha Asanome – Project Director Mobile: + 51 41 99915 – 6422 – E-Mail: cleusa@fulldan.com.br ELEMENTS CAN BE PUBLISHED Project summary FullDNA operates in the healthcare industry and offers complete of transcriptome (RNA-Seq) exams to help healthcare professionals assess patients' genetic characteristics and risks through a simple collection of saliva or oral cells. Its team consists of 4 managers, specialists among the largest in Brazil in the health field and, in Israel, 31 people (6 geneticists, 4 bioinformatics, 3 biochemists, 2 oncologist, 1 cardiologist, 3

	family doctors, 2 pediatricians, 1 neurologist and 9 senior programmers). With the COVID-19 pandemic, the company decided to designate a team of researchers to develop an algorithm capable of identifying the susceptibilities of each person to develop Coronavirus Disease. As a result, they created a system that interprets genetic data and shows the index of susceptibility to COVID-19 and other susceptibilities of each person, through a panel of the respiratory system. The general objective of this proposal is to carry out a scientific and comparative study between the level of susceptibility obtained in genomic tests and the occurrence in real cases of contamination by COVID-19 in state of Paraná, in a random sample of 300 people, inferring for the Brazilian population. The methodology will use techniques such as stratified random sampling, genome extraction through genome sequencing transcriptome (RNA-Seq), advanced AI (artificial intelligence) mechanisms and Bioinformatics in the collection and interpretation of genomic data, with two unique algorithms - one for research using thousands of scientific data and another predictive algorithm using artificial intelligence, to search and compare with global and national genomic data. With all this, it will issue detailed reports with predispositions, characteristics and needs of each person analyzed. With this it is expected to demonstrate the effectiveness of genetic tests in the case of pandemics, to generate a probabilistic database that can be used in the future, to indicate a broader risk group than only old citizens or people with diseases, to expand access to a study with 99.5% reliability predictability, in the case of new pandemics. The term of the project is 6 months, with a budget of $ 133,630,00.

5. Public consultation and governance support technology

Technology	Organization	Continent
5.1 AliHealth Online COVID-19 Consultation Platform	Alibaba Group	Asia
5.2 TraceCovid	Abu Dhabi Department of Health (DoH)	Asia
5.3 Consumer Sentiment Tracke	IPSOS	Asia
5.4 AI temperature tool	Kronikare	Asia
5.5 AarogyaSetu	Ministry of Electronics and IT, Govt. of India	Asia
5.6 COVID-19 Chatbot	IQVIA India	Asia
5.7 VigilantGantry	GovTech	Asia
5.8 Travel and Health Declaration System	GovTech	Asia
5.9 AI-enhanced, IoT-connected, eco friendly hygiene micro station	Soapy	Asia
5.10 Remote examining system	TytoCare	Asia
5.11 Rock Art Enhancer App	Manote Arpornsuwan	Asia
5.12 Technology Stack, home service, project diya	DoctorC	Asia
5.13 CLOUDMAKER platform	Vulcan Augmetics	Asia
5.14 WellteQ App	WellteQ	Asia
5.15 Secure and personal cloud storage	MyHealp	Asia
5.16 Place Checkup - White Label Platform	Infraspeak	Europe
5.17 LazioDoctor per Covid	Regione Lazio	Europe
5.18 Movendos Health Platform	Movendos	Europe
5.19 Olwel platform	Olwel	Europe
5.20 VideoVisit remote care system	VideoVisit	Europe
5.21 THOR UVC Disinfection System	Finsen Technologies	Europe
5.22 Firegent's Qwikidata	Firegent iASP Sdn Bhd	Europe
5.23 G2k COVID Control System	G2K Group	Europe
5.24 iVH HIT	Beginning SAS	Europe
5.25 online course	Generation	Europe
5.26 eSHIFT Partner Network	eSHIFT Partner Network	Europe
5.27 Panic Attack & Anxiety Relief	Rootd App	North America
5.28 COVID-19 Navigator	PwC	North America
5.29 Brave's mobile app, Brave Buttons, Overdose Washroom Sensor monitors	Brave Coop	North America

5.30 IBM-High Performance Computing Consortium for COVID-19	IBM	North America
5.31 rayTech	Raybaby	North America
5.32 Web-Based and Mobile Applications	Dimagi	North America
5.33 GreenPass	FinTech4Good	North America
5.34 Iktos AI technology platform	FinTech4Good	North America
5.35 VERSES HEALTH	FinTech4Good	North America
5.36 Open Source Medical Supplies	FinTech4Good	North America
5.37 TrustLink	FinTech4Good	North America
5.38 biometric ID systems	Simprints	Africa
5.39 PrimeCare Website	PrimeCare	Africa
5.40 YouMeda	YouMeda	Africa
5.41 VIDA vs. COVID	Village Data Analytics (VIDA)	Africa
5.42 Emergency Telecommunications Cluster (ETC)	ETC	Africa
5.43 ehCOS Remote Health	Eduardo Llinares Legido	South America

5.1 AliHealth Online COVID-19 Consultation Platform

Description and rationale	Since COVID-19 is a new virus, people have little knowledge about it and easily get nervous when they develop suspicious symptoms. However, there are many difficulties in going to hospitals for medical advice because 1) medical resources are already stressful and there is in-hospital infection risk, 2) transportation capacity is heavily reduced, 3) people have language barriers to call local hotlines for medical advice due to language barriers. AliHealth has launched an online COVID-19 consultation platform. The platform is built in a mobile app, AliPay. AI translation is used to tackle the language problem. People can directly contact doctors online with COVID-19 treatment experience for advice.
When and where was it demonstrated?	Globally January 2020 to present
Where was it used?	From January 24th to present, in China From March 8th to present, globally
What were the results?	As of April 7th, more than 10,000 doctors registered on the platform, and nearly 30 million people got medical advice from online consultation.
Validation/endorsements	State and local governments
Approximate cost	It is currently free of charge. Up to now, AliHealth has subsidized nearly 4 million yuan ($570,000) for medical consultation fee.
Funding sought	We hope UN can promote the platform and encourage more doctors to participate.
Contact details and further information (please specify, which elements could be published)	William Cheng longhai.cx@alibaba-inc.com All the information provided can be published

5.2 TraceCovid

Description and rationale	The Abu Dhabi Department of Health (DoH) has launched an app based on bluetooth wireless technology that can help authorities contact and trace people that have come into close contact with patients that have tested positive for COVID-19. The app – TraceCovid – allows users to detect other smartphone devices that have also installed the same app, and so when users come into contact with one another, a secure tracing identifier (STI) is exchanged through the app and will be stored on each user's smartphone.
When and where was it demonstrated?	During COVID-19 phase, demonstrated at Ministry of Health, U.A.E.
Where was it used?	Abu Dhabi, U.A.E.
What were the results?	Detecting other smartphone devices that have also installed the same app, and so when users come into contact with one another, a secure tracing identifier (STI) is exchanged through the app and will be stored on each user's smartphone.
Validation/endorsements	World Health Organization, Ministry of Health, U.A.E., Healthcare Agencies and governments.
Approximate cost	FREE
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	support@tracecovid.ae https://tracecovid.ae/

5.3 Consumer Sentiment Tracke

Description and rationale	Tracking public sentiment & behaviour In light of the coronavirus outbreak. The coronavirus has impacted markets, behaviours and lives. Understanding how citizen and consumer opinions and behaviours are evolving in this time of uncertainty is crucial in order to be able effectively manage and initiate the appropriate response.
When and where was it demonstrated?	During COVID-19 phase-15TH Mach 2020, demonstrated at National Health Organization
Where was it used?	Kingdom of Saudi Arabia & MENA regions
What were the results?	Monitoring a multitude of aspects in light of the coronavirus outbreak, including, but not limited to concerns about the virus, expectations from authorities, changes in behaviours, and perceived impact.
Validation/endorsements	National Health Organization, The Government, World Health Organization
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.ipsos.com/sites/default/files/ct/news/documents/2020-03/covid-19_mena_consumer_sentiment_tracker_-ksa_march_16.pdf IPSOS, Samama Al Tahlia Bldg. Prince Muhammad Bin Abdulaziz Rd P.O. Box 10042 Riyadh 11433 Nicola Qahoush Research Manager – Ipsos MENA Nicola.Qahoush@Ipsos.com

5.4 AI temperature tool

Description and rationale	Singapore built an AI temperature tool in two weeks. The government's healthtech agency worked with a local startup to adapt a commercial wound-scanning device, as the city stepped up measures against COVID-19. Singapore has launched an AI tool to automate temperature screenings, developed by its healthtech agency IHiS and a local startup called Kronikare.
When and where was it demonstrated?	During COVID-19 phase, Singapore Government health tech agency.
Where was it used?	Singapore
What were the results?	AI tool to automate temperature screenings.
Validation/endorsements	Singapore Government health tech agency.
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://govinsider.asia/innovation/covid-coronavirus-singapore-ihis-kronikare-temperature-ai/ IHIS+Kronikare sales@kronikare.ai ehealthit.svcdesk@ihis.com.sg (65)1800 6644 347

5.5 AarogyaSetu

Description and rationale	AarogyaSetu is an app launched by the government of India. The Ministry of Electronics and IT launched this app on 2nd April 2020, Thursday which helps people identify the risk of getting infected by COVID-19. It calculates the interaction of the person with others using cutting edge Bluetooth technology, algorithms and AI (artificial intelligence).
When and where was it demonstrated?	During COVID-19 phase, mygov.in, Ministry of Electronics and IT, Govt. of India.
Where was it used?	India
What were the results?	Helped people identify the risk of getting infected by COVID-19. It calculates the interaction of the person with others.
Validation/endorsements	Ministry of Electronics and IT, Govt. of India
Approximate cost	Free
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://play.google.com/store/apps/details?id=nic.goi.aarogyasetu&hl=en_IN support.aarogyasetu@gov.in

5.6 COVID-19 Chatbot

Description and rationale	Using advancements in technology and natural language processing, the AIML Center of Excellence (COE) at IQVIA India has created a solution that can help governments and healthcare organisations manage through these unpredictable times, while reducing the burden on existing resources. The COE has created a COVID-19 Chatbot to help the general public learn more about COVID-19. The topics covered include basic information about COVID-19, transmission, testing, risk reduction and safety measures. Information has been collected using reliable sources like Centers for Disease Control, World Health Organization, etc. A list of 50+ questions along with their answers has been collated to cover a broad spectrum of COVID-19 related information
When and where was it demonstrated?	During COVID-19 phase, State – local government
Where was it used?	India
What were the results?	Helped the general public learn more about COVID-19. As there is a need for health organizations to automate as many responses to these inquiries as possible to free up human resources to deal with more complex problems in the fight against this pandemic.
Validation/endorsements	AIML Center of Excellence (COE), Centers for Disease Control, World Health Organization
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.nasscom.in/covid-19-chatbot IQVIA India Sunil Kumar Singh, Principal, Advanced Analytics, AIML Center of Excellence, IQVIA India (Sunil.Singh@in.imshealth.com)

5.7 VigilantGantry

Description and rationale	Developed by GovTech, VigilantGantry is an AI-driven automated temperature screening gantry that augments existing thermal systems to enhance the rate of contactless screening, saving time and manpower. An alert will sound once the system has detected an abnormal temperature. This is especially useful for high traffic volume sites and detection of symptomatic cases. VigilantGantry is modular and can be easily integrated with off-the-shelf electronics, existing thermal systems and mobile optical cameras. If required, the solution is also able to interface with facial recognition solutions for contact tracing. GovTech plans to open-source VigilantGantry's source codes for the industry to scale and deploy to different sites across Singapore.
When and where was it demonstrated?	During COVID-19 phase National Government, Singapore
Where was it used?	Singapore
What were the results?	Augmented existing thermal systems to enhance the rate of contactless screening, saving time and manpower.
Validation/endorsements	National Government, NUS Singapore
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	http://www.nus.edu.sg/inside-nus/stories/ai-driven-temperature-screening-with-vigilantgantry https://www.tech.gov.sg/contact-us/ General +65 6211 2100 info@tech.gov.sg Mainline +65 6211 0888 Quality Service Manager qsm@tech.gov.sg

5.8 Travel and Health Declaration System

Description and rationale	Developed by GovTech, the Travel and Health Declaration System is a free-for-use Cloud-based visitor registration system. Visitors scan a QR code using their SingPass Mobile app, give consent to share their name and contact information with the building managers, and make the necessary declaration required. This online service will be regularly updated to reflect the latest advisory and guidelines. Using this system allows businesses to verify user identity with data from Government sources to facilitate their tracing work should the need arise.
When and where was it demonstrated?	During COVID-19 phase National Government, Singapore
Where was it used?	Singapore
What were the results?	Visitors scan a QR code using their SingPass Mobile app, give consent to share their name and contact information with the building managers, and make the necessary declaration required. This online service will be regularly updated to reflect the latest advisory and guidelines.
Validation/endorsements	National Government, Singapore
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.go.gov.sg/travelandhealth https://www.tech.gov.sg/contact-us/ General +65 6211 2100 info@tech.gov.sg Mainline +65 6211 0888 Quality Service Manager qsm@tech.gov.sg

5.9 AI-enhanced, IoT-connected, eco friendly hygiene micro station

Description and rationale	Soapy offers the first ever AI-enhanced, IoT-connected, eco friendly hygiene micro station, helping consumers to wash hands effectively according to standards set by the World Health Organization. It takes the exact optimal amount of water and soap per hand washing. A computer vision interface verifies that the hand washing was done properly. On request, the soap will now include a plant-derived substance proven to kill tobamo virus – which is more resistant than Corona virus.
When and where was it demonstrated?	During COVID-19 phase, Ministry of Health, Israel
Where was it used?	Israel
What were the results?	Your hygiene is in your Hands.
Validation/endorsements	Local Government
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	2 Oppenheimer Street, 6th Floor, Rechovot, Israel, 76701 Website: www.soapy.care Email: info@soapy.care Phone: (+972) 54 266 3533 Phone: (+972) 50 343 3402

5.10 Remote examining system

Description and rationale	Tyto Care enables providers to remotely examine patients in quarantined wards and patients in isolation at home, without risking exposure. Most hospitals in Israel, including the renowned Sheba Medical Center, are currently working with Tyto Care to examine patients in their quarantined wards, as well as to monitor patients in isolation at home. This allows doctors to gain the vital clinical data they require to monitor the situation from a safe distance, minimizing physical contact and reducing the heavy load on ERs and clinics. The solution can be deployed within one workday
When and where was it demonstrated?	During COVID-19 phase, Sheba Medical Center, Israel
Where was it used?	Israel
What were the results?	A comprehensive Primary Medical Exam and Telehealth Visit
Validation/endorsements	Local Government, Sheba Medical Center
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	http://www.tytocare.com/

5.11 Rock Art Enhancer App

Description and rationale	Android smartphone application, Rock Art Enhancer App could rapidly detect invisible facial flushing, the subclinical sign in COVID-19 patient that could not be visible and recognized by the naked eye with a novel method. We discovered the innovative method which can detect invisible facial flushing in dengue infection and influenza by using image enhancement with decorrelation combined image segmentation with K-means clustering. We expect to be able to apply to the COVID-19 patient too, because the clinical signs and symptoms, including the immunopathogenesis of dengue infection and influenza are similar to COVID-19. This is the first case of the COVID-19 patient with the appearance of invisible facial flushing detected by the smartphone application. The innovative application may be useful as a rapid screening tool for diagnosis of COVID-19 patients in the future. This novel screening tool for diagnosis of COVID-19 patients will help all medical service providers the effective screening tool for the recognition and early diagnosis before performing CT scans and real-time RT PCR (rRT-PCR) assays, especially in some health care facilities where could not be performed due to lack of laboratory support. Furthermore, application in active case finding for COVID-19, the key actions to stop transmission is challenging in countries with community transmission.
When and where was it demonstrated?	We demonstrated the invisible facial flushing in COVID-19 patient rapidly detected by smartphone application. The Rock Art Enhancer app using for Android smartphone in three step technique uses a combination of decorrelation stretching for enhancing the colors in photos to make faint features more visible and with color thresholding for image segmentation. We applied the Rock Art Enhancer app with the face photo of a COVID-19 patient, a 33-year-old ophthalmologist who was one of the first people to recognize the outbreak of 2019 novel coronavirus disease (COVID-19) in Wuhan, a Chinese doctor who became a folk hero after he was taken in by authorities for warning about the dangers of a deadly new virus now spreading around the world. This innovative technique revealed generalized areas of facial flushing,

	including on nose, around the eyes, cheeks, and forehead presented in the figure C and D. This article was submitted to the Journal of Healthcare Engineering waiting for the publication online.
Where was it used?	Because facial flushing in COVID-19 patient was subclinical sign which was unrecognized and invisible to the naked eye and this is the first case of the COVID-19 patient with the appearance of invisible facial flushing detected by the smartphone application so it has not been used anywhere before.
What were the results?	The sensitivity of three steps modified Manote and Matinun technique for all tests in dengue, influenza patients was 96.8%. We expect to be able to apply to the COVID-19 patient too, because the clinical signs and symptoms, including the immunopathogenesis of dengue infection and influenza are similar to COVID-19. Advantages of the detection of the invisible facial flushing in COVID-19 patient by image enhancement and segmentation. 1. Non-contact and non-invasive, only take photos with a smartphone. 2. Available everywhere, almost everyone in every family in the whole country or all levels of medical providers can send the face photos via the internet such as Facebook and Line app. 3. To be useful as a rapid screening tool for diagnosis of COVID-19 before performing CT scans and real-time RT PCR (rRT-PCR) assays. 4. To be useful in active case finding for COVID-19, the key actions to stop transmission for further care and isolation, contact tracing and quarantine. 5. Can be the effective clues for the recognition and early diagnosis of COVID-19. 6. Interpret the findings quickly within 1 minute for three step technique uses a combination of decorrelation stretching with color thresholding for image segmentation. 7. Can be done repeatedly in the next 1-3 days without any pain and more economical than laboratory tests. 8. Can be used in all healthcare facilities in telemedicine following the doctor's advice.

	The enhanced face photos using the smartphone application may be useful as a rapid screening tool for diagnosis of COVID-19 patients. Furthermore, this clinical discovery with medical image enhancement may apply for all patients with viral induced cytokine storm such as dengue infection, influenza, Ebola, Middle Eastern Respiratory Syndrome coronavirus (MERS-CoV) and Severe acute respiratory syndrome (SARS) caused by SARS coronavirus (SARS-CoV) in the future medicine and may be used in conjunction with thermoscan camera as front line screening and diagnostic capacity.
Validation/endorsements	This is the first case of the COVID-19 patient with the appearance of invisible facial flushing detected by the smartphone application. The process and interpret the finding are rapidly within 1 minute for three step technique. This article was submitted to the Journal of Healthcare Engineering waiting for the publication online.
Approximate cost	Rock Art Enhancer App was available on Google Play Store priced US $ 1.99.
Funding sought	None.
Contact details and further information (please specify, which elements could be published)	MANOTE ARPORNSUWAN, M.D. ORCID: 0000-0001-9689-4157 - Retired Medical Physician, Senior Professional Level, Buriram Hospital, Buriram 31000, Thailand Email: manote_arpornsuwan@yahoo.com

5.12 Technology Stack, home service, project diya

Description and rationale	DoctorC is a tech-first healthcare provider. Founded in 2014 by Neehar, Mansi, Karan, with a goal to transform the delivery of healthcare from being designed for doctors and providers, to a consumer centric model. We build our own software and we employ our own medical teams. Our core focus is diagnostics. Within diagnostics, we provide the following: Home Service: Customers get healthcare services at home. We have a team of 70+ specialists (DoctorC personnel) in 12 cities across India. Book: Customers can book the service online / on the phone Track: We track the phlebos, samples and process the test via our partner labs Report: Digital Reports are generated for consumers online Walk-ins: Customers use our platform to obtain transparent information about the diagnostic offerings of our 220+ partner labs (all of whom are accredited). They can compare labs, tests, prices, and book appointments via our platform. We believe there are three pillars in the direct fight against the virus: Getting Equipped: Testing kits, and other medical equipment, are presently in huge shortage. Presently, the battle is to be able to obtain equipment in order to be able to test at scale. Accelerate testing: Once supply is established; India will need to test people at previously unseen rates. No diagnostic centres or hospitals (public or private) have the technology to be able to track such a large volume of testing without scaling up their operations team. This includes tracking the number of people who need to get tested, delivering the test to them, and processing the results fast & accurately. This is going to result in an operational roadblock. Accurately targeting: Official data sources only provide information about (a) the total number of people who have been tested and (b) the number of people who have tested positive. Presently, little is known about the true spread of the virus. We believe that we are best positioned to help in putting together Pillars 2 & 3. These are our solutions:

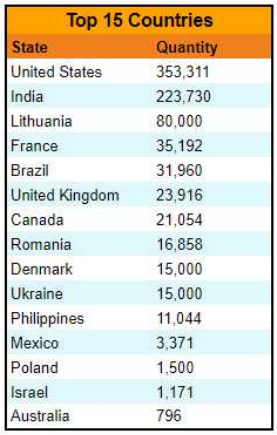
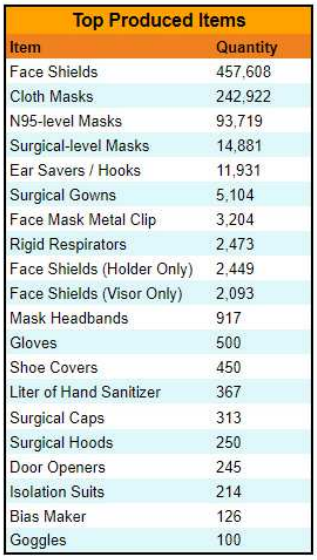
	Technology stack: Given the volume of testing that needs to take place, we will provide the Covid testing facilities with the ability to integrate with our technology – providing them with a one-stop solution to be able to book, track, and report COVID-19 testing. They will be able to scale operations on the ground without having to add any manpower at the back end. Almost all diagnostic centres must employ at least 1 person in the back office for every 10 technicians. With our tech, logistics management (i.e. the process of booking, tracking, and reporting) becomes completely automated. Home Service: We are in the process of making our home service operations compliant with Indian Council of Medical Research (ICMR) guidelines on COVID-19. In the next few weeks, we intend to rapidly add to our network of medical technicians, train, and deploy them to provide safe, accurate, and high-quality home service, in partnership with authorized labs. However, given the ease of transmission and the volume of cases that need to be tested, traditional home care delivery may prove to be unviable both in terms of speed of delivery as well as cost. We are developing novel ways to streamline COVID-19 testing on this basis. Project Diya: Project Diya (projectdiya.com) is an initiative to estimate the true spread of the Covid-19 in India. The tool estimates, based on individual responses, if people are eligible for getting tested for the virus (based on ICMR guidelines) and their location. Data from this dashboard will indicate geographic areas showing spikes in COVID-like symptoms. As a result, we would be able to: Provide healthcare services in a targeted, data-driven way Identify the number of cases far more accurately than what is being presently done
When and where was it demonstrated?	Technology Stack: We have already integrated our technology stack with two of the largest diagnostic chains in Southern India: Aarthi Scans (Link to integration) and Lucid Diagnostics (Link to integration). All their digital sales on their websites are routed through our platform. Four of our existing partners have also expressed interest in using our tech stack. Publicly listed Vimta Labs, a B2B diagnostics provider which doesn't have a field presence but has been authorised by ICMR to conduct testing, has expressed interest to use our tech stack. We will reach out to diagnostics centres across the country and integrate logistics management and digital sales.

	Home Service: Given our experience in home service, the fact that we already process 10,000+ tests per month, and our ability to hire and train high-quality medical professionals at speed, we can support patients who need to be tested by working alongside authorized diagnostic labs to provide high quality home care. As a result, we estimate that we will have to hire over 100 technicians (in addition to our existing 71 technicians). They will be able to conduct a maximum of 2,000 COVID tests per day over the next 12 months (750,000 tests cumulative). Project Diya: In just four days, we have received over 10,000 responses and are in discussions with ICMR to adopt Project Diya as a source of information. We will also reach out to state governments to use the data. We hope that over the course of the next 12 months, over 160 million Indians will take the survey to help assess measures that need to be taken at a granular level in order to contain the spread of the virus.
Where was it used?	Technology Stack: We have already integrated our technology stack with two of the largest diagnostic chains in Southern India: Aarthi Scans (Link to integration) and Lucid Diagnostics (Link to integration). All their digital sales on their websites are routed through our platform. Home Service: We already process 10,000+ tests per month, and have the ability to hire and train high-quality medical professionals at speed – without adding any additional man-power at the back end. Project Diya: We have received over 10,000 responses and are in discussions with ICMR to adopt Project Diya as a source of information. We will also reach out to state governments to use the data.
What were the results?	Technology Stack: Before partnering with these centres, they had no digital presence. The growth of digital sales in diagnostics is accelerating. With our tech stack, labs will be able to scale sales without adding manpower at the back end. Home Service: We provide 10,000+ tests per month and employ over 70 healthcare specialists. We have very high customer satisfaction, with a net promoter score of 76.

	Project Diya: Out of the 10,500+ people that have taken the test, 450 (4.2%) have been eligible to get tested under ICMR guidelines. However, out of those, only 9.3% (42 people) did get tested whereas 408 people did not get tested.
Validation/endorsements	Investors: D A Prasanna: Founder and CEO of GE Medical Systems India Perot Jain: Dallas based VC firm led by Anurag Jain and Ross Perot Jr Anil Dharni: Co-founder of Funzio Other Notable Investors such as: Aluri Rao (former Managing Director of Morgan Stanley PE), Chaitanya Despande (head of investments for Marico and advisor to Mariwala Family Office), Gautam Pai (The Manipal Group) Partner Labs: Our network of 220+ partner labs are some of the most recognized across India and include: Thyrocare, Neuberg (both have already been authorized by ICMR to provide the COVID-19 tests), Lucid Diagnostics, Suburban Diagnostics, Tesla Diagnostics, Sterling Accuris Diagnostics. We expect more of our partner labs to be able to be authorized soon. Team: Neehar - CEO: CS Masters @ Brown University; 4 Years @ Oracle, Bay Area Mansi - COO: CS Masters @ Cornell University; 4 Years @ Oracle, Bay Area Karan - CTO: CS Masters @ Cornell University; 3 Years @ Funzio, San Francisco Dr. Justin Schram - Advisor: Ex-Regional Medical Director @ Landmark Health Our core team have known and worked with each other for over 5 years on average
Approximate cost	Integration of Tech Stack: USD 150,000 Home Service Expansion: USD 310,000 Project Diya: USD 30,000 Total: USD 500,000
Funding sought	USD 500,000
Contact details and further information	Neehar Cherabuddi Mobile: +91 99089 67570 Email: neehar@doctorc.in

5.13 CLOUDMAKER platform

Description and rationale	There is currently a huge shortage of PPE and medical equipment across the healthcare sector around the world. Local businesses and makers want to help but do not have the organization to make effective connections with hospitals. We are scaling up an online platform to connect SME manufacturers, workshops, and makers (3d printers) with hospitals and healthcare facilities in need of PPE and medical equipment. We set a medically approved product library and quality check producers, then take orders from hospitals and pass to the best local manufacturer to deliver. This (CLOUDMAKER) is a platform that is highly scaleable so long as there are local teams of makers (of all kinds), companies and doctors willing to work together. In an absolute worst case scenario, the platform can enable coordination of local teams to make open source ventilators (whilst maintaining social distancing, which requires careful coordination)
When and where was it demonstrated?	Similar initiatives or projects are underway across the world as local makers and businesses use facebook groups to connect with each other and local healthcare services. In Vietnam this is being done on a less coordinated scale through facebook. https://www.facebook.com/groups/155042985943381/
Where was it used?	One such example is the Open Source Covid19 Medical Supplies group, of over 70,000 members. They started on facebook less than a month a go and have already separated into smaller local organizations to serve national and regional needs without so much noise in channel. https://www.facebook.com/groups/opensourcecovid19medicalsupplies/ They are operating in the US, across the EU, and in several South American countries. Countries registered to date include:

	
What were the results?	So far these communities have manufactured and delivered over 800,000 pieces of protective equipment (primarily face shields) to healthcare centers around the world. They have enabled local healthcare workers to get enough PPE to continue delivering care safely, and have expanded their operations to cover groups who are ignored or lower priority such as care home workers, quarantine camp workers, lab techs, and testing staff. These are the totals as of April 13th  In Vietnam using social media groups various makers, companies and schools have already made and donated thousands of face shields and mask holders to their healthcare facilities.

Top 15 Countries

State	Quantity
United States	353,311
India	223,730
Lithuania	80,000
France	35,192
Brazil	31,960
United Kingdom	23,916
Canada	21,054
Romania	16,858
Denmark	15,000
Ukraine	15,000
Philippines	11,044
Mexico	3,371
Poland	1,500
Israel	1,171
Australia	796

Top Produced Items

Item	Quantity
Face Shields	457,608
Cloth Masks	242,922
N95-level Masks	93,719
Surgical-level Masks	14,881
Ear Savers / Hooks	11,931
Surgical Gowns	5,104
Face Mask Metal Clip	3,204
Rigid Respirators	2,473
Face Shields (Holder Only)	2,449
Face Shields (Visor Only)	2,093
Mask Headbands	917
Gloves	500
Shoe Covers	450
Liter of Hand Sanitizer	367
Surgical Caps	313
Surgical Hoods	250
Door Openers	245
Isolation Suits	214
Bias Maker	126
Goggles	100

Validation/endorsements	We are supported by UNDP Vietnam, as well as the Vietnamese French chamber of commerce. We have started with local 2 social media groups, connecting makers and medics, which have grown to several hundred members each in a matter of days. We have delivered 200 face shields personally, will be delivering another 100 this week (this is from our own resources) and are also working to deliver anti aerosol boxes to hospitals across the country over the next week.   We are working with FV hospital and Decathlon to help use their masks as respirators and distribute upgrades through local 3d printers. There are 5 local factories in our network who are scaling up to produce thousands of face shields, mask holders, and anti-aerosol boxes to distribute.
Approximate cost	About $200,000 to scale up to reach multiple continents within 6 months, including funding for the initial materials for makers.
Funding sought	$185,000 USD. We have started the project with $15,000 of our own funds.
Contact details and further information (please specify, which elements could be published)	Rafael Masters CEO Vulcan Augmetics 90/2 Bach Dang Phuong 2 Q. Tan Binh Ho Chi Minh city Vietnam www.wearevulcan.com www.cloudmaker.vn https://www.facebook.com/cungchongcovid19/ (Our page to take orders from medical staff) https://www.facebook.com/groups/563059407644907/ (Our maker group)

5.14 WellteQ App

Description and rationale	Introduction WellteQ is an enterprise digital health platform based out of Singapore. Incorporated in October 2013 we have secured corporate customers predominantly across Asia Pacific with some in Europe and most recently in Canada. Our smart phone app is accessed by users to connect wearables, receive personalised nudging, earn badges and prizes, participate in group and individual programs. Our most used program is mental wellness. We can connect through 'click-to-call' to telehealth. Corporates offer this to their employees to reduce risk and cost associated with human behaviours (absenteeism, health and safety, productivity). We white label our platform for insurers where their objective is user engagement and healthy behaviour change. Wearable and self-reported data screen users for risk which we can then promote and/or incentivise early intervention into telehealth or referral into primary care consultation. We capture a high volume of health profile, attitudinal, psychological and biometric data that we display for our clients via analytics dashboards and can export data extracts for more sophisticated clients. Rationale The primary focus is to mitigate infection spread via isolation. The consequence of isolation are many, most of which increase unhealthy behaviours and coping strategies (sedentary behaviour, caloric intake, stress, financial pressure, social withdrawal, alcohol and other drug consumption, relationship conflict, domestic violence and suicide. We need to support people and the best (and only) way to do this at scale, promptly and affordably is leveraging existing community digital infrastructure – by way of smartphones, wearables and telehealth. Wearables we can capture asymptomatic signals of fever via continuous biometrics (heart rate, heart rate

	variability, sleep, pulse oximetry and activity data., useful in early identification of COVID. Push notifications nudge a user towards healthier daily habits (towards COVID hygiene practices and lifestyle illness prevention eg sleep, activity, stress, nutrition) and away from unhealthy coping (excess alcohol, sleep deprivation, withdrawal). Telehealth – connect users into telehealth consultations in any market where teleconsultations exist (medicine, psychology, allied health) Mental Health Programs – this period is the most stressful since the great depression. We need to promote and support mental health hygiene. Our programs provide fundamentals and can escalate telepsych support as required. Gamification – social engagement offering community programs and individual challenges, rewards and prizes can be offered. The rationale for use case is better explained in this presentation
When and where was it demonstrated?	We have been deploying to corporate customers for over 5 years across Asia Pacific, EMEA and now Canada/US. Our leadership has key noted at conferences globally.
Where was it used?	In excess of 30 countries in enterprise corporate health contracts over the course of 5 years. APAC, EMEA and most recently Canada/US.
What were the results?	31% increase in engagement 1 in 2 users reduced stress 28% increase in resilience Reduction in stress 10% 1 in 3 reduced alcohol intake 46% users improved sleep quality For some case studies see this presentation
Validation/endorsements	Dr Sandy Chong –United Nations Australia (Australia) Dr Shakeela Mariyam – WHO ex Chairperson (Maldives)

	Joern Watzke – Garmin Head of Enterprise (Germany) Erin Fullarton (nee Maclean) Bupa Insurance (Australia) Cendric Luah – Willis Towers Watson (Singapore) Nathan Vincent – nib insurance Australia (Australia) Ed Hagard – Sanofi (Singapore) All contact details (phone/email) provided upon request
Approximate cost	Volume pricing scale (50k+ users) USD $1 - $5/quarter per user per month License pricing territory (per state/country) by arrangement Further pricing discounts applied for investors
Funding sought	USD$5m – expanded operations Asia USD$15m – expansion Asia + America's USD $25m – expansion Asia, America's, Europe
Contact details and further information (please specify, which elements could be published)	Corporate details: Scott Montgomery, Founding CEO scott@wellteq.co +6584563858 Publishable details: wellness@wellteq.co

5.15 Secure and personal cloud storage

Description and rationale	MyHealp is a secure and personal cloud storage solution for the healthcare of individuals, based on the data privacy of the end-user. The information into the system can only be input and retrieved form the end-user. Like google drive, with Myhealp the user has a private and secure account on Myhealp cloud system solution to store and manage all the individual healthcare information. The system is built in a secure and private environment, where the user can manage all its healthcare information, coming from multiple sources, but always updated from costumer, and never connected to 3rd party systems. Some basics of the solutions are: - Data privacy and security. - Multiple data input source, always managed from user, and exclusively from its Smartphone. - Continuous engagement of the costumer with AI solution, through self-assessment of the end-user health status based on Surveys. - Surveys are created from specialist and are used for automatic evaluation of the end-user health state. After Coivd-19 starts, Myhealp creates specific survey to support the end-user to evaluate its Exposition and Risk to Covid-19. Thanks to this specific survey, MyHealp has given to the end user the opportunity to daily evaluate its health state based to exposition to Covid-19, based on the self-evaluation through survey, end-user habits and movements. From Myhealp we support the end-user, by support him/her with set of tools to manage its health and also at this moment to self-manage the exposition and risk to Covid-19. To support Covid-19 situation MyHealp has created a Covidhealp module, which has updated the existing solution with: - Dashboard to inform to the user about its daily evaluation. - Specific survey for self-assessment of the end-user to evaluate the exposition and risk to Covid-19.

	- Secure QR code generation to share basic information to authorities and/or health care system in case of positive evaluation. - Self-recoding of the individual movements to evaluate the exposition and risk to Covid-19. Myhealp through Covdhealp solution was also updated with a Confidence value which defines the veracity of the data input by the end-user. All these values are computed in real time by the AI system. Data computation are based on the real usage of the application from the end-user. Thanks to CovidHealp module inside Myhealp APP, we are expecting to become the digital and individual protection system for end-user, which together with the medical tests, we can deliver to the countries and authorities the right tool to keep the pandemic under controlled, through interactive and safe real time manner. Also, we can manage direct communications between State and Citizens, due to possible affectations referring to the Covid19 (like possible positives), and also the management of confinement of citizens, and its mobility. Solution is targeted to be a tool for Authorities and Healthcare systems.
When and where was it demonstrated?	Myhealp was built on top of a Connected Car solution, which is already deployed and under usage in Asia since 2018 and which is used for end-user to manage its driving information and to manage push communications. Myhealp was built by reusing this Connected car platform due to the capabilities of the existing platform as principals: - Data privacy and security: from cybersecurity point of view the platform was already audited by independent's cybersecurity agencies (Dekra and Securtity By Design). - Platforms has a centric approach to costumer. Thanks to its already proven AI solution, the system automatically evaluates the user and generate content to communicate and engage with costumer without human intervention; keeping the data privacy of the end user.

<table>
<tr><td></td><td>During these last 2 years, the solution as connected car solution has been demonstrate:
- Security and data privacy.
- Reliability on operations.
- Great performance on end-user engagement.</td></tr>
<tr><td>Where was it used?</td><td>Solution is currently used in Indonesia for Costumer engagement in Connected Car solution.
In these last 2 years of operations it has demonstrate the result on services reliability and costumer engagement.
From MyHealp point of view the solution is under evaluation from some Municipalities in Spain to manage the access of general public to the public services and massive events, based on the 3 values coming from the CovidHealp module (Exposition to Covid-19, Risk of having Covid-19 and end-user confidence level). Based on this values, the authorities together with health care system can manage the accessibility and keep the risk under control in a real time manner without braking a the privacy of the individuals.</td></tr>
<tr><td>What were the results?</td><td>As a secure and reliable cloud service platform, with centric approach to costumer thanks to the automatic data processing through real time AI algorithms and communications, the current results are:
- Reliability of the solution on 2019 was 99,8% of uptime
- Engagement of end-users:</td></tr>
<tr><td>Validation/endorsements</td><td>From medical point to of view the solution is under evaluation from several medial specialist some of them experts in epidemiology, like:
- Emma Roca (www.linkedin.com/in/emma-roca-60877a87)
- Dr. Gonzalo Grazioli</td></tr>
<tr><td>Approximate cost</td><td><table>
<tr><th>Number of Users</th><th>Monthly Cost</th></tr>
<tr><td>0 -5.000</td><td>275 €</td></tr>
<tr><td>5.001 - 10.000</td><td>500 €</td></tr>
<tr><td>10.001 - 15.000</td><td>675 €</td></tr>
<tr><td>15.001 - 20.000</td><td>800 €</td></tr>
<tr><td>20.001 - 25.000</td><td>875 €</td></tr>
<tr><td>25.001 - 30.000</td><td>900 €</td></tr>
<tr><td>30.001 - 50.000</td><td>1.250 €</td></tr>
</table></td></tr>
</table>

	50.001 - 100.000	2.000 €
	100.001 - 500.000	9.000 €
	500.001 - 1.000.000	17.000 €
Funding sought	Looking for Series A round.	
Contact details and further information (please specify, which elements could be published)	You can find more information in the following websites: - https://www.myhealp.com/ Contact details: Lluis Olivet Cos 0034.699.430.749 hello@myhealp.com	

5.16 Place Checkup - White Label Platform

Description and rationale	Place Checkup - White Label Platform PlaceCheckup.com allows establishment managers to manage their operations related to the safety and cleaning guidelines to mitigate COVID-19 and let their customers know about it. The platform allows businesses to follow specific routines to mitigate propagation risk. Afterwards, costumers can search for businesses near them which have a certificate and thus, have a lower risk of COVID-19. Place Checkup shares the WHO recomendations and local recommendations in terms of higienization routines so that business owners can reduce the spread of COVID-19. Allowing businesses to share a certificate stating the compliance with these routines gives confidence to consumers and people as a whole. This solution directly impacts the UN Sustainable Development Goal #3: Health and Goal #9: Infrastructure, industrialization. Our orientation is to provide safety and reduce the health impacts of COVID-19 while fostering innovation and increasing the possibility for businesses of any scale, size or geography to communicate to their customers that they are mitigating the pandemic impact.
When and where was it demonstrated?	The project pilot was deployed in Portugal in May, through social media channels and partnerships with local professional associations.
Where was it used?	Certificates have been given to companies in Portugal, Spain, Brazil, United Kingdom and Angola.
What were the results?	As of last official count, 226 certificates have been created, meaning 226 companies that have performed adequate cleaning routines to reduce
Validation/endorsements	ACB - Associação Comercial de Braga http://www.acbraga.pt/ NERBA - Associação Empresarial do Distrito de Bragança

	https://www.nerba.pt/pt/
Approximate cost	Free for end-user. Free for business owners that request the certificate. Approx. EUR 300.000 in development costs during 2020.
Funding sought already and challenges for scaling up	All development has been funded by Infraspeak's own funds and resources. The scalling up challenge is getting to sufficient businesses and associations in order to democratize this tool and ensure that correct
Contact details and further information (please specify, which elements could be published)	Felipe Ávila da Costa - CEO (fcosta@infraspeak.com) José Vieira Marques - Head of Partnerships (jmarques@infraspeak.com)

5.17 LazioDoctor per Covid from Regione Lazio

Description and rationale	LazioDoctor per Covid from Regione Lazio Through the mobile Android application downloaded on the phone and a self-assessment questionnaire, some information will be processed by the system and will be made available to healthcare professionals. In the case of answers indicative of risk of contact or infection, the patient will be contacted for further information and tele-visited; in this way it will be possible to contact your general practitioner in virtual mode, anywhere. The application provides secure bidirectional text-audio communications via smartphone between the citizen and their doctor. The video call is activated, if necessary, by the doctor to investigate the patient's clinical picture.
When and where was it demonstrated?	During COVID-19 phase, Local Government, Ministry of Health, Italy
Where was it used?	Italy
What were the results?	Through the mobile Android application downloaded on the phone and a self-assessment questionnaire, some information will be processed by the system and will be made available to healthcare professionals.
Validation/endorsements	Local Government, Ministry of Health, Italy
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.regione.lazio.it/DRcovid/

5.18 Movendos Health Platform

Description and rationale	Movendos is focusing on remote solutions in healthcare, social care, rehabilitation and therapy. Movendos Health Platform enables selected easy to use services related to need- and symptom-based time reservation, data collection, surveys, reporting, remote appointments, chat and messaging. The solution enables access to right care at the right time and gives professionals fluent daily tools, being it traditional reactive sick care or emerging preventive care.
When and where was it demonstrated?	During COVID-19 phase, Local & National Government
Where was it used?	Finland
What were the results?	Focusing on remote solutions in healthcare, social care, rehabilitation and therapy-easy to use services related to need- and symptom-based time reservation, data collection, surveys, reporting, remote appointments, chat and messaging.
Validation/endorsements	Movendos
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.movendos.com/en/ Movendos Oy Kalevantie 7C 33100 Tampere E-mail addresses Sales: sales@movendos.com Coaches: coaching@movendos.com Emails format: firstname.lastname@movendos.com

5.19 Olwel platform

Description and rationale	Olwel platform is providing remote-monitoring, telemedicine and counselling to the Covid-19 suspected and quarantined people and facilitating to isolate the infected people or refer to the right hospital at the right time.
When and where was it demonstrated?	During COVID-19 phase, Local & National Government
Where was it used?	Finland
What were the results?	For providing remote-monitoring, telemedicine and counselling to the Covid-19 suspected and quarantined people and facilitating to isolate the infected people or refer to the right hospital at the right time.
Validation/endorsements	Olwel platform
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://olwel.com/en/ Call 09666 766 000 Reach us directly from your phone.

5.20 VideoVisit remote care system

Description and rationale	VideoVisit offers a complete remote care platform with all necessary tools for social- and healthcare service providers for care beyond hospital walls, and also for communication between patients in service homes and their family. In co-operation with GetJenny, the company has also created a coronavirus chatbot that can be linked to websites to answer customers' questions.
When and where was it demonstrated?	During COVID-19 phase, Local & National Government
Where was it used?	Finland
What were the results?	Necessary tools for social- and healthcare service providers for care beyond hospital walls, and also for communication between patients in service homes and their family.
Validation/endorsements	Olwel platform
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.videovisit.fi/ sales@videovisitglobal.com +358 9 3158 9800

5.21 THOR UVC Disinfection System

Description and rationale	THOR UVC Disinfection System
When and where was it demonstrated?	Deployed globally in over 26 countries. For the purposes of this form, please consider the Netherlands.
Where was it used?	Zaans Medical Center, Kon. Julianaplein 58, 1502 DV Zaandam, Netherlands
What were the results?	The Zaans Medical Center has developed a scalable UV-C disinfection method to disinfect FFP1 mouth masks by using a UV-C robot (THOR UVC). The SARS-CoV-2 is a virus that is sensitive to UV-C, which makes this method suitable for disinfection of FFP1 masks used by healthcare personnel in the nursing of COVID-19 infected patients. Both sides of the FFP1 mask are irradiated, achieving complete disinfection of the inside and outside of the mask. The function and fit of the FFP1 mask is not affected during disinfection, making the mask safe for reuse. The UV-C principle can be applied for multiple disinfection of FFP1 masks. This method represents a breakthrough in the current times of scarcity. The Zaans Medical Center can sterilize large numbers of masks per day and is, of course, willing under the current circumstances to make the remaining sterilization capacity available to other healthcare institutions and healthcare providers at no cost and therefore completely free of charge. .
Validation/endorsements	The SARS-CoV-2 is an RNA virus that bears a strong resemblance to the previous SARS-CoV. Sars-CoV has revealed from the literature how much UV-C radiation is needed to destroy it . We have shown through measurements that we achieve enough radiation throughout the mask to inactivate the virus. We have had our measurements tested/validated by an (independent) certified company. In addition, we have our findings tested by the National Expert Group..
Approximate cost	£39,950 GBP

Funding sought	£50,000 GBP for further testing of product in applications such as ambulances, aircraft and healthcare facilities with direct focus on COVID-19 control.
Contact details and further information (please specify, which elements could be published)	Tristan Williams, Technical Director, FINSEN TECHNOLOGIES – 00 44 7387 184327 Annette Crowe, Sales and Marketing Director, FINSEN TECHNOLOGIES – 00 44 7798 932663 Extracts for publication: https://www.noordhollandsdagblad.nl/cnt/dmf20200327_79365593/zaans-medisch-centrum-ontwikkelt-methode-om-mondmaskers-in-tijden-van-de-coronacrisis-te-hergebruiken https://www.zaansmedischcentrum.nl/over-zmc/nieuwsberichten/zaans-medisch-centrum-ontwikkelt-methode-voor-hergebruik-ffp1-mondmaskers-door-uv-c-desinfectie/ https://www.zaansmedischcentrum.nl/over-zmc/nieuwsberichten/zaans-medisch-centrum-ontwikkelt-methode-voor-hergebruik-ffp1-mondmaskers-door-uv-c-desinfectie/)

5.22 Firegent's Qwikidata

Description and rationale	Description: Firegent iASP Sdn Bhd helps organizations to manage data across distributed teams and beyond. Our solution uses A.I. to automatically capture data from documents, share it and chart it with zero coding. Firegent's Qwikidata is the data exchange platform that automate the collation, updating and distribution of 'ready-to-use' (reusable) data. Extracted data can be combined with data from multiple sources for deep and comprehensive analysis. Rationale: To solve the problem of data trapped inside documents and data silos belonging to different organizations or employees scattered across various locations. This is a problem when multiple teams or employees attempt to communicate or access the data for processing or analysis. Problems: - Slow and costly to capture data from various document types like PDF, MS Excel, MS Word. - Aggregating data from various sources is messy and painful. - Managing the flow of information is difficult - A lot of time and effort is wasted on just moving data around and formatting in a way that makes it usable for analytics. - Technical expertise is needed to extract, transform and load data before it can be use.
When and where was it demonstrated?	2014 – London, UK 2016 – Singapore 2019 - Kuala Lumpur, Malaysia 2020 - Kuala Lumpur, Malaysia

Where was it used?	Amarjaro Pte Ltd Traveller Buddy CIMB Bank CL Systems Sdn Bhd
What were the results?	80% reduction in overall processing time. Reduction in staffing by 40%. Provide all employees the ability to share data and design interactive charts without any coding. Enable clients to access and analyse data in a real time and dynamic way beyond the limitations of Excel.
Validation/endorsements	2018 Member of state government organisation, SITEC (Selangor Info Tech and e-Commerce Council) Top ten finalist for Selangor Accelerator Program 2015/16 Recipient of the "Coach and Grow Program" from Cradle Fund under the Ministry of Finance Malaysia to fund and develop high calibre tech startups. 2015 Recipient of the "MaGIC e@Stanford Program" under the collaboration between MaGIC (Malaysian Global Innovation & Creativity Centre) and Stanford University, USA.
Approximate cost	US$15/account/month
Funding sought	US$50,000
Contact details and further information (please specify, which elements could be published)	Jay Cheah jay@firegent.com www.firegent.com

5.23 G2k COVID Control System

Description and rationale	G2k Solution Description: G2K COVID CONTROL SUITE, All data of the COVID Control Suite converge in the Health Data & Decision Centre. It is the digital control centre for governments and ministries to follow the spread and development of infections in real time. G2k COVID Control System Modules: 1-Fever Scanner: Contactless fever detection for use in neuralgic places like hospitals, traffic hubs or shopping malls. 2- First Contact App: Guided registration of suspicious cases including the recording of symptoms and all relevant information for contact tracing. App-based and digitalized. 3- Hospital APP: For hospitals and clinics: Integration of quick tests and Realtime transmission of bed and test capacities. 4- Patient App: For COVID-19 patients and suspected cases. Documentation of the course of symptoms. Information about care needs. Reliable location information.
When and where was it demonstrated?	To cope with the incredibly high inquiries on the COVID Control Suite G2K decided to host a publicly available product presentation in form of a webinar. The webinar was open to everyone and was actively promoted via partners, social media, newsletters and G2K's own network. It included a live product demo as well as a live broadcast to our SAB Factory (Showroom) in Berlin our headquarters. The webinar reached 321 Live Registrants and an additional 438 viewers of the recorded version on YouTube. The webinar was conducted on the 26th of March 2020.
Where was it used?	1- It was used in Europe’s Largest Private Hospital Group Helios in Germany they Signed a Contract with G2K for Fever Scanner 2- The renowned German dentist “Zahnärzte Im Kaisersaal” decided to install G2K's Fever Scanner to control access to their practice. The system is in use to detect people suffering from fever symptoms before they enter the practice and get in contact with other patients or medical staff, hence reducing the risk of a forced interruption of the operation of the practice.
What were the results?	In Helios Clinics the results showed the accuracy of the G2K Fever Scanner against a medical thermometer has been

	validated during the last week together with the medical professionals on-site. A representative test showed an average deviation of only 1.4%. This means that the G2K Fever Scanner determines the body temperature of people entering the clinic with an accuracy of 98.6%.
Validation/endorsements	Validation from the clients that implemented the G2k system: “The G2K Group’s Fever Scanner is an essential component for the maintenance of our practice. The timely detection of patients potentially suffering from Covid-19 is extremely important to protect our staff and patients from infections and to maintain our practice. The automated and contactless temperature measurement significantly reduces both the risk of infection and the economic consequences for my practice!” - Andreas Bothe, owner of the dental practice. --------- And from Media sources: Our “Covid Control Suite” Has Taken the Press by Storm. Within the Last Weeks Numerous Top Media Have Reported on the G2K Group and Our Contribution in the Fight Against Covid-19 as Forbes, Focus, Hanelsblatt Insider, Source Security and Frankfurter Allgemeiner.
Approximate cost	The cost is a license based according to the project’s size
Funding sought	We would accept funding
Contact details and further information (please specify, which elements could be published)	https://www.get2know.com Contact Persons: mohamed.farouk@g2k-group.com shereen.el-bedewy@g2k-group.com G2k Disclaimer These materials are provided by G2K and its affiliated companies ("G2KGroup") for informational purposes only, without representation or warranty of any kind, and G2K Group shall not be liable for errors or omissions with respect to the materials. The only warranties for G2K Group products

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5.24 iVH HIT

Description and rationale	Many digital initiatives (e.g., tracking applications) were launched since Jan 2020; however, unfortunately, no application provides tips for consistent prevention and safety. "iVH HIT" is an App dedicated to health awareness offering health tips on CoViD-19 (Coronavirus) since late February. These tips are compiled from various information made available by authoritative sources such as the World Health Organisation, the Centres for Disease Control and prevention, the National Health Service of the United Kingdom and Social Security in France, and other national sources from East Asia.
When and where was it demonstrated?	Online on Google Play. The app is available in more than 10 languages (English, French, Spanish, Arabic, Russia, Chinese etc), covering large segments of population around the world ▪ Android: http://play.google.com/store/apps/details?id=net.iValueHealth.HIT ▪ iOS: http://apps.apple.com/app/id1050871566
Where was it used?	The Application is Download in more than 40 Countries, especially in Middle East, Africa and South East Asia. Service is open to all the institutional partners (public and private companies both) who want to contribute and increase awareness fighting against the disease.
What were the results?	It has been downloaded 340 thousand times approximately. Currently more than 1000 new users downloading this App on daily basis.
Validation/endorsements	The app is meant for wellness/health tips (best practices, gestures and preventive/safety tips) and does not intend to replace any medical professional or any kind of treatment, diagnosis or prescription. These are even useful once the disease is over “as reminder”.
Contact details and further information (please specify, which elements could be published)	Munishk Gupta Beginning SAS 54 Rue Voltaire, 92300 Levallois Perret, France Email: Munishk.gupta@beginning.tech

5.25 online learning modules to share clinical expertise

Description and rationale	COVID-19 is placing unprecedented strain on healthcare systems across the world. Specifically, there are many existing healthcare professionals and non-clinical staff who need to be rapidly upskilled to care for COVID-19 and stay safe themselves. Generation is a global non-profit that rapidly trains and places disconnected learners in careers – in our first five years, we have served 37,000 learners across 27 professions (four in the healthcare sector) and 14 countries. One of Generation's strengths is our ability to rapidly create an activity-based curriculum that drives productivity and quality outcomes for a profession. As COVID-19 spread, we sought to deploy this skill to help healthcare professionals. Italy is the first country we supported to upskill nurses. We are launching similar programs in Mexico and India, and we are conducting diligence in three other countries as well. Italy The pandemic has required a broader set of healthcare professionals to acquire basic and operational skills and knowledge on the main procedures required to treat and care people infected by COVID-19. These procedures are usually known and utilized by nurses working in Intensive Care Units (ICU). Other nurses have studied these procedures at university level but are not necessarily familiar in managing and dealing with them, especially in pandemic circumstances. Within three weeks, we formed a coalition and supported our medical and academic partners by creating eight hours of online learning modules to share their clinical expertise. The course was promoted by Generation Italy, which coordinated the partners and offered assistance in designing the online learning experience; by the Vita-Salute San Raffaele University and the San Donato Group, as scientific partners and responsible for the content of the Program; by Intesa Sanpaolo, project partner for the production and promotion of the course; by Sky Italia, which through its creative and productive capacity produced and post- produced the video-lessons; and by FNOPI-National Federation of Nursing

	Professions Orders, partner for the delivery of the course and for national accreditation. The modules--which provide information on personal protective equipment use, non-invasive ventilation procedures, and stress management under emergency conditions—were nationally accredited by the Ministry of Health and launched on the national nursing association website last week. The course is delivered entirely online, and qualified participants (nurses and healthcare professionals) who successfully pass the assessments receive continuing education credits. https://italy.generation.org/covid-19 Mexico In Mexico, there is a great need for training for non-medical employees who work within the hospital setting to ensure they have the basic knowledge to keep themselves and their families safe given their levels of exposure to the virus. These employees do not normally wear personal protective equipment in the course of their daily work but will be doing so now because of the contagion risk with COVID-19. The Mexican national health care system, IMSS, engaged Generation México to design a virtual course on hand washing, donning and doffing different variations of PPE, best practices in hygiene at work and at home to prevent the spread of infection, and self-care and mental health during the pandemic. Over the course of two weeks, Generation México secured funding from the Interamerican Development Bank and, with technical experts from IMSS, designed and delivered a 90-minute virtual, video-based course designed to be adaptable for a variety of audiences and delivery mechanisms. It will be distributed via the IMSS's internal LMS system to hospital administrative staff with computer access and be shown in-person on screens to shift workers, supported by hospital continuing education facilitators. This program should launch in the week of April 20, and we expect ~100,000 staff members to access the content. India With an objective to contribute to the COVID-19 response, Generation India is redirecting its resources to

	develop an 8-hour online course for upskilling of nurses and nurse assistants, similar to Generation Italy's program. Approach: A diagnostic study was conducted amongst 12 hospitals to understand the key skill gaps; the study revealed four areas where nurses will need upskilling: a) use of PPE b) use of non- invasive ventilators c) prevention of infection and d) personal hygiene. The module will be in three parts: videos (50%), reading material (40%), and assessments (10%). Validation and Endorsement: A coalition was created comprising of 1) a hospital (Medanta Medicity) who is the main healthcare content provider and who will provide space, equipment and a nurse to shoot the videos, 2) a media partner (ABP News) who will shoot and edit the videos, and 3) a nurse association (The Trained Nurses Association of India) who will vet the content. Implementation: The module will be hosted by a variety of organizations who will also help distribute the content, such as the National Skill Development Cooperation (implementation body set up under the Ministry of Skills development & entrepreneurship, Government of India), industry associations like the Confederation of Indian Industries (CII), the Trained Nurses Association of India, individual hospitals, and state governments. The eLearning course with 4 modules is being developed and should be available in late April.
When and where was it demonstrated?	Italy The program was first made available to nurses on April 6th. The course is delivered through the online e-learning platform for the Continuous Medical Education of the National Federation of Nursing Professions Orders (FNOPI). The platform allows all the nurses at a national level to get access and to take the course.
Where was it used?	Italy Nurses taking the courses are coming from all the regions in Italy, from both hospitals and medical universities.
What were the results?	Italy

	In a week from the launch, 11,000 nurses enrolled in the program and 50% of them have already successfully completed it. Nurses across Italy from various hospitals and universities took the course. At one month from the launch of the program, we will have a full detailed report highlighting statistics on the number of users, their gender, age, geographical area where they operate, level of satisfaction and feedbacks on how to improve it. There has also been keen interest to replicate the program for other healthcare professions (see endorsements from FNOMCEO and FNOTSRM below).
Validation/endorsements	
	1. Italy The Vita-Salute San Raffaele University- is a point of reference in the field of university education, as one of the top academic institutions in Italy. The teachers of the course are the professionals of the Vita-Salute San Raffaele University, including Professor Giacomo Monti, Professor Valentina Di Mattei, Dr. Beatrice Bertini and Dr. Maria Teresa Cibelli. Valuable inputs were received from Professor Enrico Gherlone, Magnificent Rector of the Vita-Salute San Raffaele University, from Professor Alberto Zangrillo, Vice-Rector for Institutional Clinical Activities of the University and head of the Anesthesia and Intensive Care Units and Cardio-Thoracic Operative Unit Vascular of the IRCCS San Raffaele Hospital, from Professor Roberto Burioni, Professor of Microbiology and Virology of the Vita-Salute San Raffaele University, and from Professor Duilio Manara, director of professional teaching of the Degree Course in Nursing at the Vita-Salute San Raffaele University. 2. FNOPI - National Federation of Nursing Professions Orders. Partners for Course Delivery and National Accreditation. FNOPI is a public administration controlled by the Ministry of Health and the official body in charge of representing nurses in Italy. 3. GRUPPO SAN DONATO. Being the No 1 hospital group in Italy, Gruppo San Donato is a pioneer in multiple research fields, with outstanding clinical programs and academic excellences. GSD provides diagnosis and treatment in all recognised medical fields that you would expect from a world-class healthcare system. San Raffaele Hospital is part of the GSD.

	4. FNOMCEO – National Federation of Surgeon and dentists Order. FNOMCeO is a public administration controlled by the Ministry of Health and represents physicians and dentists across the country. The Federation has shown interest in granting access to the course for all of their members (approximately 180,000) across the country. Generation Italy is currently developing an MOU with FNOMCEO to formalize the partnership 5. FNOTSRM – National Federation of Technical Healthcare Professions and Technical Radiologists Order. FNOTSRM is a public administration controlled by the Ministry of Health and represents technical healthcare professionals as well as technical radiologists. The federation has shown interested in granting access to the course for their members. Generation Italy is discussing an MOU with FNOTSRM to formalize the partnership
Approximate cost	Italy Development of the program: Includes trainers; design of the online learning experience; content production (supporting materials); production and post-production of the video-lessons; learning objective post-production (adaptation of content to technical standards of the e-learning platform) – these were provided as in-kind donation from the partner. Direct costs ~€15,000, In-kind support ~€45,000 Accreditation of the program: €5,000 Delivery of the program: Costs to set-up the platform, to manage the users, and technical customer service: approximately €30,000 Mexico Program development: ~MXN 750,000 Accreditation and hosting: Managed directly by partners India Program development: ~USD 50,000 Accreditation and hosting: Managed directly by partners
Funding sought already and challenges for scaling up	We seek support to cover our direct program development and delivery costs in Italy and India, totalling USD$100,000. We are also seeking to replicate similar efforts in various additional countries, most likely in Brazil, Pakistan, and

	Kenya in the short term. We would seek funding support of an additional USD$50,000 for each country to cover the costs to design and produce the online program. These requests will be contingent on our formation of the appropriate coalition to create and deliver these programs in each market.
Contact details and further information (please specify, which elements could be published)	• Italy: Oscar Pasquali, Country Manager, Generation Italy (oscarp@generation.org) India: Arunesh Singh, CEO, Generation India (arunesh@generation.org) Mexico: Laura Moodey, COO, Generation Mexico (laura@generation.org) Other geographies: Patrick Morton, Regional COO, South Asia / Middle East / Africa (patrick@generation.org) More Information at generation.org Contact details shared above may be published.

5.26 eSHIFT Partner Network

Description and rationale	Low and Middle Income Countries (LMICs) are currently racing to establish digital systems to handle their first cases of COVID-19 and prepare for the onset of the pandemic in their populations. In March, the Zambian National Health Institute (ZNPHI) requested assistance in evaluating the DHIS2 COVID-19 addon application, developed originally by the Sri Lankan Ministry of Health (MOH). AoS.Health (a digital health technology platform and associated partnership initiative) immediately responded by forming a COVID-19 Task Force consisting of volunteer members of the eSHIFT Partner Network, a Geneva based non-profit association and NGO. Partners in eSHIFT's network have deep knowledge in implementing connectivity solutions that are being used in countries across the world. We have supported governments, charities, NGOs and health organisations to develop connectivity solutions that help to save lives, improve health outcomes and contribute towards UN SDGs, in particular SDG 3 and UHC. Through that work, we have developed Open Interop, an open-source interoperability middleware solution that enables data collection from varied sources, translation and manipulation of data, and forwarding of data to connected endpoints (https://openinterop.org). We have also incorporated a connectivity solution that captures transmissions from medical devices, then maps and routes to one or more healthcare systems using a variety of message formats and healthcare protocols. The Zambian COVID-19 case and contact tracing system can be rapidly deployed for other country usage within a matter of weeks. By taking the existing DHIS2 COVID-19 addon application, we can deploy surveillance solutions, and via Open Interop offer unique interoperability access to other government-to-government (G2G) data sources and APIs (e.g. laboratories, port of entry, census, government IDs etc.). This additional technology component is often essential for the deployment of any successful management information system.
When and where was it demonstrated?	The project commenced in mid March 2020. Within days, the DHIS2 COVID-19 app had been evaluated and the decision made to deploy it as the national COVID-19 case-based surveillance and tracing system. The AoS Health Platform

	and the COVID-19 Task Force offered the most direct means to rapidly deploy this generic, globally endorsed, COVID-19 application package, while making its integration and interoperability into the Zambian context a reality through the additional use of the Open Interop interoperability tool.
Where was it used?	Over the last 3 weeks (March-April 2020) the Task Force, in collaboration with ZNPHI, launched the service in Zambia. Furthermore, an improved version including contact tracing and integration with national points of entry and laboratory case reconciliation is now underway. The Task Force is also supporting the deployment of an associated Android-based mHealth solution with remote device management -- another integrated part of the AoS Health Platform. The Zambian MoH has rapidly adopted this system in order to provide a nation-wide digital option to manage the full data life cycle of this crisis.
What were the results?	The eSHIFT/Aos Health solution has become the national COVID-19 integrated surveillance solution for the Zambian Ministry of Health under the auspices of the Zambia National Public Health Institute (ZNPHI). The solution has been scaled nation-wide with trainings ongoing as of this writing. However, further interoperability and integration efforts, along with ongoing support, are needed in order for this solution to fulfil the country's urgent requirements related to the crisis. Our Task Force is also currently in negotiation with several other countries' MoHs to scale up similar work. In some cases, such as with the Royal Government of Bhutan, work has already commenced.
Validation/endorsements	The Zambia National Public Health Institute (ZNPHI) is our ongoing implementation partner on this effort. The technology choices within the DHIS2 platform have been broadly endorsed by WHO and the global health community (https://www.dhis2.org/covid-19). AoS Health technologies have been evolving under support through grants originating from UK/DFID related to Antimicrobial resistance surveillance (GAMRIF) and connected diagnostics technologies. This proposal includes a letter of endorsement from the Republic of Zambia, National Public Health Institute (ZNPHI).

Approximate cost	The Task Force has been put in place as an urgent humanitarian philanthropic effort, primarily to service the needs of ZNPHI and is currently working on a pro bono basis vis-a-vis the Republic of Zambia. We calculate that approximately 75'000.- USD of FTE time has already been dedicated to the project .
Funding sought already and challenges for scaling up	100'000 USD The COVID-19 Task Force, via eSHIFT as the lead and Principal Recipient / Investigator, seeks donor support for the ongoing digital health efforts associated with COVID-19 response, including the surveillance element, plus other potential ICT related needs. We seek this funding to target the needs in the countries we are supporting now, and to expand the role we can play in other countries under discussion. In Zambia, in collaboration with ZNPHI, we intend to maintain and enhance the COVID-19 surveillance and tracking system. Our AoS Health partnership is committed to ensuring continuity of the service and seeks appropriate funding to achieve this. The Task Force is also committed to expanding the functionality beyond the current programs and sharing these technologies solutions with the broader global digital health community. In particular we see our expertise in technologies to support the engineering of: Linking digital diagnostics including rapid diagnostic test (RDT) data from facilities Lab data integration (to match with case tracking) regional, national integration in particular key realtime linkages to other national data sources additional hardware (tablets, phones, connectivity etc) The Task Force is also currently in negotiations with The Commons Project (https://www.thecommonsproject.org/covidcheck) to enable the same technology used in Zambia to support integration of the CONVIDCheck aggregate data into DHIS2 COVID-19 Dashboards. We see an ideal opportunity for strategic reuse of technology in this collaboration wherein the requested funding could also provide a key incentive and catalyst.
Contact details and further information (please specify,	eSHIFT Partner Network https://www.eshift.org/ The eSHIFT Partner Network (eSHIFT) is a Geneva, Switzerland based non-profit entity focused on scaling digital health innovations in LMICs. Its founding members are

which elements could be published)	former WHO staff who saw the need to bridge the gap between the abstract world of global digital health policy-setting and the promise that innovative, best-fit digital technologies can deliver if allowed to scale. eSHIFT is committed to delivering high-quality, best-practice, cost-effective and sustainable solutions for global digital health needs. In the longer term our mission is to create a suite of global public goods for everyone's benefit. The AoS Health COVID-19 Task Force The AoS Health Platform brings together a suite of robust and sustainable technologies, with comprehensive consulting, implementation, and operational services. It provides a complete solution for healthcare providers to quickly tailor and maintain digital mobile health systems in country. The AoS Health COVID-19 Task Force currently consists of the AoS Health group and individual volunteers organised to exploit AoS Health assets and methods to assist, when possible, in COVID-19 interventions. The Task Force has been put in place primarily to service the needs of Zambia, ZNPHI. The ambition is to assist other countries by sharing materials including the option to rapidly deploy the Zambia systems as starting place for other MoHs to establish a digital response.

5.27 Panic Attack & Anxiety Relief

Description and rationale	Rootd is the #1 ranked mobile app for panic attack & anxiety relief on both iOS and Google Play. Rootd's innovative blend of modern engaging design, therapist-approved features, and on-demand accessibility, combine to help users during all stages of managing panic attacks and anxiety. Rootd is appealing to both youth and adults alike, has over 270,000 downloads in over 100 countries, and frequently makes lists as a top anxiety app (in Healthline, Women's Health and Cosmopolitan Magazine among others). This month Rootd is featured as one of only 6 recommended apps in Time Magazine's edition on Anxiety: The Age of Anxiety. Most importantly, Rootd's user reviews consistently state that it has multiple differentiators that are integral in managing current stress related to COVID-19.
When and where was it demonstrated?	Rootd is Canadian and created by founder Ania Wysocka who designed Rootd when struggling with anxiety and panic attacks herself. It has since been praised and recommended by mental health therapists across the US, Canada and the UK, and listed as a resource on University websites. Rootd is proven, affordable and scalable innovative, and based on leading research in Cognitive Behavioural Therapy.
Where was it used?	Rootd is available in English, French, Portuguese and Polish. In the coming week it will be available in Spanish and Mandarin as well. It has been used in over 100 countries to date as the availability on the App Stores make it immediately available globally.
What were the results?	Rootd users have expressed that Rootd has helped them overcome anxiety, agoraphobia, panic attacks, stress related to COVID. They have also expressed that it has increased their confidence and independence, allowing them to rely more on themselves. Over the past few weeks Rootd has received hundreds of messages from users sharing how they are struggling and how Rootd has been supporting them.
Validation/endorsements:	Rootd has over 1000 positive user reviews and enjoys a high rating in the App Stores at 4.6/5. I will paste in a few reviews by users and mental health professionals here and also attach a testimonial document. Among the most highly praised features are the immediate access emergency SOS button as well as the design. Rootd is

	used both by individuals or individuals with their families since the design is appealing to users of all ages. “I’ve suffered from panic attacks for almost 10 years. I’ve done CBT, medication, meditation, but nothing helped me in the moment when that panic attack hit, until I downloaded Rootd. Rootd makes it feel like someone is with me, even when I’m alone. I owe my continued stability to this simple genuis app. its a MUST for all who are facing the same type of war with anxiety.” @RainyNally Thank you so much for this app! I have had anxiety and panic attacks for over 30 years (PTSD from long term emotional abuse) and this has just helped me through a panic attack better than any medical professional has ever done, you are life savers @S.Doyle John O'Sullivan Apr 2, 2020 at 8:16 AM I can see this as essential to dealing with the coming months. The big red button has proven to be very useful. Highly recommended. Giana Falacco Mar 24, 2020 at 10:10 AM I never thought an app would be able to calm me down but Rootd does that. There is so much material that you really can learn to calm down. Definitely 10/10 recommend! Chy Giles Mar 24, 2020 at 6:55 PM I've had this app for 2 days, and it's already helped me so much. Its given me such understanding and peace about my feelings and the graphic design of this app brings thing to a much more lighter feeling, I love it. by Englitchik – Mar 24, 2020 I’ve had even more to stress about (as has everyone else) lately, and rootd helps me step back and get out of my head. Vanessa B Mar 28, 2020 at 7:36 AM Love the design <3 simple and elegant, the little monster character looks like what it feels to have anxiety but also makes you feel like you can work with it and get better when attacks happen "It is critically important that we treat mental health challenges with the same urgency as we treat physical challenges. Apps like Rootd bring attention to the need to address mental health challenges. I applaud the focus of the app and the strategies it contains. I believe that this

	excellent app will make a difference in the lives of people living with anxiety." Dr. Jillian Roberts, Renowned Psychologist, Author and Professor "I appreciate the simple, factual, and yet caring approach of Rootd that makes it an inviting, interesting, and easy to use tool. Its easy to read and affirming statements at the end of each section are true and encouraging to readers. I endorse this for individuals looking for support and tools for managing anxiety and panic attacks." Wendy Marion-Orienti, Licensed counsellor at PRH International School of Adult Education and Research
Approximate cost	Rootd is freemium based and typically costs $5 per user per month for Premium access but due to increased stress related to COVID-19 we want to offer this free of charge for anyone who can benefit.
Funding sought	We are open to donating our time and resources. Roughly $10,000 USD would help cover costs to Rootd associated with establishing servers and setting up a means of reaching as many people as possible who are struggling at this time, but we are open to covering this on our own. Rootd is available in several of the UN languages and is soon to be available in two more (Spanish and Mandarin)
Contact details and further information (please specify, which elements could be published)	We are committed to do whatever it takes to get Rootd out to help more people in need at this time, working around the clock. The nature of being a mobile tool means we can launch an initiative nearly immediately and the highly scalable format allows us to support millions of users at a time. Please feel free to call 778-772-6247 for any additional information. Helping individuals through Rootd and via the UN would be an incredible honour. We look forward to hearing from you and learning how Rootd can continue to help individuals and families around the world.

5.28 COVID-19 Navigator

Description and rationale	COVID-19 (coronavirus) presents significant challenges to people and organisations around the globe and the disruption continues to evolve. It's important that businesses prepare for and respond to this "new normal" in order to ideally emerge stronger. PwC's team of specialists collaborated to create a digital assessment to help you understand the potential impact to your business and gauge your readiness to respond.
When and where was it demonstrated?	During COVID-19 phase, State – local government, PwC
Where was it used?	Global
What were the results?	Assessed the potential impact to your business and gauge your readiness to respond
Validation/endorsements	Local and State Government, PwC
Approximate cost	Free for specific period, chargeable accordingly after.
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.pwc.com/gx/en/issues/crisis-solutions/covid-19/response-navigator.html https://www.pwc.com/us/en/library/covid-19/response-navigator.html Kristin Rivera Partner, Global Forensics Leader, Global Crisis Consulting Leader, PwC US David Stainback Partner, Crisis Consulting Leader, PwC US

5.29 Brave's mobile app, Brave Buttons, Overdose Washroom Sensor monitors

Description and rationale	Brave Coop has built 3 technology tools for people at risk of overdose by virtue of using alone. Overdose death across the world has reached epic proportions and is going to worsen as a result of isolation measures introduced in the wake of COVID-19, and as pressure placed on the supply of illicit drugs increases cross-contamination and a lack of access to a consistent strength of drug. Continuing to support this vulnerable is of paramount importance - both to simply keep them alive, and to reduce the burden on the hospital and emergency response system. Our tools have been designed with the people at risk of overdose to ensure they are acceptable to them. What's more, because they are digital, they are still 100% functional in a world where people are being asked to self-isolate - and indeed, they are more widely important and relevant now. Brave's mobile app allows digital supervised consumption to take place through a VOIP call. It is anonymous and only reveals the caller's location in the event that an overdose is determined to have taken place, at which the supporter is able to summon help. Our Brave Buttons are smart buttons that send a message to dedicated phones for responders (staff etc) in supportive housing. Staff respond to the button press and then document the response and reason for the alert through the phone. (Similar to a nurse alert system in hospitals.) Our Overdose Washroom Sensor monitors enclosed spaces (washrooms) where drug use frequently takes place. In the event that someone ceases movement, or their breathing rate drops below a pre-set threshold, an alert is sent to summon one to check on the washroom.
When and where was it demonstrated?	Our mobile app was first demonstrated through a co-design process with people who use drugs in Vancouver, Canada in mid-2018. Our buttons have been used in supportive housing in Vancouver since December 2018. The sensor was demonstrated in a cafe in Vancouver in September 2018.
Where was it used?	The mobile app and buttons are being used in Vancouver and are currently being rolled out in Columbus, Ohio. The sensor is currently installed in multiple locations in Vancouver.

What were the results?	The mobile app is being used to keep people safer from overdose when they use alone, or are remote or distant from service providers that could assist them. To date we have been onboarding people in small cohorts - we have a few dozen people actively engaging with the system but we have not yet had an overdose. The buttons have been used thousands of times and have resulted in 20 overdose reversals, hundreds of safer use engagement, and hundreds of physical safety and mental health responses. We have also installed them in temporary hotel in Vancouver being used to quarantine COVID positive people. The sensors are actively monitoring washrooms and have documented over a thousand washroom uses and over a hundred alerts - all of which have been responded to and with no overdoses (or other health emergencies).
Funding sought .	Brave would welcome funding between $100,000 and $2.5m - at the lower end we could use investment to improve user-facing UX of our systems, and overall security. Towards the upper end we could increase the R&D capacity of our team as a whole, e.g. adding ML to our sensor system, the ability to track for multiple events (falls, seizures etc), and develop new products (e.g. wearables, Narcan-finder community response system, a tool for alleyways)
Contact details and further information (please specify, which elements could be published)	Gordon Casey, gordon@brave.coop, +1 604 500 8569.

5.30 IBM-High Performance Computing Consortium for COVID-19

Description and rationale	The COVID-19 High Performance Computing Consortium is a unique private-public effort spearheaded by the White House Office of Science and Technology Policy, the U.S. Department of Energy and IBM to bring together federal government, industry, and academic leaders who are volunteering free compute time and resources on their world-class machines.
When and where was it demonstrated?	During COVID-19 phase, Local & National Government
Where was it used?	Global, USA
What were the results?	Researchers are invited to submit COVID-19 related research proposals to the consortium via this online portal, which will then be reviewed for matching with computing resources from one of the partner institutions.
Validation/endorsements	Local & National Government
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.ibm.com/it-infrastructure/us-en/resources/campaignmail/mail/covid-19/ https://covid19-hpc-consortium.org/

5.31 rayTech

Description and rationale	A non-contact & real-time remote health monitor that facilitates continuous monitoring through a centralised quarantine database: In a situation where most countries have exceeded their resources to handle the pandemic, our technology, rayTech, aims at facilitating management of available resources intelligently. We have created a non contact remote health monitoring solution to track the onset of COVID-19 even when there are no symptoms. Also, we track shortness of breath- the most significant differentiator of COVID from flu. Our technology can be controlled through a mobile app and a compact tabletop hardware that uses low power radio waves to continuously monitor the vitals at every step of the Contact tracing. rayTech can be integrated with any IoT enabled device without any new hardware including mobile devices, smart speakers and wearables. With no contact or clinical setting required, our algorithms have 98% accuracy is breathing rate detection- the key vital that helps in monitoring the COVID progression. We address the following challenges with our technology:- Risk of Hospital Acquired Infection: While a high influx of patients have been reported, studies establish that only 20% require hospitalization for COVID-19. Remote and real-time monitoring can enable caregivers to attend to the patients without repeated exposure to source of infection. Further, it can also help manage the 80% mild cases to be monitored within their home spaces, converting them into step-down ICUs. Lack of caregivers, hospital beds and ventilators: Most countries are lagging behind the WHO recommended ratios of Doctors and hospital beds. With our technology, all the devices can be connected to one central database that lets you monitor more than 1 lakh patients at a time continuously. By just tracking respiration rate, you are able to intelligently categorize the quarantine patients into mild, severe and critical cases. The doctor can also see the video and the audio of the patient who is categorized as critical. This also helps Doctors to select the patient who needs care and direct the resources to the right patient. Non-availability of vaccine: This absence of a readily accessible vaccine has further raised the importance of

	preventing or detecting the infection early. From early detection to post oxygen therapy, our technology can non-invasively and continuously monitor recovery and deterioration from the breathing trends. Cost and Technical expertise required to operate existing medical solutions: Medical equipment to monitor vitals mostly comes with a fixed and hefty price-tag and technical expertise to operate them, unlike consumer devices. Our rental model facilitates usage of our tech during the prescribed quarantine duration, without having to invest in a medical device. The plug and play model requires minimal training provides clinical grade accuracy from a consumer device. Further, our technology can be integrated with available IoT devices of users, reducing unfamiliarity in adopting new tech.
When and where was it demonstrated?	Our system has its functionality demonstrated in a clinical setting like NICUs as well as in home environments including nurseries. We have clinical studies conducted at hospitals with Ethical Committee approvals and have real users who have vouched for the safety of our technology in their home nurseries. Our technology has also been featured on known forums like Kickstarter, CNN and WIRED.
Where was it used?	Our devices have been tested in clinical settings like ICUs for evaluation and also in home environments for monitoring breathing rate, movement and sleep.
What were the results?	Our technology has achieved 98% accuracy in breathing rate monitoring in correlation with FDA approved device. This was attained after close to 500 hours of continuous monitoring of breathing in an ICU setting. We have completed over 7 Billion breathing instances capturing variations in breathing rate during fever, asthma and sleep apnea. The non-contact technology and instant updates on the companion mobile app has been highly appreciated w.r.t safety by parents.
Validation/endorsements	Our consumer device is FSA/HSA approved. FCC Certified Featured in WIRED as “Must have home gadget” along with Google Home
Approximate cost	$250/unit ; Cost can be reduced further on scaling
Funding sought	USD 650000 for manufacturing at scale

Contact details and further information (please specify, which elements could be published)	Ranjana Nair Email: ranjana@raybaby.us Phone: +91 9886519427

5.32 Web-Based and Mobile Applications

Description and rationale	COVID-19 is quickly emerging as one of the worst global pandemics in the last century. Health systems are quickly shifting resources to mitigate its toll. It is clear that the effective use of digital technology will play a core role in how effective COVID-19 response will be. Dimagi is one of the world's largest providers of technology for frontline health workers. Our open source technology platform, CommCare, is the world's most widely-used mobile data collection and service delivery platform. Dimagi is committed to doing all that we can to support the COVID-19 response. Dimagi is rapidly deploying free, pre-built COVID-19 template applications. These templates can be used as fully-functioning applications within a desktop or mobile browser and as standalone, offline-capable Android applications to carry out disease surveillance and educational activities based on leading clinical protocols from the World Health Organization, CDC, and others. All free COVID-19 Template Apps are housed in this library (http://www.commcarehq.org/covid19) and can be imported into your CommCare project space. **Web-Based and Mobile Applications (can be used immediately)** *1. Contact Tracing: WHO First Few X (FFX) Cases* This template application reflects the WHO's protocols to investigate the First Few X (FFX) cases and their close contacts. Available in English, French, Spanish, Hindi, and Portuguese. *2. Port of Entry Surveillance* This application reflects WHO protocols to detect and report on ill travelers and their contacts at points of entry. Used as an intake and surveillance tool at points of entry (airports, seaports, border crossings, etc.) *3. Facility Readiness and Stock Tracking* Based on WHO protocol, this application enables facility readiness planning and allows for the recording and reporting of specific COVID-19 related resources. *4. Health Worker Training & Monitoring* This application can be used by healthcare providers to support remote COVID-19 training. It will also contain forms for daily situation reports. 5. Lab Test Tracking (Under development)

	Once developed, this application will manage COVID-19 testing, used by health workers to collect samples and to receive completed test results. **Messaging Applications (requires Dimagi configuration)** *6. Community Monitoring* With Turn.io and WhatsApp, Dimagi has created a fully automated SMS/WhatsApp based daily screening and tracking solution. *7. US COVID-19 Local Response System* Per CDC guidelines, Dimagi has developed a web apps + SMS system used for case intake and contact tracing for local American health systems, including in San Francisco, California. For details on these apps you can go to: https://confluence.dimagi.com/display/commcarepublic/CommCare+for+COVID-19
When and where was it demonstrated?	Our team brings more than a decade of experience in rapidly deploying digital solutions to complex problems. Our deployment approach allows swift design and iteration with all stakeholders, limiting the time it takes to configure effective solutions. We have quickly mobilized a Central Response team to gather design requirements, develop solutions, and support rollout for our open source platform and Global Good, CommCare - the most widely deployed platform for frontline health workers globally. We will grow in-country capacity, build upon reusable digital infrastructure, and leverage CommCare's proven functionality and technical characteristics for outbreak response. For example, a study that assessed 58 tools that were used during the West Africa Ebola outbreak found that only CommCare and one other tool supported all 7 technical characteristics and 4 key functionalities relevant to Ebola outbreak response. Below are past and current outbreak response efforts that Dimagi has supported. **2015: West Africa Ebola Response** In 2015, led by the Earth Institute, CommCare was deployed by UNFPA in Guinea to support over 300 contact tracers (CTs) to conduct sensitization and contact tracing, supported by a real-time information system. The data was monitored in real-time to follow up with CTs for immediate supportive supervision. Dimagi was one of two organizations awarded for USAID's Fighting Ebola Grand Challenge for Development award in the ICT Solutions category. **2018: DRC Ebola - Contact Tracing**

	In December 2018, Dimagi provided remote support to UNFPA and the MoH in DRC to launch an adapted version of our Ebola Contact Tracing 2.0 application to 40 frontline health workers in North Kivu to respond to the Ebola outbreak in the DRC. The application deployment took a matter of weeks because we leveraged an established suite of Ebola starter applications built by Dimagi during the West Africa crisis. In the February 2019 Strategic Response Plan (SRP) for the Ebola crisis in DRC, CommCare was highlighted for the MoH and its partner's intent to use CommCare for case detection and contact tracing. **2019: DRC Ebola Response - Mercy Corps Knowledge and Community Sensitization** Mercy Corps is leading the coordination of a consortium made of three international NGOs (Oxfam, International Alert and CARE International) and a national NGO CORACON that are responding to the urgent Ebola response in DRC. The objective of the consortium is to deploy mobile technology solutions to work with communities and populations in non-hot spots areas for the epidemic to improve preparedness in the case the Ebola epidemic spreads in those areas. Dimagi is supporting the consortium to digitize and deliver the following services using CommCare: ● Community sensitization and knowledge dissemination to educate communities, dispel myths, and prepare them for a potential outbreak ● Assessment of existing practices, counselling on behavior change to prevent Ebola transmission ● Capturing information about attitudes regarding Ebola to better inform emergency preparedness ● Capturing a KAP survey for a WASH program *Currently, Dimagi's COVID-19 solutions are being used in various capacities by different government and non-government organizations in different parts of the world, two of which are shared in the next section.*
Where was it used?	**Customized Dashboard: Contact Tracing Dashboard for Togo, using Tableau** On March 27th, Dimagi began supporting the Togolese government in their COVID-19 response efforts. Dimagi adapted the WHO FFX contact tracing template application to

	Togo's context and developed a Tableau dashboard reporting on critical COVID-19 indicators. **United States Project Example: San Francisco, California** Dimagi deployed a team to work with the San Francisco Department of Public Health in California and UCSF to build a system for surveillance and contact tracing based on CDC Guidelines. The application is continually updated based on changing needs of the public health department of progression of outbreak.
What were the results?	From our previous experience of supporting outbreak response CommCare has an evidence base of 65 peer-reviewed studies (https://cdn2.hubspot.net/hubfs/503070/Dimagi_CommCare%20Evidence%20Base%20Overview_Aug%202019.pdf), including 8 RCTs - making it the most evidence-based digital platform for frontline workers. These studies collectively demonstrate CommCare's positive impact on strengthening healthcare systems, frontline worker capabilities, and client results. ● An assessment of 58 tools used during the West Africa Ebola outbreak found that only 2 tools (including CommCare) supported all 7 technical characteristics and 4 key functionalities relevant to outbreak response. ● In Nigeria, CHWs who used CommCare to combat Ebola improved their knowledge of the virus, with statistically significant improvements ($p<.05$). ● A 2015 study from Guinea study found that CommCare demonstrated the potential to "improve access to surveillance data for informing response strategy."
Validation/endorsements	CommCare and Dimagi's response towards COVID-19 has been mentioned by: MIT Technology Review - https://www.technologyreview.com/2020/04/08/998758/how-san-francisco-plans-to-trace-every-coronavirus-case-and-contact/ News release by Office of the Mayor, San Francisco - https://sfmayor.org/article/san-francisco-launches-innovative-contact-tracing-program-strengthen-coronavirus-response The Audacious Project -

	https://audaciousproject.org/ideas/covid-19-response/acegid-+-broad-institute The Dimagi blog (https://dimagi.com/blog/archive/covid-19/) is regularly updated with similar news, initiative and resources in relation to Dimagi's COVID-19 efforts.
Contact details and further information (please specify, which elements could be published)	**Molly Canty** Director of Innovation Grants & Partnerships mcanty@dimagi.com

5.33 GreenPass

Description and rationale	GreenPass is a community level mobile app to help mitigate the spread of the COVID-19 epidemic at the community level. It is also a recovery period and a long-term personal data diary. Different from many government sponsored solutions and major data source (such as mobile carriers) powered solutions, GreenPass is a world-wide solution with putting each individual's privacy as first priority. It also uses a global decentralized identity (DID) to make the interoperability across nations become possible . GreenPass helps you record the health data only when you actively submit it, so that you can let others know that you are healthy through a simple QR code. Others can also use it to make appointments with you via GreenPass, so you don't need to worry about each other's health. This is extremely useful for business owners in the current situation and the recovery period. By using GreenPass in a business, the owner can manage his staff's health status and make his business a safe environment for the customers. It also can help business owners manage his customers in a new way. A 'green' business environment makes staff and customers happy, and makes business owners maintain the revenue stream. Your data only belongs to you, and the data is truly and reliably recorded through blockchain technology. It encourages everyone to endorse themselves through their own data, and become a credible member of a trust-based global society. GreenPass is trying to build the balance among privacy, health, and mobility. This is a non-profit project, and we hope more people can participate. It can be used by every community, school, shopping mall, and office to make your work more convenient, and make your travel safer to yourself and to the people around you. This solution can also be the white-labeled solution for any countries and organizations who need to build their own branded solution, especially to those 3rd world countries that don't have enough IT solutions, and also WTH, UN, Red Cross, etc. In the long run, GreenPass is a personal health data log for each individual. We call it 'my Green Passport". It can include but not limited to personal immunization records, allergy type, basic info that doctors might ask, traceable personal data such as temperature, blood pressure, heart rate,

	blood sugar, etc. It is our lifetime health record. No one has access to it without the owner's permission. More details can be found in this main article by us, https://link.medium.com/fCJETQ8hs5
When and where was it demonstrated?	This app is the combination of the best practice in Asia (such as China) and the full understanding of the western culture. The app's 1.0 version is already in use worldwide since early April, 2020. It is under first wave use in many countries, such as the USA, UK, China, and more. It has 10 languages already (English, French, German, Italian, Portuguese, Chinese, Japanese, Serbian, Arabic, and Korean). All these regions have people use it, although the volume is small at the moment.
Where was it used?	It's targeting the global population. Currently, it's used in some communities in the USA, UK, China, Netherlands, and southeast Asia. The targeting first wave users and promoters are small or medium business owners and community workers. A typical case is the OptimumTMS clinic office in the USA.
What were the results?	The feedback from the first round test and usage is very position. It solved the pain point of many people's needs in the community level - business or individual. And we see urgent demands in some developing regions, such as India, Africa, South-east Asia, etc.
Validation/endorsements	Here is the recent practice by Mark E. Blair. M.D. at OptimumTMS. They made a video themselves.  https://twitter.com/MarkEBlairMD/status/1249166182927785984?s=20 We are also working with a committee of IEEE on basic health data standard for global collaboration, and a W3C working group on Verifiable Credential practice.
Approximate cost	This is a non-profit project. Our short term goal is let people use GreenPass in this pandemic. The long term goal is to create "GreenPass Initiatives" organization to make such effort sustainable. So far, we have already spent our own 50,000 USD on the 1.0 version and released it to the global market. We are getting huge encouragement from the global community so we want to continue this effort in a rapid way. We also love

	to work with the international organizations to deliver it to the people in this pandemic globally with endorsement. Our budget estimate for a better 2.0 version and more adoption globally is around 200K USD.
Funding sought	100K USD
Contact	More details can be found in this main article by us, https://link.medium.com/fCJETQ8hs5

5.34 Iktos AI technology platform

Description and rationale	Iktos AI technology platform for de novo drug design enables to identify *in silico* novel chemical compounds of interest against a biological target, with high predicted activity and optimized physico-chemical characteristics. Iktos technology enables to speed up drug discovery and the identification of novel drug candidates. In the context of COVID-19, potent and selective anti-viral drugs are badly needed, and Iktos AI technology for *de novo* design could bring a decisive impact to new drug discovery in the field
When and where was it demonstrated?	The value of Iktos technology has been demonstrated in a collaboration with Servier laboratories in 2018. Iktos de novo design platform enabled to identify an optimized lead in a few weeks. The results were presented at the EFMC 2018 meeting and in many other meetings.
Where was it used?	Iktos de novo design technology has since been used in many (>10) drug discovery programs in collaboration with major pharma companies such as Janssen, MSD, Merck KGaA, UCB, Servier, Grunenthal, etc.
What were the results?	Iktos technology has brought value to several drug discovery programs by enabling to identify promising molecules. When not published, the results are unfortunately confidential at this stage.
Validation/endorsements	Friedrich Rippmann, Director Computational chemistry at Merck Christophe Thurieau, VP Research at Servier Alexis Denis, Director Drug Discovery at Oncodesign
Approximate cost	Iktos is already engaged in a collaboration with SRI International to identify novel drug candidates against Covid-19 targeting the virus endonuclease enzyme. The cost of the program to reach a novel candidate in one year time is estimated to be ~1M€, 200k€ of which for Iktos, the rest for SRI.
Funding sought	200k€
Contact	65 rue de Prony 75017 PARIS contact@iktos.com Tél. : 09 73 58 45 48 http://iktos.ai/

5.35 VERSES HEALTH

Description and rationale	SMBs Finance, SMBs are struggling to get a loan during COVID-19 pandemic, they are suffering and a lot of them may to bankrupt. Blockchain technology make the loan process all automated and truly transparent. It can enable SMBs get a loan quickly and accurately.
When and where was it demonstrated?	In the end of March 2020, the loan demand quickly grows through DeFiner.org, SMBs in China, particularly in blockchain industry quickly get a loan through DeFiner.org platform, in a very transparent way.
Where was it used?	Blockchain miners get a loan through DeFiner.org and use it to pay salary and electric bills
What were the results?	The result is SMBs can maintain their daily operations without lay offing employees and go bankrupt
Validation/endorsements	DeFiner is a Techstars backed startup and named one of 8 Fintech startups to watch in 2020 in U.S.
Approximate cost	1% of loan amount, which is 80% cheaper than traditional banking cost
Funding sought	$100,000
FinTech4Good Network Economy Incubator Recommended COVID19 Solution No.4	VERSES HEALTH: PUBLIC HEALTH MANAGEMENT PLATFORM
[12]Description and rationale	ACCURATE TRACKING WHILE PROTECTING PRIVACY – GDPR COMPLIANT. VERSES has developed a trusted and open platform that allows all stakeholders to understand, visualize, plan, predict and ultimately control the dynamics of the COVID-19 and other viral pathogens using a location-based “survey” mobile application and administration portal. The platform will collect, map and share real-time data to inform public-private decision-making and policies. Built upon the following core principles and requirements: ● Privacy-by-design, decentralized data security and user anonymity ● Robust scalability (billions of users, any geography) ● Permissioned, versioned, and fully provenanced data sharing

	● Configurability, flexibility and interoperability ● Transparency and explainability of survey algorithms ● Traceability of AI model simulation history and governed execution ● Future proof for any health crisis ● I8N and Multi-lingual support While the application described herein is specifically focused on addressing the COVID-19 pandemic, its underlying architecture is engineered as a foundation to support a robust platform that can accommodate a broad number of data collection, sharing and analysis tools for local and global public health needs.
When and where was it demonstrated?	It is currently in development in Los Angeles, CA.
Where was it used?	It has not yet been used – currently in development.
What were the results?	High accuracy in testing while protecting user privacy.
Validation/endorsements	1. Technology Ethics John Havens Executive Director, IEEE AI and Autonomous Systems Ethics 2. International Privacy and Policy standards Arthur Van Der Wees , Senior Policy Advisor & Legal Council GDPR 3. Geospatial Information Systems and Enterprise Maps Constantinos Papantoniou Professional Services Technical Lead, Esri
Approximate cost	
Funding sought	$400,000
Contact	https://definer.org/

5.36 Open Source Medical Supplies

Description and rationale	Created in response to the COVID-19 pandemic, **Open Source Medical Supplies** helps local fabricators and institutions responsibly create and distribute sorely needed protective gear and medical equipment to local communities in crisis, providing medically and technically reviewed open-source design plans to fabricators of all scales and guides to community organizers who want to help organize effective local support efforts for their region. The **OSMS COVID-19 Medical Supply Guide** provides information for individual makers, community shops, and professional manufacturers on the utility, availability, and manufacturability of various open-source designs for key items of personal protective equipment (PPE) and other medical supplies, collaboratively researched by a team of medical advisers and our 70,000-member Facebook Group. The **OSMS COVID-19 Local Response Guide** is a collection of best practices and specific instructions for volunteers dedicated to organizing efforts among fabricators, makers, volunteers, health service providers, local governments, essential services and other institutions in their local communities in order to effectively to create and distribute medical supplies to places that need them.
When and where was it demonstrated?	From online to offline
Where was it used?	62 countries
What were the results?	In its first two weeks of operation, Open Source Medical Supplies helped organize 62,000 people all over the world in its Facebook group, supplied plans that volunteers turned into 280,000 medical supply items all over the world, produced an 80+ page long Open Source COVID-19 Medical Supply Guide, and released a COVID-19 Local Response Guide that helped local organizers form 95 local chapters all over the world.
Validation/endorsements	Open Source Medical Supplies teamed up with RESOLVE, Schmidt Futures, Toyota Research Institute, and private donors to stand up a full-time team to help lead a global, distributed manufacturing response to COVID-19. OSMS collaborates with hospitals, non-profit institutions, governments, professional fabricators and makerspaces all over the world to help direct local fabrication response.

Contact	https://opensourcemedicalsupplies.org/

5.37 TrustLink

Description and rationale	With over 70 million Americans aged 60 and older, older adults are prime targets for financial exploitation both by persons they know and trust and by strangers. Financial exploitation has been called “the crime of the 21st century” with estimated direct losses from elder financial exploitation in the US ranging from $3 billion to $36 billion a year— but whatever the total amount is, the problem stands to grow. Social distancing during COVID-19 pandemic is having a devastating effect on the older population - a demographic already at risk of isolation and loneliness. With emotions running high, those feeling isolated may be less likely to think critically and become more vulnerable to fraud and financial exploitation. **TrustLink** is a platform that uses artificial intelligence and delegated governance models to protect the financial wellbeing of loved ones. It helps prevent scams and frauds, lowers the costs of managing these cases and monitors and detects financial vulnerability. **B2C** - Principals can connect bank accounts, cards and financial records to the TrustLink app and nominate Trustees to help them protect their finances remotely, via the TrustLink app. Our Cognitive AI Engine analyzes patterns and trends real time in all financial transactions and sends alerts to Principals and Trustees so they can act accordingly. **B2B2C** - White label product designed for a specific bank to protect and reduce financial exploitation for their customers. Integration with the financial service provider is done via API. Explainer video (under 1m): https://www.youtube.com/watch?v=Fnx9G1_qBUE
When and where was it demonstrated?	Neurological changes associated with aging have a profound effect on the financial well-being of older adults. Cognitive aging leads to poor judgment, an inability to perform daily financial tasks, and an increased susceptibility to third-party fraud and financial exploitation by familiar people, even family members.

	Bankers and physicians are just beginning to recognize the link between money and cognitive health. Once they occur, it can worsen the effects Since changes in financial behavior often precede a medically diagnosed cognitive disorder, analyzing real time actual financial transactions would flag any atypical banking behavior or transactions consistent with fraud victimization or financial exploitation. For example, a client's recent transaction may contain unexplained withdrawals, wire transfers, or debit transactions, ACH transactions to new accounts, or checks issued to new or unusual recipients. Those would be flagged right away and eventually cancel the transactions. With more banking being done online, financial institutions started to employ monitoring software to detect diminished financial capacity, fraud and financial exploitation. However, all those solutions should not be conducted in silo, but shared across banks real time to prevent additional monetary losses.
Where was it used?	In January 2020, we delivered our platform to Kalgera, a UK company focusing on helping vulnerable people, specifically Alzheimer's and dementia patients In March 2020, through the cooperation with Kalgera we delivered our platform to Nationwide Building Society (UK) Innovation Team.
What were the results?	Kalgera is already using our platform to help its customers. Early users (principals and trustees) reported an increased feeling of financial security and confidence.
Validation/endorsements	We received a letter of recommendation from Kalgera after delivering our solutions. Here is a copy
Approximate cost	$1.5M
Funding sought	Up to $1m
Contact	https://www.trustlink.org/?AspxAutoDetectCookieSupport=1

5.38 biometric ID systems

Description and rationale	Over the past few months, COVID-19's rapid spread has stressed health systems in high-income countries (HICs). In response to the pandemic, countries like South Korea, Taiwan, and Singapore have successfully used reliable government IDs to underpin disease surveillance, patient tracking and treatment. COVID-19 will wreak even more havoc health systems in low-income countries (LICs). As estimated by Imperial College London, 30M lives could be lost if effective response isn't mounted. Unfortunately, what HICs have done cannot be replicated in LICs: as estimated by the World Bank more than 1 billion people worldwide—including 1 in 2 women in low-income countries— lack formal identification. These people are less likely to be able to access health services, less likely to know their disease status, and, ultimately, more likely to pass the disease to others. We have developed a safe and secure contactless biometric identification tool to help tackle COVID-19 in low-income countries. Simprints has already successfully tested accuracy and usability of our prototypes with front line workers in Kenya, and we are ready to launch with the UN for COVID-19 response. Simprints has experience in deploying biometric ID systems across 12 countries (reaching >393,000 patients to date), integrating into existing digital platforms to deliver healthcare and financial services to the poorest and most vulnerable, while also keeping the highest standards of data privacy and security. We are ready to deploy our technology for COVID19 response for effective testing and case tracking, cash and aid distribution, and when available, equitable vaccines distribution.The Ebola crisis has shown us the pitfalls of uncoordinated aid distribution and rampant fraud and corruption in the Non for Profit sector. With biometric identification guarding equitable assignment of cash, food ratios, vaccines we can help prevent that. In fact, Seth Berkley (CEO of Gavi) calls Simprints a "game changer" in the global fight against COVID19 in his latest article in the Harvard Business Review By deploying biometric technology in response to COVID-19, Simprints will be contributing to SDG1 No Poverty, SDG2 Zero Hunger and SDG3 Good Health and Wellbeing. By providing open standards and interoperability with other

	digital tools we aim to support UN partner organizations in the fight against COVID-19 and accord with SDG 17 Partnerships for the Goals.
When and where was it demonstrated?	October 2019, Kenya. Demonstrations were in collaboration with a local NGO, COHESU, and their community health workers.
Where was it used?	In Kenya, our biometric solution was used to identify recipients and validate aid distribution. We gathered 6,530 quality images from 656 individuals and analysed them using our face recognition algorithm. We performed 21,317,185 comparisons and achieved >95% accuracy.
What were the results?	Achieved >95% accuracy of contactless biometric identification Validation of ability to rapidly deploy in the field with integrations into data collection platform like CommCare, OpenSRP, SurveyCTO Proved Tech Performance, not compromised operating in offline, remote, and harsh environments Ensured security & data privacy for patients by not storing facial images on the device but opting for biometric anonymised templates instead Obtained user adoption ● 90% of Community Health Workers found our technology useful ● 100% of users could navigate the workflow after 30 mins training and 50% of users could navigate the flow without prior training ● Over 80% were able to capture a successful scan with <2 tries ● Workflow designed on proven procedures and low-end Android devices common in frontlines work ● No additional hardware needed
Validation/endorsements	Implementing partners and global health experts (including those from the Centre for Global Development and the WorldBank) have argued biometric digital identity is essential for pandemic response. Tech companies like Arm Holdings & Autodesk have provided co-funding and engineering resources to help enhance our contactless solution in response to COVID-19. International NGOs and Ministries of Health have expressed their interest in deploying Simprints solution intheirCOVID-19response.Please see App 1 Demand from Implementers
Approximate cost	Costs for Simprints´solution are transparent and fall into two categories:

	1. Software: ● Custom integrations with digital healthdata platforms ● Cloud hosting ● Data analytics 2. Services: ● Project management ● Training ● Data privacy & security assessments All above mentioned costs are variable and depend on the size of the deployment. Simprints commits to transparent pricing policy. No additional hardware is required.
Funding sought	£1M. To deliver purpose-built COVID-19 multimodal contactless solution for rapid deployment in LMIC with integrations to commonly used digital health platforms. Work Packages include: ● Launch our tool in selected Covid 19 healthcare projects (Deploy and conduct qualitative user research, Prepare tech stack for flexible hosting) ● Prepare for scale-readiness (Create integration packages for major digital health platforms used by Ministries of Health and large iNGO partners) We are in discussion with tech companies such as Cisco, Autodesk, and Arm, who have committed co-funding and engineering support.
Contact details and further information (please specify, which elements could be published)	-- Media Endorsements ● Harvard Business Review, ● CNBC Africa ● Reuters ● OWI ● World Economic Forum -- Partners ● Impact : BRAC, COHESU, CIFF, LSTM, D-Tree, World Vision ● Funders : BMGF, USAID, DFID, Gavi, Autodesk, Cisco, Arm

5.39 PrimeCare Website

Description and rationale	PrimeCare is a comprehensive enterprise web based, browser based, hospital management information system software solution, which is available in bilingual: Arabic and English versions, which covers all aspects of management and operations of a healthcare organization according to the well-known international standards. PrimeCare is a flexible modular – web application – software system solution, which includes more than 70 integrated modules (Administrative and Medical Modules). Currently, our health care products are proudly implemented in more than 100 hospitals and medical facilities. · Cloud Based Solution · PrimeCare helps you viewing your business as a collection of processes, easily managed to achieve the desired result. · PrimeCare presented in more than one language from your own choice, easy to understand and use · PrimeCare role-based access control unique approach assure smooth work flow, authority and management procedures · PrimeCare introduce you to a new era of hospital information management mobility scheme, to be with you anytime, anywhere · No more paper work, no more cabinet files, with PrimeCare archiving system and document generation and tracing. · Compatible with all HL7 devices · Specialty based Solutions · Appointments scheduling · Eliminating Waiting times · Powerful Performance control through dynamic detailed dashboard · Standardized Specialty based Medical Assessment · Overtime Patient History records · Complete international drug databases · Standardized Laboratory and Radiology Services CPT coded PrimeCare allows demonstrating accurate statistics about suspected covid cases profile with its laboratory

	module allows easily and on spot flagging of PCR positive patients with state of art alerting feature to concerned authorities
When and where was it demonstrated?	PrimeCare is already up and running in +100 medical facilities in Egypt & the MENA region
Where was it used?	An example of our success partners in Egypt are the international medical centre, Mansoura urology centre, Wadi el neel hospital & Egyptian police hospitals
What were the results?	All of our success partners are deeply satisfied with PrimeCare triaging & reporting functionalities. Allowing accurate & reliable statistics
Validation/endorsements	-
Approximate cost	According to each institute size (e.g. bed sizes)
Funding sought	-
Contact details and further information (please specify, which elements could be published)	Mohammed_mustafa@khabeergroup.com

5.40 YouMeda

Description and rationale	YouMeda company is one of the leading software developers specialized in cloud computing, mobile applications and e-health solutions, as the company has a group of developers, experts, marketers and physicians specialized in designing and developing meaningful e-health solutions for all healthcare stakeholders. YouMeda is a comprehensive digital platform that integrates all healthcare services together in one place for better population health. This platform helps healthcare consumers to get all types of healthcare services (ICU, NICU, Clinic, Hospital, Pharmacy, Laboratory, Radiology, etc.). Registered users are able to create their own ePHR with the ability to consolidate all medical data along the healthcare journey, Users can benefit from a lot of features like capability to book an appointment, store and share medical history with healthcare providers. YouMeda is augmented with video-based telemedicine services for home-based care to facilitate getting healthcare services in suburban and rural areas, also to facilitate communication with people who are subjected to home quarantine due to the current pandemic Covid-19. YouMeda helps medical service providers to enhance the quality of care services by organizing clinic appointments, reservations and facilitating access to patient EMR including the entire medical history. The platform also extends the provided health care services to be given remotely through mobile applications with ability to integrate with smart watches and smart wristbands to record the vital signs and any alerts to the patient ePHR. Through YouMeda, Physicians are supported with additional features including e-prescriptions, standard disease diagnosis (ICD-10) and a database for drug-drug / drug-food interactions.

When and where was it demonstrated?	YouMeda platform was launched in March 2020 in Egypt.
Where was it used?	YouMeda is being used in the Egyptian healthcare private sector through plenty of private clinics, radiology centers, laboratories and private hospitals.
What were the results?	Results for healthcare providers - Time saving. - Avoiding physical contact with patients who are potentially infected with Covid-19. - Giving healthcare services to people even during the lock down times. - Better reach for patients in rural or suburban areas. - Better diagnostic decision through getting a complete patient history. - Easy prescription of medication. Results for healthcare beneficiaries - Getting timely services. - Possibility to get medical exams or consultation during the lock down times. - Avoiding crowds in clinics or hospitals. - Ability to build and own a complete ePHR. - Ability to get most of healthcare consultations using one App without need to leave home.
Validation/endorsements	YouMeda website link http://youmeda.com/ Eng. Nasser El Ameer +201011400661 nasser_alamir@hotmail.com Dr. Ashraf Moharam +201111522722 ashraf.moharrem@yahoo.com
Approximate cost	Negotiable
Funding sought	YouMeda is committed to helping the community step up to meet the demands of the Covid-19 pandemic by offering a standard compliant, fully integrated, comprehensive, eHealth platform including mobile apps that can be accessed on any smart device for an unlimited number of users to achieve the following objectives: - Saving lives: Limit clinician and patient exposure.

	- Effectiveness: Limit transfers to clinically appropriate cases. - Efficiency: Mitigate patient surge.
Contact details and further information (please specify, which elements could be published)	msaber@khabeergroup.com Mohammed_mustafa@khabeergroup.com Islam.ameen@clinivisor.net

5.41 VIDA vs. COVID

Description and rationale	Village Data Analytics (VIDA) with "VIDA vs. COVID" (www.villagedata.io) VIDA vs. COVID is an earth observation, big data and AI-based software to help identify and prioritise rural health centres for electrification. It is based on the proven technology of Village Data Analytics to analyse remote regions in developing countries for infrastructure investment.
When and where was it demonstrated?	A first version of VIDA vs. COVID was demonstrated in Ethiopia (for the case study, see: https://www.tfe.energy/project/COVID19ResponsePlanning/)
Where was it used?	A more sophisticated and detailed version of VIDA vs. COVID was then used to help the World Bank and an African government identify and prioritize 1,000 health centres for electrification. This included an analysis of the village-level mini-grid potential surrounding the health centre (for long-term sustainability) and the population-at-risk for which a health centre is the nearest option by travel time.
What were the results?	The result was a smart map and site-level decision-making parameters. The smart map can be made available as an interactive user tool.
Validation/endorsements	Village Data Analytics as a whole has been tested with the World Bank, with USAID and with four leading electrification companies in six African countries. VIDA vs. COVID has been tested in two African countries. (The technology can also be applied outside of Africa.) For endorsements, please see the Village Data Analytics website (www.villagedata.io) and see the case study of our work with Power Gen (https://www.tfe.energy/project/improved-mini-grid-site-selection-in-west-africa-using-using-village-data/)
Approximate cost	VIDA is a data-enabled service. The cost varies from task to task.
Funding sought already and challenges for scaling up	Village Data Analytics is currently supported by the European Space Agency, appliedAI and by the Good Energies Foundation.

	We are looking for additional funding to expand VIDA's application in the field of health care, especially COVID19. Some important challenges for further scaling up are: Raise awareness about the ability and widespread applicability of data technologies. Fund and communicate test/pilot examples with different user groups. Establish data-based decision making (and data-based impact measurement) as tools in the processes of development work.
Contact details and further information (please specify, which elements could be published)	Dr. Tobias Engelmeier, tfe@tfe.energy Village Data Analytics is an initiative of TFE Energy, www.tfe.energy

5.42 Emergency Telecommunications Cluster (ETC)

Description and rationale	Public trust is one of the most important weapons in a pandemic. A population's need to access official sources of information is even greater during a health crisis. Unofficial sources may exacerbate ambiguities, while lack of information and persistent misinformation can be counterproductive for the work of healthcare providers and health officials. In the current COVID-19 response, the Emergency Telecommunications Cluster (ETC) is providing risk communication services in the form of a hotline for interaction and exchange of information between humanitarian/health partners, governments and populations to identify, trace, understand, perceive and inform affected populations in relation to COVID-19. To support the governments in Central African Republic, Iraq and Libya, ETC has set up specific COVID-19 helplines; where populations can call and get health related information. In addition, the ETC is rolling out country specific chatbots to improve the efficiency of communication. The information provided through the chatbots can also be periodically updated. These chatbots provide accessible, around-the-clock, relevant information to reinforce trust of verified information from official health ministry sources. Access to reliable health and safety information helps affected communities stay safe and could help prevent the pandemic from taking hold in these countries. The ETC plans to further improve the functionality and effectiveness of the chatbot, by using machine learning and artificial intelligence models, so that a chatbot can also interact with users, collect feedback and answer questions. As an added feature, the chatbot will be able to offer trends analysis to understand a population's concerns. This analysis can help guide decision making among humanitarians and equip healthcare stakeholders with greater insight into the community's concerns and level of knowledge about the virus.
When and where was it demonstrated?	In Libya, an inter-agency CFM call centre recently launched by the Emergency Telecommunications Sector (ETS) in Tripoli – originally intended for humanitarian assistance – was appointed by the National Centre for Disease Control (NCDC) as the national COVID-19 hotline. For the chatbot, the ETC and NCDC are managing content, and updating information to relay to communities in Libya.

	Similarly, in the Central African Republic, the ETC has set up a 1212 toll-free official hotline for the ministry of health. The ETC is also setting up phone booths, outside Bangui, to give people access to information even if they don't have a mobile phone. In the case of CAR, a chatbot will be hosted by the Ministry of Telecommunications and content will also be available in French. In Iraq, the chatbot solution will be co-hosted by the Ministry of Education and Ministry of Health, which is managing the local content to disseminate to the populations on health and education issues. As a next phase, ETC is further collaborating with private sector to add the feature of two-way interaction, machine learning and trend analysis to make the current chat bot service with improved functionality.
Where was it used?	Central African Republic and Libya, to begin with. Further countries to be included in the next couple of weeks.
What were the results?	While the WHO chatbot and global efforts provide overarching preventive information, in countries where ETC is supporting governments (Libya, CAR and Iraq), communities lack localized and updated information, such as locations of testing facilities, curfew timing, specific information on lockdown phases, etc. The hotline and complementing chatbot service can provide around-the-clock information for the populations in these countries. Since the call centre in Libya began working as a COVID-19 hotline, it has received over 10,000 calls. In CAR, since the ETC hotline was set up, there has been an uptick of virus cases, and as a result, the hotline is playing a major role where operators are able to provide verified and official information to curb confusion and misinformation. Similarly, in Iraq, the chatbot is largely supporting the government's response, and updated information is not only related to health, but also offers holistic information for parents and children on distance education, lock down-related official information.
Validation/endorsements	The demand for accurate information is high. In all three countries (CAR, Libya, and Iraq), one-way information dissemination is endorsed by government partners who have full ownership to update content periodically. Now as a next phase, ETC aims to increase the current chatbot service to further improve its functionality, to also collect feedback and concerns from the populations, in addition to

	informing them. This will allow government actors to prioritize issues, identify trends and push out an effective pandemic response.
Approximate cost	500,000 USD
Funding sought	
Contact details and further information (please specify, which elements could be published)	Phyza Jameel, Advisor to the Emergency Telecommunications Cluster: Phyza.jameel@wfp.org

5.43 ehCOS Remote Health

Description and rationale	Strict measures to slow the spread of COVID-19 in the general population are already in place. But the spread of the epidemic is putting an intolerable strain on front-line resources. So, **we need to reduce the demand for presential care by treating mild-to-moderate cases at home**. 80% of infections result in cases that DO NOT require presential care. ehCOS Remote Health is **ready-to-use** solution, which is **self-contained and can be applied immediately**, leading to the activation of community-based care models, enabling remote care and monitoring channels, which will **reduce the pressure on the public health system during all phases of an epidemic or pandemic**, such as the one we are experiencing today, caused by the infectious disease COVID19. The solution is based on standalone products from the ehCOS suite by everis Health. It allows health authorities to rapidly roll out a **community-centered care model**. Its primary goal is to reduce the pressure on front-line workers and resources during all phases of an epidemic or pandemic. It takes a holistic approach and delivers benefits for all three groups: • Patients and their carers. • Front-line healthcare staff. • Healthcare authority managers. Among **its features** are included: • **Self-triage and Advice Services** (questionnaires to collect data on symptoms, self-triage and pre-diagnostic advice, heat maps) • **Virtual care services** (videoconference and chat between healthcare professionals, patients and carers; virtual space to share information; dynamics form to collect information) • **Call center services** (Proactive telephone monitoring of patients diagnosed with COVID-19; Proactive telephone follow-up of an undiagnosed person if symptoms become acute; An open channel for communication with patients or caregivers; Daily support for people with greater vulnerability) • **Insights & data services** with owerful data analysis and visualization capabilities (Monitor the clinical evolution of COVID-19 cases; Analyze activity and available

	resources; Analyze the behavior of COVID-19 according to comorbidities; Detect epidemiological clusters and locations with a high concentration of people)
When and where was it demonstrated?	The solution has been demonstrated in the following healthcare facilities: • **Hospital Sant Joan de Deu (Barcelona, Spain):** The Hospital Sant Joan de Déu in Barcelona uses the platform as a patient portal. The platform is the primary channel for remote interaction between the patients and the hospital professionals. • **Hospital Sant Pau (Barcelona, Spain)**: The Hospital Santa Creu y Sant Pau uses the platform as a nursing portal. The platform provides healthcare professionals with the channels required to telemonitor patients remotely. • **Hospital Bellvitge (Barcelona, Spain)**: The Hospital Bellvitge uses the platform to remotely monitor patients with chronic heart disease. Monitoring is performed by means of the use of two devices (Weight scale / Blood pressure monitor to obtain pulse and blood pressure) and through a monitoring form with different control questions. Both the obtained measures as well as possible responses to the monitoring form have associated alarms defined by the professionals.

Where was it used?	In the context of the COVID-19 disease the solution has been successfully deployed and it is being used in the following countries and healthcare facilities:
	• Argentina
	  o Clinica Velez
	  o Ministry of Health, Cordoba province
	  o CABA
	• Chile
	  o Mutual de Seguridad
	  o Araucania
	• Colombia
	  o Comanfi

What were the results?	Although we are in early phases of the deployment in some facilities, the overall results are: • Demonstrated the flexibility of the tool in terms of easy/fast deployment and configuration for new facilities (the set up + end users training can be done in less than 2 weeks) • High level of adoption and usage

6. Medical equipment and technology

Technology	Organization	Continent
6.1 Intelligent Distribution Robot	Guangzhou Saite Intelligent Technology Co., Ltd.	Asia
6.2 CLEW-AI-based tele-ICU	Tel Aviv Sourasky Medical Center (Ichilov Hospital) and Sheba Medical Center	Asia
6.3 DebioJect: microneedles for intradermal injections	Debiotech	Europe
6.4 Uoma	Unitary Healthcare	Europe
6.5 Care-O-bot	Aida-1	Europe
6.6 temperature monitoring	SixSq Sàrl	Europe
6.7 Portable Ventilator	First-off PROTOTYPE	North America
6.8 Karuna Health Platform	Karuna	North America
6.9 Critical care Protocol Solution	Qualtrics	North America
6.10 Semi / fully autonomous robot for aircraft disinfection equipped with ultraviolet lights	Lighthouse – Disruptive Innovation Group, LLC.	North America
6.11 Solawash Automated Hand Washer	Solawash	Africa
6.12 The RNME ventilation system	Ministry of Energy, Industry, and Mining, the National Investigation and Innovation Agency and CEIBAL in Uruguay	Africa
6.13 Air heating and humidifiction system for mechanical ventilation of intensive care unit(ICU) patients	Dept of Mechanical Engineering Universidade Federal do Parana – UFPR	South America
6.14 Hydrogen peroxide vapor (HPV) technology	UTFPR, Brazil	South America
6.15 Surface functionalisation	Technallium Engineering & Consulting	Europe

6.1 Intelligent Distribution Robot

Description and rationale	Intelligent Distribution Robot The distribution robot is used to deliver medical supplies, devices, F&B by utilizing the technologies of precise positioning, self-navigation, machine vision and data fusion. The robot can execute cross-area and cross-floor distribution tasks assigned by intelligent dispatch control system. The robot has been put into use in more than 50 hospitals and medical facilities to reduce the workload of medical staffs and the risk of cross infection. Intelligent Disinfection Robot The disinfection robot, based on Saite robotic technology, integrated with robotic pneumatic system and disinfection system which can produce disinfection dry fog and UV light to effectively eliminate pathogenic microorganism both indoors and outdoors. Moreover, it can work at the infected area automatically, safely and precisely, which ensures the highly effective epidemic prevention and control. Since the COVID-19 outbreak, the disinfection robots have been worked tirelessly in more than 20 hospitals in Wuhan (the center of the outbreak).
When and where was it demonstrated?	The implementation of SAITE intelligent robots during the epidemic has been published by several predominant medias and social platforms both in China and abroad, such as CNTV, CCTV, People's Daily, Guangdong News, Guangdong Health Online, Guangzhou Daily, Guangzhou Innovation and Sina Weibo.
Where was it used?	The SAITE intelligent robots have being applied in more than 50 hospitals and medical facilities across China, including Chinese Top 10 hospitals, such as The First Affiliated Hospital Sun Yat-sen University and West China Hospital Sichuan University. Also, during the COVID-19 fight, dozens of robots have been put into isolation wards, medical shelter and quarantine facilities, which has helped hundreds of medical staffs in this fight.  

What were the results?	Since the COVID-19 outbreak, the SAITE intelligent robot is the very first robot which had been used in isolation wards in China. Wuhan, the center of this outbreak, received the first robotic technician squad, which is sent by SAITE. This dedicated team deployed the robots in isolation wards, medical shelter, quarantine facilities, etc. The robot can complete the repeated and heavy-duty tasks, such as distribute medical supplies, carry equipment and disinfect environment to minimize the unnecessary contact between medical staffs and patients. Statistically, one robot can replace three men jobs with 8-10 hours continually operating time (4 hours fully recharge). We received more and more positive feedback from number of medical facilities and hospitals, especially from Wuhan Hubei, which proved our robotic solution has protected the front-line medical staffs from cross-infection and reduce burden on personal protective equipment practically. The SAITE robot played an active and vital role in the COVID-19 fight.
Validation/endorsements	CEPREI, CNAS, Ilac-MRA, CMA Drafter of Specification and Test Methods of Guided Motion for Wheeled Mobile Robot.) SAITE has been applied for more than 60 invention patents in China, and has been included in the product catalogue issued by various government departments to fight against epidemics, including: "Guangdong Province Resource information of Enterprises to Resume Production during Epidemic with Big Data and Artificial Intelligence (the first batch)"; Case Study on AI Enabling Epidemic Prevention and Control of Guangdong Provincial Ministry of Industry and Information Technology; Achievements of Research Projects on Epidemic Prevention and Control in Guangdong Province; List of National and Local Key Epidemic Prevention and Control Enterprises.
Approximate cost	400 000 RMB – 1 000 000 RMB /Unit according to the models and requirements
Funding sought	Equity fund and Venture capital
Contact details and further information (please specify, which elements	Coordinator ： LI Liangyuan Tel：+86 19927475865 Email：liangyuan.li@saiterobot.com All information above can be published. Guangzhou Saite Intelligent Technology Co., Ltd.

could be published)	

6.2 CLEW-AI-based tele-ICU

Description and rationale	Two Israeli hospitals (Tel Aviv Sourasky Medical Center (Ichilov Hospital) and Sheba Medical Center) launch AI-based tele-ICU to support COVID-19 patients. CLEW's platform provides predictive analytics to detect respiratory deterioration in advance. Based upon a telemedicine architecture, CLEW-ICU uses AI-based predictive analytics to exponentially expand ICU capacity and resources. The AI-based algorithms are specifically trained to identify respiratory deterioration in advance, enabling early interventions that might change the clinical outcome, especially in COVID-19 patients. The machine learning models enable ICU workers to proactively manage disease severity and workload. The system's minute by minute risk stratification provides real-time acuity classification, allowing timely interventions and improved prognosis for critically ill patients. As a telemedicine-based solution, the system is used remotely, easily scaling to cope with patient volume surges while reducing a caregiver's exposure risk to infected patient.
When and where was it demonstrated?	During COVID-19 phase, Local Government, Two Israeli hospitals (Tel Aviv Sourasky Medical Center (Ichilov Hospital) and Sheba Medical Center).
Where was it used?	Tel Aviv, Israel
What were the results?	Through the mobile Android application downloaded on the phone and a self-assessment questionnaire, some information will be processed by the system and will be made available to healthcare professionals.
Validation/endorsements	Local Government, Two Israeli hospitals (Tel Aviv Sourasky Medical Center (Ichilov Hospital) and Sheba Medical Center).
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://clewmed.com/ +972-9-779-5995 5 Hamelecha St., Poleg, Netanya, 4250574, Israel info@clewmed.com

6.3 DebioJect: microneedles for intradermal injections

scription and rationale	DebioJect are microneedles for intradermal injections of liquid formulations for various applications (influenza vaccine, dengue, rabies, next COVID-19 vaccine?). Intradermal injections have been shown, with several vaccines, to reduce the dose of antigen needed to achieve the same immune response and to improve the immune response in elderly patients. In the COVID-19 application, it may immunize a larger proportion of the population more quickly and better protect the population most at risk. DebioJect was developed by Debiotech, a Swiss company with over 30 years of experience in medical devices. The company is certified ISO13485:2016 – 21 CFR 820 , owns a strong IP portfolio and collaborates with pharma and medtech world leaders.
When and where was it demonstrated?	DebioJect has been shown to be safe, tolerable and effective in a clinical rabies immunization study (1) with 66 healthy volunteers aged between 18 and 50years. Here are the main endpoints of the study: Reduction of antigen doses needed for vaccination by a factor of 5 with DebioJect device compared to intramuscular (IM) injection with classical needle (rabies). DebioJect is a safe, reliable and efficient device with significant decreases of pain at needle insertion and vaccine injection. DebioJect does not require any special training before being used (in comparisons to classical intradermal/Mantoux method). DebioJect can use the same vaccine formulation as the one used for intramuscular injections. At the end of the study, all participants were considered immunized against rabies. (1)P. Vescovo et al. “Safety, tolerability and efficacy of intradermal rabies immunization with DebioJectTM ”, Vaccine 35 (20178) 1782-1788
Where was it used?	DebioJect has been used in pre-clinical (1) and clinical (2) trials, respectively in UK (Cardiff Medicentre) and Switzerland (University Hospital of Canton de Vaud). (1) Gualeni, B., Coulman, S., Shah, D., Eng, P., Ashraf, H., Vescovo, P., Blayney, G., Piveteau, L.-D., Guy, O. and Birchall, J. (2018), Minimally invasive and targeted therapeutic cell delivery to the skin using microneedle devices. Br J Dermatol, 178: 731-739. doi:10.1111/bjd.15923 (2) P. Vescovo et al. “Safety, tolerability and efficacy of intradermal rabies immunization with DebioJectTM ”, Vaccine 35 (20178) 1782-1788)

Validation/endorsements	DebioJect has obtained : Silver Winner of the Medical Design Excellence Awards 2014 CE marking on June 6, 2014.
Approximate cost	The approximate cost (COGS) for DebioJect microneedles is around 50 cents per unit.
Funding sought	The funding would provide the opportunity to set up large-scale production. In addition, Debiotech SA is looking for potential partnerships with pharmaceutical groups to include and use our product (DebioJect) in their clinical trials on their vaccines against COVID-19.
Contact details and further information (please specify, which elements could be published)	Laurent-Dominique Piveteau, CEO – ld.piveteau@debiotech.com (0041 21 623 60 44 / 0041 79 176 03 77) Luca Reut, Business Development Manager – l.reut@debiotech.com (0041 21 623 60 85) Website page on DebioJect : https://www.debiotech.com/page/index.php?page=product_01&id=1&id_prod=47

6.4 Uoma

Description and rationale	Unitary Healthcare's Uoma is a patient logistics system that connects all the professionals related to patient transfers and acts as a secure communication platform between organisations. During COVID-19 pandemic, Uoma has been updated with features enabling patient categorisation and transferring patients automatically to right ward.
When and where was it demonstrated?	During COVID-19 phase, Local & National Government
Where was it used?	Finland
What were the results?	Connecting all the professionals related to patient transfers and acts as a secure communication platform between organisations.
Validation/endorsements	UNITARY HEALTHCARE OY
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	http://unitary.fi/en UNITARY HEALTHCARE OY TAMPERE Hämeenkatu 13 A 5 33100 Tampere Finland TAAVI SAVIAUK CEO taavi.saviauk@unitary.fi +358 50 543 5789

6.5 Care-O-bot

Description and rationale	Description An AI institutional aide, “Aida-1”, is proposed to assist health care professionals and support workers managing COVID-19 patients in care homes and hospitals. The proposal adapts the Care-O-bot 4 developed by the Fraunhofer Institute in Stuttgart, Germany, to provide a simple, multifunctional robot that transports surgical and medical items to and from patients’ bedsides. Aida-1 is an 36” high round, wheeled robot with a flat top surface that ferries medical supplies such as bandages or surgical instruments bedside via a round, stainless steel tray. Contaminated items can be dropped into the robot and the medical tray can be “swallowed” for carrying to disposal and disinfection stations. Aida-1 disengages from its charging portal upon voice command or a command from a smartphone app and travels to a dispensary, where staff load it with the desired items. Staff use a voice command or the smartphone app to direct Aida-1 to its destination, where the robot travels autonomously. Once at its destination, the robot elevates itself to any height to act as an assistant to health care professionals. Once a task is completed, Aida-1 returns to its charging portal, which can be located at a nursing station or utility area. The robot disgorges its 15x10 inch tray for sanitizing, elevating to release the tray at a cleaning or disinfection station. Rationale Adaptive “robotics” relieve health care workers of routine tasks, increasing their capacity to deal with acute care pa- tients requiring intensive treatment and monitoring. Aida- 1 provides a ready-made, cost effective solution to patient support in high stress environments. It responds to funding, training or hiring pressures that limit the availability of health care personnel and support workers to perform routine tasks.
When and where was it demonstrated?	The Care-O-bot 4 is a fourth generation robot developed by the Fraunhofer Institute, which has 30 years experience designing and programming service robots, and Mojin Robotics. Product demonstrations for version 4 in 2015 are available at:

	https://www.futuretimeline.net/blog/2015/02/22.htm#.VZorhGOYvQp and version 3 in 2013 at: https://vimeo.com/60249416 Care-O-bot 4 uses open software interfaces that allow it to be expandable for developers. The institute encourages scientists to develop new applications for the Care-O-bot 4 and its predecessor, Care-O-bot 3. Aida-1 will use the base wheeled module of the Care-O-bot, adapting it to create a smaller, simpler version for service tasks.
Where was it used?	The Care-O-bot, versions 2 to 4, is in use at the following institutions: http://wiki.ros.org/Robots/Care-O-bot/distribution
What were the results?	Care-O-bot 4 is reviewed at: 1. U. Reiser et al., "Care-O-bot® 3 - creating a product vision for service robot applications by integrating design and technology," 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems, St. Louis, MO, 2009, pp. 1992-1998. doi: 10.1109/IROS.2009.5354526. Its predecessor, Care-O-bot 3, is reviewed at: 1. Graf, B., Parlitz, C., and Hägele, M. (2009) Robotic Home Assistant Care-O-bot® 3 Product Vision and Innovation Platform. In: Jacko J.A. (eds) Human-Computer Interaction. Novel Interaction Methods and Techniques. HCI 2009. Lec- ture Notes in Computer Science, vol 5611. Springer, Berlin, Heidelberg. doi: org/10.1007/978-3-642-02577-8_34. 2. Reiser U., Jacobs T., Arbeiter G., Parlitz C., Dautenhahn K. (2013) Care-O-bot® 3 – Vision of a Robot Butler. In: Trappl R. (eds) Your Virtual Butler. Lecture Notes in Com- puter Science, vol 7407. Springer, Berlin, Heidelberg. doi: org/10.1007/978-3-642-37346-6_9.
Validation/endorsements	The Care-O-bot 4 received a Red Dot Award ("Best of the Best") for innovation design. It is validated by the IEEE at: https://robots.ieee.org/robots/careobot/ https:// spectrum.ieee.org/automaton/robotics/-home-robots/ care-o-bot-4-mobile-manipulator?utm_source=robots and https://spectrum.ieee.org/automaton/robotics/-home-robots/care-o-bot-4-mobile-manipulator?utm_source=robots.ieee.org.

Approximate cost	To be determined.
Funding sought	A licensing agreement is sought with a robotics develop- er and the Fraunhofer Institute. The institute facilitates technology transfer through its patent system at: https://www.fraunhofer.de/en/research/range-of-services/fraun- hofer-intellectual-property-transfer.html
Contact details and further information (please specify, which elements could be published)	Linda M. Mueller, CEO dba PolygenX Idea Corporation

6.6 temperature monitoring

Description and rationale	We need to avoid COVID-19 from spreading. Until a COVID-19 cure is found or a vaccine is developed, quarantine zones and social distancing are the main ways to limit the spread. Quarantine zones need to be set up all over the world, in a wide range of locations, from remote areas of developing countries where healthcare infrastructure and skills are scarce, to urban environments where healthcare professionals are overstretched by the scale of the epidemic. During quarantine, patients' temperature monitoring is an essential tool to either identify those who require medical aid or those who are recovering. These temperature measurements and vital signs must be monitored in a patient record. It is also important to detect if a patient leaves the zone before their quarantine period expires, to avoid further infections. Our solution allows patients to be monitored in isolation zones, such that they: 1. do not infect others; 2. are moved to hospital only if their case deteriorates This is achieved by regularly recording the body temperature of every patient in the isolation zone. To achieve this simple yet critically important objective, two solutions are made available by SixSq: 1.Basic configuration, relying on manual temperature measurements 2. Sensor configuration, relying on wearable temperature sensors. Both solutions are based on a local installation of OpenMRS, the open source and de- facto humanitarian standard in medical record systems. In order to ensure high availability of the patient record system, independently of the internet, OpenMRS is installed on an edge device located in the zone. The small ruggedized machines are coupled to create a fault-tolerant system. The community behind the open source OpenMRS software is already engaged with this project, since it addresses a critical community need, both in terms of COVID-19, and in terms of ease of software deployment for similar remote applications. Depending on the solution configuration, the temperature measurements are either manually entered in the patient file on

	OpenMRS, or automatically communicated by the wearable sensor, via Bluetooth. To ensure no IT personnel are required on-site, the edge system is remote controlled from a central location. When an internet connection is available, anonymised and aggregated data is pushed to a central cloud application. The Bluetooth interface also triggers an alert if a patient leaves the zone, thus violating the isolation requirement. The solution therefore provides a simple, flexible and very effective solution to track patients' temperature measurements.
When and where was it demonstrated?	The International Red Cross (ICRC) has deployed field clinics based on our technology in Africa and the Middle East on 2020. This solution builds directly on this work with ICRC. The ICRC is currently reviewing the initial deployments before planning a worldwide deployment. Note: The ICRC is completing a security audit, during which we are not allowed to publicly share this reference. This COVID-19 solution is based on SixSq technology validated in 2019, and is currently used, for example, in smart city and science applications. The European Space Agency is also using the Nuvla.io and NuvlaBox software in several production projects to provide its scientific community with access to large amount of data.
Where was it used?	See previous answer. Further, the solution can be installed in a range of isolation zones, including repurposed buildings, containers and trains, or tents and clinics. The solution also works for a range of available internet connection, including intermittent or poor-quality connections.
What were the results?	The solution deployed by ICRC was packaged within days, compared to weeks and months with alternative technologies and partners. The results are summarised hereafter, benefits that this COVID-19 solution will also have: Simple deployment and installation by non-IT experts Remote operations, including monitoring and updates Locally fault-tolerant system, ensuring no loss of temperature measurements in case of failure

<table>
<tr><td></td><td>Optional remote backup possible
Consolidation of measurements in the cloud, anonymised, providing valuable data for specialists and scientists
Correct execution in challenging environments (e.g. high temperature, dust, high humidity)
For the temperature sensors, the product has already been successfully deployed in hospitals in China and the USA.</td></tr>
<tr><td>Validation/endorsements</td><td>The European Space Agency has publicly acknowledged1 the capabilities of SixSq and the technology foundation this solution is built on.

The ICRC has successfully deployed a very similar solution as this COVID-19 solution. However, we do not yet have the permission to publicly announce it.</td></tr>
<tr><td>Approximate cost</td><td>The solution comes in two main configurations:
Basic setup, with manual temperature measurements
Sensor automated setup, with wearable temperature sensors
The following table provides indicative costs, without taking into account the cost of local logistics and installation.
<table>
<tr><th>Configuration</th><th>Approximate cost (without local logistics and installation) per year</th><th>Equivalent cost per patient per year</th></tr>
<tr><td>Basic 100
Includes 100 patients concurrently, with manual temperature measurements</td><td>First year: $6,900
Subsequent years: $3,120</td><td>First year: $69
Subsequent years: $31</td></tr>
<tr><td>Sensor 100
Includes 100 patients concurrently, with wearable temperature sensors</td><td>First year: $19,400
Subsequent years: $6,000</td><td>First year: $194
Subsequent years: $60</td></tr>
<tr><td>Sensor 500
Includes 500 patients concurrently, with wearable temperature sensors</td><td>First year: $69,000
Subsequent years: $16,200</td><td>First year: $138
Subsequent years: $32</td></tr>
<tr><td>Sensor 1000
Includes 1000 patients concurrently, with wearable temperature sensors</td><td>First year: $125,000
Subsequent years: $25,800</td><td>First year: $125
Subsequent years: $26</td></tr>
</table></td></tr>
<tr><td>Funding sought</td><td>The cost of the proposed solution is detailed in the previous section.
For teams wanting to explore further integration and/or extensions of the solution, SixSq is available to support these tasks.</td></tr>
</table>

	With funding, SixSq is also available to support open source communities with our professional software developers, such as OpenMRS.
Contact details and further information (please specify, which elements could be published)	SixSq Sàrl Avenue de France 6 1202 Geneva Switzerland sixsq.com Marc-Elian Bégin CEO, Co-founder meb@sixsq.com +41 77 44 68 119

6.7 Portable Ventilator

Description and ration	Portable Ventilator The unit is very small, light and durable and robust. It can be used indoors or outdoors. It can be used In a tent or portable hospital without the need for building power. It can be used in the rain and in poor climate conditions. Its small size makes it very useful in ambulances in place of a BVM or ambubag, freeing up the EMT to do other activities during patient transport to and from hospitals. It can be mounted on the side of a regular patient bed. This allows the bed and ventilator to be easily moved as a complete assembly. And this ventilator does not require a special ventilator bed as most others do. The unit can be powered by 120vac house power, 240vac european house power, 12 volt car battery, Lithium Tesla type battery or solar. It has a 360° Swivel Connector-Patented Medication Port for use with MDI or syringe. Manometer port: Integrated PEEP connection, no adaptor necessary. Adult, Child, and Infant sizes. Pressure release valve standard on child and infant models, optional on adult model. All models complete with reservoir bag and 02 tubing. Range of accessories including 3M Hepa Filter and PEEP valve. Latex free.
When and where was it demonstrated?	Merritt BC Canada
Where was it used	Our testing facility
What were the results	Ready for production
Validation/endorsement	ASME ASTM ISO9000 AQAP1
Approximate cost	$6500cdn
Funding sought	$40,000 for tooling to deliver 20 units per week starting immediately
Contact detqils and further information (please specify which elements could be pubished)	Russell R. Lanphier, First-off PROTOTYPE. 604 795 6756

6.8 Karuna Health Platform

Description and rationale	Karuna enables care teams to go fully remote while staying connected to high-risk patients. We're equipping our partners with the tools needed to boost staff productivity, triage incoming requests, and mitigate risk while communication volume from anxious patients soars. Karuna enables HIPAA-compliant text messages and phone calls on mobile and desktop. Care managers securely access Karuna on their personal devices, enabling fully remote care while maintaining necessary protection of sensitive health information. With varying levels of existing data integration available, care teams can get started with Karuna today. For more advanced integrations, we can customize rollout plans that make sense for your organization.
When and where was it demonstrated?	During COVID-19 phase, applied by the counselling centres, hospitals, city local administration.
Where was it used?	USA/Globally
What were the results?	Protected staff and high-risk patients during COVID-19 and to boost staff productivity, triage incoming requests, and mitigate risk while communication volume from anxious patients soars.
Validation/endorsements	Local Governments, Jeremy Merrill, Senior Director, Behavioral Health Initiatives at New Horizon Counseling Center, NY
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://meetkaruna.com/covid/

6.9 Critical care Protocol Solution

Description and rationale	Assisting in early flagging of high-risk patients by sharing and analyzing results in real time, allowing for more targeted allocation of critical care services that are already in short supply.
When and where was it demonstrated?	During COVID-19 phase, National Government
Where was it used?	USA/ Global
What were the results?	Critical care Protocol Solution: This is a customized solution for governments and ministries of health directed at early identification for critical care/high-risk patients. This solution utilizes guidelines from the World Health Organization and the Edmonton Frailty Scale, and is powered by a critical care protocol algorithm. The solution assists in early flagging of high-risk patients by sharing and analyzing results in real time, allowing for more targeted allocation of critical care services that are already in short supply.
Validation/endorsements	EY, SAP AI
Approximate cost	NA
Funding sought	NA
Contact details and further information (please specify, which elements could be published)	https://www.ey.com/en_gl/news/2020/04/ey-sap-and-qualtrics-collaborate-to-bring-resources-to-governments-around-the-world-to-help-in-the-fight-against-covid-19 https://www.qualtrics.com/support/ AUSTRALIA +61 2 8310 8031 SINGAPORE +65 6407 1133

6.10 Semi / fully autonomous robot for aircraft disinfection equipped with ultraviolet lights

Description and rationale	An infectious disease originated in Wuhan, a city in the Hubei province of China has till date killed a total of about 284,000 and infected more than 4 million people globally. The coronavirus disease (COVID-19) has spread to 212 countries and threatening the global economy to shrink by almost 1% in 2020. World health organisation was alerted on December 31 last year to several cases of unusual pneumonia in China and the organisation has declared the novel virus a global pandemic on March 11, 2020. Unfortunately, the virus has already transmitted to many countries from its origin before most countries could decide on closure of their borders for international travelers. World Health Organisation's (WHO)guide on hygiene and sanitation in aviation states that the main source of infection for fellow passengers is from an infected person and the risk from droplet exposure from an infected person. The concern that the pathogen can remain in the aircraft by contaminating surfaces after the infected person has left is highly alarming the aviation industry on the importance of and effective disinfection procedure. WHO recommends for coordinated plan to reduce the risk of transfer of pathogens from infected person to other passengers through surfaces on the aircraft to deal with such infectious disease. The COVID-19 virus mainly spread by droplets produced by coughing or sneezing of infected person. They also spread through the droplets that survive on surface for many days. Hence, the disease not only affect the co-passengers in aircraft when the infected person is travelling but also leaves the droplets active on many areas in the plane including seat area, armrests, tray tables, seatbelt latches, light and other control buttons, overhead compartments and handles, adjacent walls and windows, and video monitors and may infect the future next passengers. While the aviation industry is getting ready for operation post-pandemic, it is important to consider efficient disinfection process to ensure safety and wellbeing of passengers. An effective disinfection method will not only be useful during this hard time of fighting with COVID-19 but also in future to save passengers from other communicable diseases. This

	project aims to develop a semi / fully autonomous robot for aircraft disinfection equipped with ultraviolet lights. The development of this robot is aimed at cleaning the aircraft's passenger, cabin crew, and cockpit area and is not aimed at exterior disinfection or passengers checked-in baggage area on the plane. We propose an effective disinfection using 254nm UVC lights positioned at several levels of the robot to cover carpet to overhead compartments on the plane. Cooperative robot approach can be applied to minimize the cleaning time while not compromising on the effective disinfection. The semi-autonomous robot can be operated remotely by the operator to nullify the risks of UVC exposure to humans and the fully autonomous robot can be monitored from anywhere across the globe. The robot will not use any chemical or cleaning liquids while the focus is only on the ultraviolet rays-based disinfection for aircraft interiors. This project is done by LIGHTHOUSE – DISRUPTIVE INNOVATION GROUP LLC, a US Company that is a business opportunity builder based on Applied Research from Top Academia in collaboration with the PAIR LAB, Chennai (India) - Auckland (New Zealand). This project is the outcome of the collaboration between a consortium between Tufts university Human Factors Engineering Lab (US), Sant Joan de Hospital, Robots4Health Unit, Barcelona (Spain), and The PAIR Lab. The PAIR LAB is established with mutual research interests from Bharath Institute of Higher Education and Research and Auckland University of Technology. Currently the Lab operates in both universities aimed at aimed at incorporating deeper integration of user perspectives in robotics research, development, and application.
When and where was it demonstrated?	The prototype developed was demonstrated at Madras ENT research foundation, India on April 13, 2020. https://www.youtube.com/watch?v=H-OvIPOSMoQ&t=1s Other evidences of the benefits of such technology are: Researchers at Columbia University are testing the effectiveness of a certain type of UV light — called far-UVC light — against the novel coronavirus. This type of UV light can kill viruses without harming humans, according to

	Columbia University's Center for Radiological Research. The research team's experiments have shown far-UVC effective in eradicating two types of airborne seasonal coronaviruses (the ones that cause coughs and colds). The researchers are now testing the light against the SARS-CoV-2 virus in collaboration with Thomas Briese and W. Ian Lipkin of the Center for Infection and Immunity in a biosafety laboratory on Columbia's medical center campus, with encouraging results, Brenner said. Pittsburgh International Airport has put UVC fixtures on its floor-cleaning robots, making it the first airport in the US to test the use of the ultraviolet rays to scrub the coronavirus from surfaces. If effective, the UV-cleaning robots could be a model for other airports as they plan to reopen and try to persuade people to travel again. However, some of those solutions are costly, far from the mass production, or not adapted for transportation vehicles like aircrafts. The systems that are for similar are not full autonomous systems.
Where was it used?	The robot is under development and the prototype has been demonstrated in several places in India.
What were the results?	The UVC equipped robot disinfected the ICU ward at the hospital for 20 minutes. Agar plate experiment was conducted to investigate the efficiency in disinfection before and after UVC robot disinfection procedure. Bacillus growth was reported in the culture before the robot was deployed for disinfection and the post test indicated no colonies growth in the culture.
Validation/endorsements	Before UVC robot disinfection  After UVC robot disinfection 

Approximate cost	We have endorsement letter of the Director of Research and Innovation of the Sant Joan de Deu Hospital of Barcelona and the coordinator of the Human Factors Engineering Lab for medical devices at Tufts University, Professor of Practice Dr. Dan Hannon.
Funding sought	$200K : building two platforms and the cost of building dollars, certification by the FDA in collaboration with Dr. Prof. Dan Hannon and Tufts University – Human Factors Engineering Lab, plus advising cost and test in Chennai ,India and Sant Joan de Deu Hospital, Barcelona, Spain. The timeline of this project is 6 months.
Contact details and further information (please specify, which elements could be published)	Dr. Jordi Albo Canals Chief Scientic Officer LIGHTHOUSE – DISRUTIVE INNOVATION GROUP LLC Cambridge, MA, US. Email: Jordi.albo@lighthouse-dig.com Cell Phone: +1 8577015708 Dr Jaishankar Bharatharaj Co-director (robotics), Bharath Institute of Higher Education and Research Research Associate, Auckland University of Technology Email: Jaishankar.roboin@gmail.com / Jaishankar.Bharatharaj@aut.ac.nz Cell Phone: +91 99427 30646

6.11 Solawash Automated Hand Washer

Description and rationale	The Solawash Automatic Hand Washer goes by the tagline "hohoro wo sa" in Akan language, to wit (wash your hands) The Solawash Automated Hand Washer is a hand-washing sink powered by Solar Energy. The sink, a recycled barrel has a single tap, for liquid soap and for water. The tap dispense soap upon detection of the human hands and begins sounding an alarm for 25sec to get the individual ready for the outflow of water. The sink has been programmed such that as soon as the alarm goes off, water flows out, enough to get hands thoroughly rinsed. This invention is expected to solved varied problems that comes with having to open and close taps, thereby re-staining hands with germs, bacteria or virus in the phase of the Corona Virus Pandemic and other diseases caused by fecal-oral transmission including diarrhea, typhoid, cholera, polio and hepatitis. Features of the Solawash Automated Hand Washer include A standard water holding capacity of 80litres. This capacity can serve 150 people before refill and waste water capacity of 160litres. The water holding capacity can be customized to hold more water on request. The Sink is powered by solar energy stored in batteries that last for 48hours before running down The systems controls water used, by calibration of the amount of soap needed and corresponding water to rinse hands. This helps to save water. The Sink is Assembled from recycled oil barrel and old car tires It is durable; made to meet standard requirement. The area around the barrel is a branding space for advertising. There is also the notification time between the time soap is dispensed and the time water for rinsing flows. This notification time can be customized into voice messaging to disseminate health educational messaging. There is product differentiation based on size of barrel and additions of other features such as hand dryer and tissue dispenser. This is to segment the market and create affordability for all. It is very user friendly (sensors triggers dispensing of liquids and an alarm notification of when water will flow, refill time and time for emptying waste water compartment) After sales servicing is available Well branded product that attracts people to wash their hands frequently

	It is portable to move around
When and where was it demonstrated?	The prototype is been demonstrated for the past 2weeks at Atwima Amanfrom, a town under lockdown in the Kwadaso Municipality to encourage regular hand washing to prevent the spread of Corona Virus
Where was it used?	The Solawash Automated Hand washer has not been produced on large scale to be widely use because the prototype is undergoing some certification processes before plans to scale up is implemented.
What were the results?	Results from the demonstration of the prototype shows the following Preliminary results This invention has solved problems that comes with re-staining hands through the opening and closing of taps The sink with a water holding capacity of 80litres can serve approximately 150 people before refill Solar energy stored in batteries can last for 48hours before running down The Sink is user friendly and attractive encouraging many people to wash their hand frequently
Validation / Endorsement	In an exclusive remark in the 5th nations address on the Corona Pandemic, the president of Ghana Nana Akuffo Addo applauded sense of entrepreneurship and innovation in the invention of a solar-powered handwashing sink (Solawash Automated hand washer) and others such as 'COVID-19 prevention electronic bucket' all in aid to help fight the spread of the Corona Virus pandemic. Solawash is in collaboration with Business facilitators such as the Trade Ministries of Ghana, The Sanitation Ministry, National Board for Small Scale Iindustries (NBSSI) and Ghana Standard Board to duly certify the product to begin mass production, purchase, recommend and promote the product beyond the shores of Ghana. Solawash has also received interest of sales orders from corporate organisations, government agencies and international bodies. Currently the Prototype is undergoing certification from regulatory bodies in Ghana. Prominent among them is the Ghana Standard Board
Approximate Cost	The cost of the production for the prototype is GH¢2000.00. That notwithstanding, financial analysis for Solawash Business plan

	predicts the costs to come down, to vary between GH¢800.00-1500.00 through economies of scale and product differentiation.
Funding Sought	Funding is being sort to Produce 10,000 pieces of Solawash to distribute across the country in prevention of the Corona Virus spread through regular hand wash To purchase fabrication equipment and tools For Payment of Business Consultancy, legal Services, certification and regulatory fees
Contact details and further information (please specify, which elements could be published)	1 Richard Kwarteng (Product Inventor) Contact: +233(0)242 979 347 Email: aningblaq.k@gmail.com 2. Joel Adusei - Gyamfi (Business Consultant) Contact： +233(0)243 435 595 Email: solawash20@gmail.com NB: any clarification that is not peculiar to the product invention should be directed the Business Consultant through - Joel Adusei-Gyamf.

6.12 The RNME ventilation system

Description and rationale	Uruguay is currently developing a program lead by the Ministry of Energy, Industry, and Mining, the National Investigation and Innovation Agency and CEIBAL Plan to support the design and manufacture of artificial respirators (one of the options for production is to use 3D printing). The government is investing six millions of Uruguayan pesos in this initiative that seeks to prevent the possible shortage of artificial respirators in the country, which could lead to inadequate attention of people affected by COVID-19, contributing to reduce mortality of persons who need hospitalization and artificial respirators. Uruguay has high technical knowledge on bioengineering and some pilot experience producing respirators but luck of experience in producing this kind of products in a massive way, so the government is supporting this program in order to boost and accelerate the production.
When and where was it demonstrated?	A call for proposals has been lunched.
Where was it used?	The artificial respirator was not used yet.
What were the results?	Two proposals have been selected there´s time until May to present results. Brief description of the proposals: 1.The RNME ventilation system is based on a volumetric control mode with square flow, where the user configures the Tidal Volume and Respiratory Frequency parameters on a control display, serving both invasive and non-invasive ventilation in BiPAP mode. Each kit includes a high pressure safety regulator and audible alarm. The proposed equipment has been thought to be installed in a modular and systemic way. For cases where it may be necessary, a series of kits have been included that give the set the versatility described above. They are: a. Generator and Perimeter KIT (up to 50 beds) b. Branch KIT (up to 10 beds). 2. RespiraOne: the goal is to design and manufacture 50 respirators that are fast, reliable, complete, safe, proven to work, and supported by the standards of the corresponding medical organizations. They must be

	easy to clean and sterilize. Easy to build and replicability. The components must be inexpensive and easily available on the local market. Automatic volume control type ventilation will be performed. They will have adjustments of the following parameters: Volume of air expelled to the patient, ratio between insufflation and expiration and cycling (breaths per minute). It will have an assisted breathing mode and a controlled one. The assisted mode will be triggered by the patient and limited and cycled by the ventilator. The controlled mode will be triggered, limited and cycled by the respirator.
Validation/endorsements	Ministry of Industry, Energy and Mining is leading the initiative (MIEM). More information: https://www.anii.org.uy/apoyos/innovacion/237/diseno-y-produccion-de-respiradores-para-afrontar-el-covid19/
Approximate cost	Six millions Uruguayan pesos in total (USD 136.363), divided for the two proposals selected. One for 1.5 (USD 34090) 4.5 million (USD 102272).
Funding sought	Uruguayan Government.
Contact details and further information (please specify, which elements could be published)	Natalia Mamberto-International Cooperation Assistant UNIDO-MIEM.

6.13 Air heating and humidifiction system for mechanical ventilation of intensive care unit(ICU) patients

Description and rationale	AIR HEATING AND HUMIDIFICATION SYSTEM FOR MECHANICAL VENTILATION OF INTENSIVE CARE UNIT (ICU) PATIENTS, for coupling to oil free air compressors in order to allow them to act as simple artificial respiration devices, consisting of two coupled acrylic containers that consist of an upper heating and humidification box and a lower water container. This simple system conditions the air that leaves the mechanical ventilator (air compressor reservoir), with a thermostat and a humidistat that control electric heaters and water sprays, heating and humidifying the flowing air. It also comprises a lower water container, which stores liquid water that is pumped to the upper box as needed to humidify the air blown to the patient. Rationale: For the normal individual, it has been experimentally verified that the temperature at the trachea level varies between 32 and 34 oC, the absolute humidity (AH) varies between 25 and 35 mgH2O L-1, and the relative humidity is approximately 95% (Shelly, 1998; Branson, 1999). Based on these experimental data, the compendium of Intensive Care Medicine (2004), of the Brazilian Association of Intensive Care Medicine, in its chapter 24, establishes that in intubated patients (who are being mechanically ventilated) the conditions of the blown air must be with temperature between 32 and 34 oC, as well as relative humidity between 95 and 100%. Internationally, similar conditions have been standardized at the midtrachea as 100% relative humidity (RH) with absolute humidity (AH) of 36 to 40 mg L-1 at 31 to 35°C (Cairo, 2013). The herein proposed device would provide the patient with air close to the internationally standardized

	conditions for mechanical ventilation, which can represent less discomfort during intubation, and a faster recovery, thus anticipating discharge and vacating hospital beds and equipment. References: Branson RD. Humidification for patients with artificial airways. Respir Care 1999; 44:630-42. Cairo JM. Mosby's Respiratory Care Equipment. 9th edition. St. Louis, Mo, USA: Mosby, Elsevier; 2013. Shelly MP. Conditioning of Inspired Gases. In: Marini JJ, Slutsky AS, editors. Physiological basis of ventilatory support. New York: Marcel Dekker; 1998. p.575-99.
When and where was it demonstrated?	19 June 2006 – MSc Thesis submitted before the Graduate Program of Mechanical Engineering at Federal University of Parana, UFPR, Curitiba, Parana, Brazil.
Where was it used?	Only Laboratory Experiments at UFPR were conducted with a rubber made test lung typically used to test ICU mechanical ventilators.
What were the results?  	The system consists of a compressor, as shown in Fig. 1 (top), an "on - off" unidirectional solenoid valve, as shown in Fig. 1 (bottom), for opening and closing the air flow rate to the patient, and an electronic timer circuit, to control the solenoid valve, which was set to energize the valve for 1 second, opening the air flow for inspiration, and for 2 seconds, closing the air flow to allow for expiration, according to the international mechanical ventilation protocol (Cairo, 2013). As an example of the multiple tests conducted in the laboratory with the prototype shown in Figs. 1 and 2, in one of them, the thermostat was adjusted to 36 ° C and the humidistat to 85%. The test had a total duration of 7200 s. The initial environmental conditions were

Figure 1. Air compressor (top) and solenoid vale (bottom).

Figure 2. The air heating and humidification system prototype coupled to a fully blown rubber made test lung.

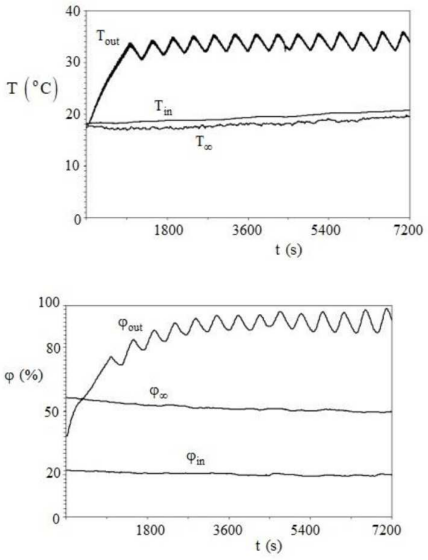

Figure 3. The system temperatures (a) and relative humidities (b) time evolution during the laboratory test.

and . Notable was the effect of air compression that caused a drop in the relative humidity of the system inlet air to . The ambient air and system inlet air temperature were nearly the same throughout the test. In order to vary the compressor inlet air condition, the system's air compressor was placed inside an air-conditioned controlled room. Figure 3 shows the test results. The stabilization of the outlet air temperature, Tout occurred rapidly, starting at t ~ 1000 s, remaining in the range of 32 to 35 ° C throughout the test, as shown in Fig. 3a. The relative humidity of the outlet air, , elevated more slowly as shown in Fig. 3b, reaching 80 % at t ~ 1800 s, and stabilizing between 85% and 95% from t ~ 3000s showing that the system was capable of increasing relative humidity to the required levels in acceptable time. o T 18 C □ = 56 % □ □ = in 22 %□= out □

Validation/endorsements	he system has been patented in Brazil – PI 0601068-7, which was granted on 14 Feb 2018.
Approximate cost	US$ 100,000.00
Funding sought	US$ 100,000.00
Contact details and further information (please specify, which elements could be published)	Since the idea has already been patented in Brazil, anything in this proposal could be disclosed. Contact details: PI: Jose Viriato Coelho Vargas, PhD, ME Professor of Mechanical Engineering and Biologist Dept of Mechanical Engineering Universidade Federal do Parana – UFPR Rua Cel Francisco Heráclito dos Santos, 100, Bloco IV, sala 7-23 CP 19011

6.14 Hydrogen peroxide vapor (HPV) technology

Description and rationale	The new coronavirus (2019-nCoV) has become a growing threat amongst developing countries, such as Brazil, where a high ratio of population to number of health care facilities and medical staff is present. In the treatment centres, such as hospitals, there is direct and indirect exposure between patients of Covid-19 and healthcare professionals, making them vulnerable to contagion. Personal protective equipment (PPE) are used in order to avoid the infection of the health care providers. Given the ongoing high demand, shortage of these materials can put in risk the containment of the virus. In developing economies, shortage of PPEs is intensified due to the ferocious competition with the developed countries to acquire these commodities. Furthermore, as the World Health Organization (WHS) urges the population to wear masks only if respiratory symptoms are present, many healthy people are increasingly using masks hiking demand. Thus, effective strategies to reuse this equipment must be implemented with urgency to tackle the shortage of EPIs in Covid-19 treatment centres. We put forward a low cost easy-to-manufacture disinfection device based on hydrogen peroxide vapour (HPV) and hydrogen peroxide gas plasma (HPGP) for N95 masks and other medical items, such as PPEs. As opposed to other methods, such as thermal (autoclave), the system preserves the quality and functionality of the PPE. According to [N95DECON], UV-C and ozone-gas
When and where was it demonstrated?	The use of hydrogen peroxide vapor (VPH) and hydrogen peroxide gas plasma (PGPH) has been tested against several organisms and demonstrated effective disinfection of a wide range of microorganisms, including bacteria, viruses and fungi (Sakudo et al., 2019). The fact that hydrogen peroxide vapor (HPV) does not leave residues as it decomposes into oxygen gas and water, in addition to the low temperature of the application in the steam phase makes it easy to apply. Goyal (2014), and its collaborators demonstrated the effectiveness of the technology in disinfecting surfaces

	contaminated with feline calicivirus (FCV); human adenovirus type 1; acute respiratory syndrome coronavirus (SARS-CoV); avian influenza virus (AIV); and swine influenza virus (SWIV). According to Kenney et al., 2020, the HPV method diminishes the presence of viruses in N95 masks to amounts where there is no risk of infection. In addition, the method does not deform the masks as it avoids thermal processes in contrast to autoclave sterilization, for example. Schwartz, 2020 and his collaborators demonstrated that HPV is efficient in the decontamination of the SARS-CoV II virus in N95 masks, allowing it to be reused for more than 50 times. Recent studies as shown in Sakudo (2019), and Ansaldi (2004), and their respective collaborators have shown that hydrogen peroxide gas plasma (HPGP) efficiently eliminates microbial pathogens such as bacteria, fungi, and viruses faster than HPV. The technology behind it is effective in inactivating pathogens on the surface of medical and dental devices, as well as in food, or, even, in the air.
Where was it used?	Hydrogen peroxide vapor (HPV) technology is already widely used in hospitals, biopharmaceutical manufacturing areas, biosafety laboratories and food industry surroundings, as a bactericidal, fungicidal, and viral decontaminant of these environments and surfaces. In most cases, vaporization processes are used to transform hydrogen peroxide from its liquid state in concentrations of 30% to 40% in the gaseous state, which can occupy the entire volume to be decontaminated. Portable decontamination devices or rooms adapted with vaporizer, sensors and forced ventilation are already used in many places that require efficient sanitization. Hydrogen peroxide and plasma decontamination modules are already effective methods for surgical materials such as electric scalpels, endoscopes and others. Several products are already certified by health agencies in diverse countries and used in hospitals worldwide. Companies such as Bioquell, ASP (STERRAD) and Steris developed products based on this technology for hospital instruments, which are sold at values above U$ 45,000.00.

What were the results?	The researchers Goyal, Chander and Yezli (2014) demonstrated that no viable virus was identified after exposure to HPV in any of the vaporized volumes tested by them. HPV was virucidal (with a reduction of more than 4 log) against feline calicivirus (FCV), adenovirus, transmissible gastroenteritis coronavirus of pigs (TGEV - V, a severe acute respiratory syndrome coronavirus [SARS-CoV] surrogate) and avian influenza virus (AIV) in the smallest vaporized volume tested (25 mL). For the swine influenza virus (SwIV) a reduction of 3.8 log was found for the vaporized volume of 25 mL and a reduction of 4 log for the vaporized volumes of 27 and 33 mL. Researcher XIA (2020), and his collaborators achieved a maximum inactivity of 1.3 log of the virus Porcine reproductive and respiratory syndrome virus (PRRSv) with non-thermal plasma HPGP subjected to a 20 kV electric field and, in 2019, a reduction of 2,3 log for bacteriophage virus MS2 with plasma subjected to 30kV. The decontamination experiments of N95 masks with commercial equipment from the BQ-50 system (Bioquell, Horsham, PA) carried out by Kenney, 2020 and his team demonstrated that a single cycle of hydrogen peroxide vapor results in the complete eradication of the SARS-CoV virus -2 of the masks. In 2016, the US Food and Drug Administration (FDA) published a technical study that showed that the mask N95 does not change its mechanical characteristics and does not lose performance after a 50 decontamination cycles following this method.
Validation/endorsements	The validation of our solution is based on the following bullet points: • Literature proven efficiency of the technology • Commercial products available endorsed by Declaration of Conformity in many countries • Components readily available and easy to access • Hydrogen peroxide is relatively inexpensive and available

<table>
<tr><td></td><td>• The designers of this solution are a part of the UTFPR post graduate engineering research laboratory (Laboratory of Sensor Technology - LTSS). We have experience in developing innovative solutions and R&D for industrial partners such as Petrobras, Engie among others.</td></tr>
<tr><td>Approximate cost</td><td>The table below shows the approximate cost for the fabrication of one unit that can produce both plasma as well as vapor of Hydrogen peroxide. This is a fraction of a similar commercially available equipment as informed above.
<table>
<tr><th>Nº</th><th>Item</th><th>Cost per unit</th><th>Total cost</th></tr>
<tr><td>1</td><td>High voltage generator</td><td>U$500</td><td>U$500</td></tr>
<tr><td>1</td><td>Vacuum pump</td><td>U$120</td><td>U$120</td></tr>
<tr><td>6</td><td>Piezoelectric ultrasonic vaporizers</td><td>U$8</td><td>U$48</td></tr>
<tr><td>1</td><td>Mechanical components</td><td>U$200</td><td>U$200</td></tr>
<tr><td>1</td><td>Electronic components</td><td>U$80</td><td>U$80</td></tr>
<tr><td>4</td><td>Electrode</td><td>U$50</td><td>U$200</td></tr>
<tr><td>1</td><td>Hydrogen peroxide concentration sensor</td><td>U$200</td><td>U$200</td></tr>
<tr><td>Total</td><td></td><td></td><td>U$1,348</td></tr>
</table></td></tr>
<tr><td>Funding sought</td><td>Scholarship = 3 people for 3 months = U$7,000.00
General material for development and trials = U$15,000.00
Performance tests = U$10,000.00
Total = U$32,000.00</td></tr>
<tr><td>Contact details and further information (please specify, which elements could be published)</td><td>Professor Cicero Martelli
cmartelli@utfpr.edu.br
Cell phone number: +55 41 99680 3196</td></tr>
</table>

6.15 Surface functionalisation

Description and rationale	Surface functionalisation or functional thin films exhibiting photocatalytic properties, are crucial for the mineralisation of microbes, bacteria, viruses and more generally organic residues. Durable sterilisation is enabled if photocatalytically active surfaces are exposed to natural or synthetic light. This functionalisation opens new opportunities to sterilise the coated devices under defined illumination and to provide germ/virus inhibiting surfaces at day light. As a result, patients, elderly persons and medical personals in hospitals, retirement homes, co-workers in public administrations, kids and students in educational institutions. In turn, it would reduce the use of disposable equipment and/or disinfectants.
When and where was it demonstrated?	The proof-of-concept (TRL6) was developed by individuals under the roof of their own business in cooperation with end-user industrials in several European countries. The focus was devoted to the realisation of thin coatings exhibiting outstanding anti-fingerprint and easy-to-clean properties. However, all tests regarding photocatalytic activity according to ISO22196 were carried out and destroyed completely bacteria, methylene blue, and stearic acid, leading to the mineralisation of these organic species whatever it is. As a result, the coated surfaces are germ/virus inhibiting, anti-fingerprint, and easy-to-clean. In addition, the hardness of the thin films can be adapted in a wide range so as to meet various applications. The production of the TiO2 based photocatalytically active coatings was developed at room temperature in order to enable the treatment of temperature sensitive materials such as fabrics, polymers and even paper. Titania is known to be bio-compatible and environmentally friendly and offers a sustainable added value to future products. Further the more, it has been proven that titania coatings prevent the development of any multi-resistant germs.
Where was it used?	The process was industrially upscaled and commercialised for coating of eyeglass frames within the last 5 years. Currently, some adaptations are envisioned to functionalise flexible materials using roll-to-roll coating systems for textile and polymers

	(plastics) used in environments with higher hygiene requirements.
What were the results?	
Validation/endorsements	Validation tests were carried out according to ISO22196 for several samples (7,5 x 2,5 cm2) on different types of materials (polymers, glasses, metals/alloys, ceramics...). The aim of this project is to upscale the process onto a roll-to-roll coating unit in order to treat various tissues and films (separation of beds in hospitals, and plastic boards or films used to protect screens, signboards, walls in toilets...).
Approximate cost	For such plasma deposition-based processes, the costs depend on the web width and the coating thickness but lie in any cases 5 to 10 times lower than the conventional silicate-based coatings.
Funding sought	For the upscale and validation of the roll-to-roll process including equipment, consumables, sub-contracting for antibacterial/antiviral testing, and man-power, a lump sum of approx. 1 million will be needed to deliver an industrial prototype with a coating width of 50 cm (TRL8). This prototype would allow us to scale up for all the required web widths.
Contact details and further information (please specify, which elements could be published)	Contact: Prof. Dr.-Ing. habil. Patrick J. Masset (patrick.masset@technallium.com)

7. Other technologies

Technology	Organization	Continent
7.1 UVC LEDs	KAV Technology Limited	Asia
7.2 e- Platform	Turn Your Concern Into Action Foundation (TYCIA)	Asia
7.3 Protein and greens powders	dba PolygenX Idea Corporation	North America
7.4 Foot Pedal Operated Hand Washing System	Ezabo Baron Woxsan Technology	Africa
7.5 Fortified supplementary food product	McCarron University, School of Public Health	Africa
7.6 Village Data Analytics (VIDA) with “VIDA vs. COVID”	Village Data Analytics	Africa
7.7 E-Shop Somalia	E-Shop	Africa
7.8 H.A.R.D disaster management system	Evandro Holz	South America

7.1 UVC LEDs

Description and rationale	Multi-functional Light . UVC with General Lighting together with intelligent smart lighting control . & we have a chance to work with “Disinfection Robots” and “Distribution Robots” that is currently used in airports, hospitals, museums, shopping malls and other public areas. It is our self-develop R&D unit which is focusing but not limit to the market need like the UVC (Multi-functional) light, we need to ensure the correct wavelength diodes are using and in order to get the desire result. The purpose of the research as we want to use a multifunction lamp (patented) to kill the germs and virus. By Nov 2019 we have started to make a survey for the captioned. We have engaged few professional engineers, they are assigned to develop and designed how to put the UVC and LED together with the smart intelligent driver control . The smart control must be required as the using of UVC power must be smart control and limited. Attached our application of patented . Our Product specification sheet. Based on existing evidence, we believe so. Here’s why: UVC light has been used extensively for more than 40 years in disinfecting drinking water, waste water, air, pharmaceutical products, and surfaces against a whole suite of human pathogens (Fluence UV Dose Required review IUVA). All bacteria and viruses tested to date (many hundreds over the years, including other coronaviruses) respond to UV disinfection. Some organisms are more susceptible to UVC disinfection than others, but all tested so far do respond at the appropriate doses. UVC disinfection is often used with other technologies in a multibarrier approach to ensure that whatever pathogen is not “killed” by one method (say filtering or cleaning) is inactivated by another (UVC). In this way UVC could be installed now in clinical or other settings to augment existing processes or to shore up existing protocols where these are exhausted by excessive demands due to the pandemic. COVID-19 infections can be caused by contact with contaminated surfaces and then touching facial areas (less common than person-to- person, but still an issue).

	Minimizing this risk is key because COVID-19 virus can live on plastic and steel surfaces for up to 3 days. Normal cleaning and disinfection may leave behind some residual contamination, which UVC can treat suggesting that a multiple disinfectant approach is prudent. UVC has been shown to achieve a high level of inactivation of a near-relative of COVID-19's virus (i.e., SARS-CoV-1, tested with adequate dose of 254nm UV while suspended in liquid). IUVA believes similar results can be expected when treating COVID-19's virus, SARS-CoV-2. However, the key is applying UVC in such a way that it can effectively reach any remaining viruses on those surfaces. We also concurs with CDC guidance to hospitals that the germicidal effectiveness of UVC is influenced by the UVC absorbing properties of the suspension, the surface or aerosol that the organism is in; by the type or action spectra of the microorganism; and by a variety of design and operating factors that impact the delivered UV dose to the microorganism. Therefore in order to tackle the public health crisis caused by COVID-19, we engage our few internal engineers and R&D team to work on a solution for the public. We do not forget the original intention our designed is a device which is comprised of LED, UVC lighting and a smart control" in which it can prevents of viruses and bacteria such as SARS, MERS, Ebola, norovirus and C- DIFF & the latest COVID-19 . UVC LEDs can play a useful role in preventing infectious disease, we like our design is a proven simple, safely product for the public to apply easily and disinfect surfaces in hospitals, kitchens, washrooms, schools, offices and nursing homes, etc. UV-C LED products are already available for high-end applications like industrial water purification, but there is a strong push to reduce the cost of the LED chips in order to address the very large consumer market for disinfection which we strongly believe it is helpful to general public users in the future.
When and where was it demonstrated?	We are started to prepare the mock up at Hong Kong International Airport by 2020 April .

Where was it used?	It will use in HK International Airport . Start since March 2020
What were the results?	The product will be tested by Intertek Laboratory
Validation/endorsements	Will be conduct soon
Approximate cost	The unit cost is HK$3000. Per Lamp set , with UVC LEDs and LED downlights.
Funding sought already and challenges for scaling up	Hong Kong One Million dollars
Contact details and further information (please specify, which elements could be published)	KAV Technology Limited , Mr. Anthony Wong , Executive Director email : anthonywong@kav-tech.com

7.2 e- Platform

Description and rationale	Informal sector employs more than 90% of India's total workforce and most of these workers are daily wage earners who have lost their livelihood post India's complete lockdown triggered by COVID- 19. Daily wage earners, slum residents and the impoverished community in India have faced extreme money shortage and were in no position to stockpile ration for the entire period. A significant portion of such workers are migrants, and are not included in the PDS (Public Distribution System – Indian Food Security System), and are underserved by the government. Such scarcity is also being seen in villages, where the supply chains have completely come to a stand-still, as they have been cut from the neighbouring town / city. These families are quickly running out of ration, and finding it difficult to survive the lockdown. The announcement by the Government on 14 April 2020, to extend the lockdown further by 2 weeks has magnified this drastic situation. Our organization, Turn Your Concern Into Action Foundation (TYCIA), has reacted to this need, under India Against Corona (IAC) initiative, by supplying the ration to the daily wage earners and their family in need. We are heavily leveraging technology and have created an e- Platform (www.indiagainstcorona.com) to crowd-source the information about daily wage earners around us, who are in desperate need of ration. Post collating their request on real-time requirement, we verify the sanctity of such requirement, and match them real time with individuals who are willing to support them via the e-Platform. The individual donor can directly reach out to the family in need and support them via the platform. We are using internet banking, credit cards, UPI (Unified Payment Interface) and e-wallets to enable people to support via our platform. The objective of the platform is to make local effective circles where people in the same neighbourhood / cities can help each other to reach out to the families who are in immediate need. Moreover, the e-platform will enable easy data collection, transparency and enhance accountability. We are implementing the following steps to deliver the results: • Identification Identification of people in need is undertaken via the e-Platform: - People in need / regular samaritans can directly engage and send the request either by uploading a photograph, excel, word or pdf document, which contains the requirements of people in need

	(https://www.indiagainstcorona.com/enablerLanding). Any such request placed on e-Platform will be marked as Unverified. • Requirement gathering - Requirement data to include – contact details, ration requirement, number of family members, number of days of ration left - Our backend team calls to ensure correct information is collected and further collates the list and hands it to the verification team • Verification Verification team will cross-check the data: - Collected by the e-Platform or forwarded by backend team - Verification is conducted via Simple Random Sampling, where volunteers check the authenticity by visiting the families in need - Post verification, the list will be uploaded on the e-Platform, with a qualifier of Verified • Last mile support - Verified requests will be taken up by respective enablers (volunteers) in their cities / neighbourhoods to begin the process of collection and packaging of ration and will be delivered either at door-step or centrally in the community (after taking all necessary precaution as advised by the government) e-Platform will also allow Verified requests to be supported by: - Individual donors providing monetary support directly (https://www.indiagainstcorona.com/peopleInNeed) - Regular people by creating small supportive circles within their communities • Outcome - Once delivery is made, enablers will provide confirmation to the backend team - Backend team will place a phone call to the beneficiary and the qualifier of Verified will be changed to Fulfilled - For individual donors, the backend team will process tax exemption certificates
When and where was it demonstrated?	This network was formed in the last week of March (after India had declared the lockdown) through TYCIA and 30 volunteers coming together on WhatsApp Group, who identified the situation and started providing on the ground support. The initial ration requests were received on WhatsApp, but after fully realizing the scope of the problem, we moved to the e-Platform to scale our relief efforts. At this moment, e-Platform is being enhanced to serve dual purpose of supporting the enablers to monitor and execute

<table>
<tr><td></td><td>situations on the ground, and helping the donors to understand the process and provide support to the listed people in need.</td></tr>
<tr><td>Where was it used?</td><td>We have currently provided relief efforts in 16 districts across 4 states of India. We are constantly expanding our base, and other organizations are joining the India Against Corona initiative and we aim to reach 25,000 families and 100,000 beneficiaries over the next 2-3 weeks.<table><tr><td>Uttar Pradesh</td><td>Azamgarh, Siddhartha Nagar, Muzaffarnagar, Sultanpur, Lucknow, Faizabad, Ghaziabad, Varanasi</td></tr><tr><td>Madhya Pradesh</td><td>Khandwa, Seoni, Shivpuri</td></tr><tr><td>Delhi</td><td>South Delhi, North East Delhi, North West Delhi, South West Delhi</td></tr><tr><td>Assam</td><td>Karbialong</td></tr></table></td></tr>
<tr><td>What were the results?</td><td>We have built a team of 45+ members which comprises of 15 enablers (coordinators working on ground reaching the most vulnerable) and 30 volunteers who have already supported 11,000 families (comprising on average of 4 members each). We foresee 15-20 more enablers joining our network and we are confident to swiftly expand our base to support 25,000 families (100,000 beneficiaries).
Moreover, our final objective / long term plan will be executed from April 2020 to March 2021, and will support the efforts on the ground. This plan will:
Create a social behaviour where regular population living in villages / cities will continue identifying and reaching out to the beneficiaries. E-platform is an essential tool, which will help propagate the message across the population.
The support will also be required beyond the lockdown as the path to recovery would be arduous. We would create an emergency fund to ensure that the services are provided without any interruptions and can continue to support the families in need.
The e-Platform will also enable us to maintain the database of the beneficiaries, which can be leveraged to garner support for such workers from the local government institutions and schemes, thereby helping the daily wage earners / underserved population to integrate into public schemes run by the governments.</td></tr>
<tr><td>Validation /endorsements</td><td>Based on our work on the ground and the word of mouth support, we have received crowd-sourced requests for more than 1,000 families already in the last 5 days of operationalizing the e-Platform. We are in the process of fulfilling all the requests at the moment. We expect the crowd-sourced requests to increase and we need support for our operations.</td></tr>
</table>

<table>
<tr><td></td><td>We have been supported in our efforts on the ground by District Magistrates and local administration of the respective districts. We have received transportation passes and free movement to deliver the ration within the districts / cities.
We have also joined hands with multiple organizations on the ground to support the relief efforts. By working together with different organization, we are able to use the resources, such as packaging and transportation, more efficiently.</td></tr>
<tr><td>Approximate cost</td><td><table>
<tr><th>Work Stream</th><th>Amount (INR)</th></tr>
<tr><td>To enhance the e-Platform, hire Project Coordinator, MIS Coordinator (12 months), increase the strength of backend team, verification team and enablers</td><td>850,000</td></tr>
<tr><td>Support of ration kits (each INR 600 for 15,000 families)</td><td>9,000,000</td></tr>
<tr><td>Total funding required</td><td>9,850,000</td></tr>
</table></td></tr>
<tr><td>Funding sought already and challenges for scaling up</td><td>We seek your support in helping us fund the e-Platform as well as the supply of ration kits. We are looking to fund the campaign for e- Platform and associated costs and help us with 5,000 ration kits<table>
<tr><th>Work Stream</th><th>Amount (INR)</th></tr>
<tr><td>To enhance the e-Platform, hire Project Coordinator, MIS Coordinator (12 months), increase the strength of backend team, verification team and enablers</td><td>850,000</td></tr>
<tr><td>Support of ration kits (each INR 600 for 5,000 families)</td><td>3,000,000</td></tr>
<tr><td>Total funding sought</td><td>3,850,000</td></tr>
</table></td></tr>
<tr><td>Contact details and further information (please specify, which elements could be published)</td><td>Name: Mohit Raj (Founder of TYCIA)
Mobile Number: +91 83739 09212
Email Address: tyciafoundation@gmail.com, mohitraj99@gmail.com
We have 3,000+ pending requests (1,200 urgent requests with ration left for 1-3 days) and as the requests for support are increasing steeply, the resources of our network (personal and donations) are getting saturated. We are seeking your support to scale and, further systemise our e-platform to reach more donors and connect them to people in need.
Moreover, we have previous experience in handling crisis situations as our team has delivered emergency response and long-term reformation support during Muzaffarnagar riots (2013) and Nepal Earthquake (2015).
We are confident that with the right support, we will be able to leverage our solution to benefit at least 100,000 lives that have been severely impacted by the COVID-19 pandemic.
To know more about our work, find us at:
www.indiagainstcorona.com www.tyciafoundation.org</td></tr>
</table>

7.3 Protein and greens powders

Description and rationale	Description The United Nations World Food Programme predicts widespread famine in up to 20 less developed countries (LDCs) within the next 90 days due to COVID-19. Financial aid from more developed countries is expected to decline because of recessionary pressures caused by social isolation and infection rates. A nutrient-dense powder and pill are proposed to deliver food substitutes in LDCs where poverty, lack of land ownership and unstable institutional infrastructures may contribute to accelerated levels of food insecurity during the pandemic. The pill form is proposed where access to clean water for mixing of powdered forms is an impediment or where low-soluable soy proteins are used. Rationale Protein and greens powders, although not a complete substitute for whole foods, have been demonstrated to have health benefits. Protein powders typically contain whey, soy or casein proteins and greens powders greens, vegetables, seaweed, probiotics and digestive enzymes. Manufacturers in more developed countries are idled due to social isolation practices, presenting a socially beneficial and economic opportunity to change over to production of powdered and pill-based food substitutes. The knowledge and technology exist to ramp up production of family- and individual-sized blister packs of powdered and pill-based nutrients that could be distributed at the community level. Due to the proliferation of plastic waste, a seaweed-alternative to plastic packaging is preferable, although biodegradable plastics may also be considered.
When and where was it demonstrated?	Grand View Research estimates demand for global protein supplements at $17.55 billion USD (2019), with exponential growth of eight per cent between 2020 and 2027. Protein powders accounted for 64 per cent of protein supplement market revenues (2019). This research indicates the supplements market benefits from strong online sales and mass distribution channels in more developed countries. Brand leaders who have the manufacturing and supply chain management experience to mass produce protein powders include Glanbia Plc, NBTY, IOVATE, Quest Nutrition, Amway, NBTY, MusclePharm Corp, Abbot Laboratories, Cyto Sport and Transparent Labs. Orgain, VEGA and NOW Labs are leaders in greens powder manufacturing and distribution.
Where was it used?	High levels of dietary protein are associated with musculo-skeletal health. The American College of Sports Medicine and the

	Academy of Nutrition and Dietetics report an appropriate daily protein intake for a healthy adult is 0.8 grams per kilogram of body weight and for an adolescent 0.4 to 0.5 grams. Insects, in dehydrated forms such as cricket powders, are among cheap, nutritious protein sources. Daily fibre intake of between 0.25 and 0.38 grams would be average for North American adults. Many greens powders are USDA-approved organic derivatives, reducing pesticides and herbicide exposure.
What were the results?	Peer-reviewed research on the use of protein and greens powders had the following outcomes: Contraindictions for the use of greens powders include potential interactions with anti-coagulants if the product contains high concentrations of Vitamin K. Fiber supplementation may be necessary; a minority of greens powders possess the essential levels of fiber provided by vegetables, legumes, fruits and whole grains. According to their manufacturers, specific greens powders may contain herbs or other extracts that pose potential harm to children and pregnant or breastfeeding women or interact with medications. Greens powders may have antioxidant and detoxification (due to increased urine alkality) benefits. Supplemental protein powders can enhance bone health through muscle growth and strength
Validation/endorsements	Notes to previous sections: 1. Grand View Research, Protein Supplements Market Size, Share & Trends Analysis Report By Product (Protein Powders, Protein Bars), By Source, By Distribution Channel, By Application, By Region, And Segment Forecasts, 2020 - 2027, Market Research Report ID GVR-1-68038-694-3, 2020 Feb, accessed 23 Apr 2020, www.grandviewresearch. com. 2. Kelsey M. Mangano et al, Dietary protein is associated with musculoskeletal health independently of dietary pattern: The Framington Third Generation Study, Am J Clin Nutr, 2017 Mar, 105(3): 714–722. doi:10.3945/ ajcn.116.136762. 3. Gina Shaw, Do You Need Protein Powders?, online: WebMD, accessed 23 Apr 2020, https://www.webmd.com/ vitamins-and-supplements/features/protein-powder#2. 4. Magdalena Montowska and Iga Rybicka, Nutritional value, protein and peptide composition of edible cricket powders, Food Chem., 2019 Apr., 289: 130-138. doi: 10.1016/j.foodchem.2019.03.062.

	5. “Vitamin K: Fact Sheet for Health Professionals”, National Institutes of Health, Office of Dietary Supplements, accessed 23 Apr 2020, https://ods.od.nih. gov/factsheets/VitaminK-HealthProfessional. 6. J.W. McRorie Jr., Evidence-based Approach to Fiber Supplements and Clinically Meaningful Health Benefits, Part 1: What to Look for and How to Recommend an Effective Fiber Therapy, Nutr. Today, 2015 Mar, 50(2): 82- 89. doi: 10.1097/NT.0000000000000082. 7. D.M. Minich and J.S. Bland, Acid-alkaline balance: role in chronic disease and detoxification, Altern Ther Health Med, 2007 July-Aug, 13(4): 62-65. 8. M.E. Sears and S.E. Genius, Environmental determinants of chronic disease and medical approaches: recognition, avoidance, supportive therapy and detoxification, J Environ Public Health 2012, 2012:356798. doi: 10.1155/2012/356798. Epub 2012 Jan 19. 9 T.R. Fenton, B. Armour and J. Thirsk, Comment on “Modulation of Metabolic Detoxification Pathways Using Foods and Food-Derived Components: A Scientific Review with Clinical Application”, J Nutri Metab. 2015, 2015: 934070. doi: 10.1155/2015/934070. Epub 2015 Oct 12. 10. Mangano, supra fn 2.
Approximate cost	Dependent on country factors, manufacturing, supply chain management and distribution costs.
Funding sought already and challenges for scaling up	None sought
Contact details and further information (please specify, which elements could be published)	Linda M. Mueller, CEO dba PolygenX Idea Corporation

7.4 Foot Pedal Operated Hand Washing System

Description and rationale	Foot Pedal Operated Hand Washing System for Vulnerable Communities in Uganda We propose to design and install improved, low cost Foot Pedal Operated Hand Washing System consisting of Soap, Water and Sanitizer Dispensers for the vulnerable communities in Uganda. The system will be installed in over-crowded community market places, public bus and commuter parks, schools, universities, health centres, street food vending points, places of worship, sports and entertainment venues, and public leisure parks among others. These places usually contain great number of vulnerable population who meet and socialize hence, making them prone to the exposure to COVID-19 and other viral diseases transmitted through body fluids from infected persons. According to the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO) and Health Ministries across the world including Uganda, keeping hands clean is one of the most important steps we can take to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean, running water. Hands are the main pathways of germ transmission and its hygiene is therefore the most important measure to avoid the transmission of harmful germs. However, the current hand washing systems used in Uganda by the community are Hand Operated which makes it easy for Cross-Transmission of germs from one infected person to another since they all have to touch the water taps and soap with their hands. For this reason we propose to automate the process with Simple Mechanical Foot Pedal Operated System that does not require electricity. It can be installed and used by remote Off-Grid Communities who do not have access to electricity. The system is also easy to maintain and will be made using locally available materials.
When and where was it demonstrated?	Similar foot pedal operated hand washing systems have already been setup in countries like South Africa, India, Nepal among others and touchless commercial hand sanitizer dispensers are already in existence in many countries, however not commonly used in Uganda. In India for example Special Foot Operating Hand Washing Kiosks are installed in Railway Stations and Grain Markets to address CIVID-19 cross- transmission from per to per through hand contacts. Its also used in large scale food production factories and some high risk biological science laboratories.

Where was it used?	South Africa, India, Nepal, Commercial Food Production Factories, High Risk Biological Science Laboratories among others
What were the results?	Hand hygiene has many health benefits hand washing with soap is life-saving. The most cost-effective public health intervention, it also protects people from life-threatening illnesses such as cholera, other diarrhoeal diseases, pneumonia and intestinal worms. It has been linked to: 16–23% reduction in incidence of acute respiratory infection 50% reduction in pneumonia Substantial reduction in neonatal infections Up to 48% reduction in risk of endemic diarrhoea (reference 1; reference 2). Infection-related infant deaths could be reduced by 27% by improving hand washing practices in healthcare facilities, and a further 40% by hand washing in the postnatal period.
Validation/endorsements	According to a report by WaterAid, availability of hand washing facilities in low- and middle- income countries is poor. Globally, 40% of households still don't have hand washing facilities with soap and water, and just 19% of people wash their hands with soap after visiting restrooms. Almost half of healthcare facilities (43%) lack basic hand washing facilities with soap and water, and nearly half of schools (47%) in developing countries lack hand washing facilities. This makes good hand hygiene impossible for millions of people, contributes to the spread of infections and makes tackling pandemic very difficult.
Approximate cost	Our initial approximate cost for the project is US Dollars 50,000 to be used for designing and building 34 durable high quality hand washing system using Stainless Steel that involves portable water tanks, its stands, hand washing sink system and transport and communication facilitations during the project.
Funding sought already and challenges for scaling up	We sought about US Dollars 30,000 or LESS in kind support to enable us to build 20 durable and high quality system for our vulnerable communities using Stainless Steel.
Contact details and further information (please	EZABO BARON WOXSAN TECHNOLOGY Kitende, Kajjansi Town Council Wakiso Kampala, Uganda ezabobaron@outlook.com

specify, which elements could be published)	

7.5 Fortified supplementary food product

Description and rationale	**Description** The specific health challenge we are addressing is the double burden of malnutrition among the vulnerable population mothers and children below two years. Also, there are limited and trusted options of safe and nutritious supplementary food products in Uganda. Due to the COVID-19 pandemic, there is a decline in diet quality, mothers are shifting family diets from the consumption of nutrient rich fruits and vegetables to cheaper monotonous calories. This directly affects maternal, infant and young child nutritional status. It has been scientifically observed that persons whose bodies are healthy have shown some immunity towards COVID 19. Malnutrition on the other hand reduces the body's immunity hence making it susceptible to infections including COVID 19. The purpose of this project is to provide a nutritious supplementary food product and nutrition education that will help to prevent malnutrition and also enhance the immunity of the population against disease. There are several causes of malnutrition during the COVID-19 pandemic, including the disruptions in the food system and un-employment. The mandatory lock-down as a pandemic mitigation measure has affected food supply chains for the nutritious perishable foods to markets which resulted into food price crises. Also, the loss of household incomes and closure of school feeding programs have greatly affected the vulnerable mothers and children. In the worst case scenario, COVID-19 effects have led to diverting health care resources to mitigating the pandemic. All these factors affect maternal and child nutritional status, causing acute, and later, chronic under-nutrition. In some population segments, the lock- down is an opportunity to overeat, and lead sedentary lifestyles, which resulted into the onset of overweight, obesity and later, preventable non-communicable diseases. **Rationale** According to the UDHS 2016 report, 29% of children <5 years are stunted; 10% of infants are born with low-birth weight, 4% are wasted and 4% are over-weight. Also, 32% of women of reproductive age and 53% of under-five children are anaemic, 17% of adult women

	and 8% of adult men are overweight (UBOS & ICF 2018). During and post COVID-19 pandemic and its effects on the food system, the above nutritional status indicators will be negatively impacted, the vulnerable population experiences both acute and chronic malnutrition that weighs down the already overwhelmed health system. Our solution (model), is a fortified supplementary food product made from local foods, that passed food safety tests; and nutrition education. We aim to: i) to contribute towards preventing the double burden of malnutrition among mothers and children during the first "*a 1000 days critical window of opportunity*". Interventions and good nutrition have lasting positive impact on children in this period(Black, Victora et al. 2013), and prevent the inter-generational malnutrition – poverty cycle. Preserving the first "*a 1000 days critical window of opportunity"* is the current focus of the second Uganda Nutrition Action Plan, the third National Development Plan, and contributes towards achieving the Sustainable Development Goals and Vision 2040. ii)To ensure that households have readily accessible, affordable, culturally acceptable, nutritious and easy to prepare food to eat during periods of nutrition shocks. Also, the same product is useful to institutions like prisons, schools, health care facilities, refugee settings and other re-settlement camps. **Product feature:** We have a product that will have a genuine health claim, food safety data, and a Q-Mark to officially put the product on the market. **Offering to beneficiaries -** Nutritionally rich, culturally acceptable, locally made flour, rich in energy, Vitamins and Minerals; Packed in a Kilo and half a kilo; plus a two day training and counselling on nutrition and hygiene per month. **Value proposition** - Improved nutritional status and health: For mothers, the product contributes to increasing maternal breast milk flow, saves time for baby care, faster baby food preparation methods. For children below 2 years - healthy babies/children with the right weight for height, firm muscles, grows and develops milestones on time, does not fall sick frequently, has appetite to eat, alert/attentive, active -

	plays with others, shiny hair, healthy smooth skin with a good colour (healthy appearance), and bright, clear eyes, sleeping well, no tenderness or swelling on feet and hands- in future - children will have a good memory and school performance.
When and where was it demonstrated?	In 2014-2015 with a seed grant form Grand Challenges Canada, Rising Stars in Global Health, our model passed the proof of concept stage. In a quasi experimental design, we tested the model on 356 mother-baby pairs with children 0-24months and 120 expectant mothers in Luuka District, Eastern Uganda. The local community provided the raw materials, participated in product sensory evaluation and generated feedback for product refining. They participated in the practical cooking and food value addition sessions and the market surveys. The VHTs educate and follow-up mothers. Between 2016-2018, with a grant from Resilient Africa Network (a project sponsored by USAID) we refined the product and added other product lines that will be useful during and post-COVID-19. We have ordinary flour, instant flour, animal feed and manure.
Where was it used?	It was used in Luuka District, East-Central Uganda. Also, we conducted a market survey among 202 wholesalers and retailers, 59 mother-baby pairs and 109 men and women based in Eastern, western, South-western and Central Uganda.
What were the results?	Findings showed that our solution had a positive effect on the health of the target community. Our product is culturally acceptable, nutritionally rich and easy to prepare into a porridge eaten by mothers and children in addition to the daily meal. Our integrated solution/model demonstrated that GAM levels reduced from 13% to 7%. Also, households who received the supplementary food product were less likely to have a stunted (p-value 0.039) or wasted (p-value 0.035) child. In the total sample, core Infant and Young child feeding indicators improved; in both arms, there were statistically significant increases (p-value 0.000) in the proportion of mothers who know and practice early initiation of the baby onto the breast (p-value 0.000); the proportion of mothers who know and practice

	exclusive breastfeeding increased from 47% to 88% in the total sample. What stood out is the community adoption of the solution. Communities can make their own product, using creative food mixtures. Due to the disruption of the food supply chains for the nutrient rich-foods, the vulnerable need a fortified ready to use product. While making this product, we observe social distance guidelines, but also, we generate jobs for some mothers on the production line. It will take several months for food chains to recover, due to limited resources. A documentary of the findings is accessible here: https://www.youtube.com/watch?v=NbX5gJSxT7I
Validation/endorsements	In a cohort study, we plan to reach out to more mothers (1,000 mother-baby pairs), 300 expectant mothers and other vulnerable population segments with our model as we validate it. We shall be taking the solution to all the 15 sub-regions in Uganda, pilot it in Tanzania, Rwanda and Kenya as well. **Endorsements** - The Grand Challenges Canada, Rising Stars in Global Health, the French Embassy in Uganda (https://www.ranlab.org/ran-at-the-makerere-university-campus-france-launch-day)through the Resilient Africa Network project all know about our product and model.
Approximate cost	Our product cost estimate is USD 2.11 (8,000/= Uganda Shillings only) for a kilogram of flour. Other products, on the market range between USD 1.57 – 3.10(6,000-10,000/= Uganda Shillings depending on the product). Some of the products are not fortified, neither have the processors conducted food safety tests and community trials with them. Regarding the size, we are able to make the product in small quantities that community members who may not afford a Kilogram can access the product. We are at the phase where we are only process once we have orders. Our next step is to brand the product and launch it on the market. However, using our market survey, and assuming that we are processing the product from the capital city, for a mother who is based in Eastern, Southwestern, Northern and Western Uganda, and if we deliver a product for one thousand mother-baby pairs, we require USD 1,000,000 to supply each of the mothers 3 kilograms per week.

Funding sought	USD 1,000,000
Contact details and further information (please specify, which elements could be published)	ftushemerirwe@musphac.ug, ftusht01@gmail.com and hadong@ranlab.org

7.6 Village Data Analytics

Description and rationale	Village Data Analytics (VIDA) with "VIDA vs. COVID" (www.villagedata.io) VIDA vs. COVID is an earth observation, big data and AI-based software to help identify and prioritise rural health centres for electrification. It is based on the proven technology of Village Data Analytics to analyse remote regions in developing countries for infrastructure investment.
When and where was it demonstrated?	A first version of VIDA vs. COVID was demonstrated in Ethiopia (for the case study, see: https://www.tfe.energy/project/COVID19ResponsePlanning/
Where was it used?	A more sophisticated and detailed version of VIDA vs. COVID was then used to help the World Bank and an African government identify and prioritize 1,000 health centres for electrification. This included an analysis of the village-level mini-grid potential surrounding the health centre (for long-term sustainability) and the population-at-risk for which a health centre is the nearest option by travel time.
What were the results?	The result was a smart map and site-level decision-making parameters. The smart map can be made available as an interactive user tool.
Validation/endorsements	Village Data Analytics as a whole has been tested with the World Bank, with USAID and with four leading electrification companies in six African countries. VIDA vs. COVID has been tested in two African countries. (The technology can also be applied outside of Africa.) For endorsements, please see the Village Data Analytics website (www.villagedata.io) and see the case study of our work with Power Gen (https://www.tfe.energy/project/improved-mini-grid-site-selection-in-west-africa-using-using-village-data/)
Approximate cost	VIDA is a data-enabled service. The cost varies from task to task.
Funding sought already and challenges for scaling up	Village Data Analytics is currently supported by the European Space Agency, appliedAI and by the Good Energies Foundation. We are looking for additional funding to expand VIDA's application in the field of health care, especially COVID19. Some important challenges for further scaling up are:

	• Raise awareness about the ability and widespread applicability of data technologies. • Fund and communicate test/pilot examples with different user groups. • Establish data-based decision making (and data-based impact measurement) as tools in the processes of development work.
Contact details and further information (please specify, which elements could be published)	Dr. Tobias Engelmeier, tfe@tfe.energy Village Data Analytics is an initiative of TFE Energy, www.tfe.energy

7.7 e-Shop Somalia

Description and rationale	"e-Shop Somalia" is a smartphone app created by WFP in Somalia to deliver food assistance, which helps maintain social distancing to prevent the spread of COVID-19. With the e-Shop smartphone app, vulnerable families living near functioning markets in Somalia can redeem their WFP cash assistance online, even from their homes. They fill a shopping cart of products offered at their local grocery store contracted by WFP, select home delivery option, and check-out.
When and where was it demonstrated?	The app is being used by 46,000 people in Somalia to redeem their WFP cash assistance digitally. The app was created in 2018 but has been more heavily promoted and marketed in local grocery stores through a new "home delivery" campaign upon the breakout of COVID-19. Somalia has seen a rise in digital businesses in its emerging e-commerce market in recent years. E-Shop plays to that demand. The app is available from the Google Play Store and App Store. https://eshop.som.wfp.org/
Where was it used?	Somalia
What were the results?	Local retailers — who have 2–3 months of buffer stock for the uncertain future — receive purchase orders through the E-shop app. Local transporters then collect the goods from the small shops and deliver direct to families' homes. This process from app to door takes no more than three to seven days.
Validation/endorsements	The e-Shop app receives a score of 4.6 in Google play reviews https://play.google.com/store/apps/details?id=com.kissdevs.wfpshop&hl=en_US
Approximate cost	
Funding sought	
Contact details and further information	Kelly Stablein, WFP Supply Chain Cash and Markets Division

7.8 H.A.R.D disaster management system

Description and rationale	After working for many years with international cooperation, urban development and disaster risk management, in 2017 we decided to start a company to offer digital urban solutions that are accessible and affordable for governments and institutions working in the urban field. As a first challenge, we recognized the lack of coordination among entities and the difficulties to create and implement measures and processes in a rapid and simple manner when it comes to manage disasters. Hence, we started to build our first software, called H.A.R.D to facilitate the management of disasters as well as tackle the main critical challenges citizens face associated to a crisis. It consists of a web-based platform and a mobile app. The first supports the establishment of a system that organizes a network of authorities to respond adequately and efficiently to citizens not only during the emergency time, but in all phases of the DRM cycle. Whereas the mobile app facilitates the ongoing communication with citizens to receive their alerts and inform them how and where they can get support via digital map. Our business mission is to contribute to the achievement of the following SDGs, amongst others: SDG 3 target 3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks. SDG 11 target 11.5 By 2030, significantly reduce the number of deaths and the number of affected people. Tool presentation: https://youtu.be/vJSMIUX2RyI Tool demo: https://youtu.be/hh6N4MXnB1Y COVID specific module: https://drive.google.com/file/d/1p4-pmoiY4DniVWQQFrwm9KdTQMh2c24W/view?usp=sharing
When and where was it demonstrated?	Our first pilot test was carried out in Argentina, in the city of Gualeguaychu, in 2018. It served as the first exposure of the basic version of the tool, which included the mapping of services and analysis of the risks level in that city. There we got feedback to develop a set of new functionalities. During the second semester of 2019, we engaged with the city of Villa de San Antonio in Honduras. There, they used the full set of functionalities provided by H.A.R.D. to develop their very first city-wide risk management plan. Also in 2019, ClUrb and Smart City Cabo Verde came together for the first time and started discussing the implementation of H.A.R.D. in Cabo Verde.

Where was it used?	Please see above. We are working together with the Smart Cities foundation in Cabo Verde, as well as the national government, to use the platform to address COVID-19 associated challenges and validate all tool functionalities. In this case, we are working on the neighbourhood level (community of Safende in the capital city of Praia).
What were the results?	As a result of the pilot test in Honduras, the city of Villa de San Antonio had produced and put into action its very first Disaster Risk Management plan. By the end of May 2020 we will be able to present the first preliminary results of Cabo Verde. In this case, working in the community allowed us to customize the tool to their specific needs, which go a way beyond only responding to the COVID-19 crisis, but also side effects of isolation measures (e.g. domestic violence, assistance shopping), and other occurrences which might require support (e.g. other accidents). As a result, the government provided the green light for us to proceed with its implementation instead of their tool which would only focus on the COVID-19, as most of the new tools are.
Validation/endorsements	Every single functionality of the tool has been validated with our large professional network, as well as the communities we have worked with. That is the main reason it took us three years to get to a fully functional and fit-for-purpose tool. Also, our partners cities and institutions have also endorsed the strategic approach of the tool. We have presented it to cities, NGOs and others in Argentina, Chile, Colombia, Honduras, Ecuador, Brazil, Cabo Verde, Kenya and India, all of which have showed interest in implementing the tool, all with discussions under way. Today the tool already reflects these insights.
Approximate cost	The current overall development cost is approximately USD 100,000. Implementation cost in each new city/institution revolves around USD 5,000, including the necessary workshops and some small adaptations in the tool. This is much below any other similar tool or service currently available.
Funding sought	USD 30,000 to finalise the tool development – mostly for inserting the costliest Artificial Intelligence features which will facilitate usage even further. For the case of the COVID-19 crisis, we are completely open to deploy it anywhere it is needed. Where funds are available, we could request the USD 5,000. Otherwise, we are happy to do it for free.
Contact details and	First Name: Evandro Last Name: Holz

further information (please specify, which elements could be published)	Email: evandro@clurb.net Function: CEO Gender: Male Nationality: Brazilian Phone Number: 004917668329695