DECEMBER 2020

THE FUTURE SOCIETY

RESPONSIBLE AI IN PANDEMIC RESPONSE

PRODUCED BY:

The Future Society

IN COLLABORATION WITH:

Global Partnership on AI (GPAI) AI and Pandemic Response Subgroup

&

International Centre of Expertise in Montreal for the Advancement of Artificial Intelligence (CEIMIA)

Acknowledgments

GPAI AI and Pandemic Response Co-Chairs
Alice Oh
Paul Suetens

GPAI AI and Pandemic Response Steering Committee
Howie Choset
Seán Ó hÉigeartaigh
Daniele Pucci
Margarita Sordo-Sanchez
Blaž Zupan

GPAI AI and Pandemic Response Members
Anurag Agrawal
Amrutur Bharadwaj
Nozha Boujemaa
Dirk Brockmann
Enrico Coiera
Marzyeh Ghassemi
Michael Justin O'Sullivan
Hiroaki Kitano
Leong Tze Yun
Michael Plank
Mario Poljak
Gaël Varoquaux
Joanna Shields

GPAI AI and Pandemic Response Observers
Cyrus Hodes
Alan Paic
Kim McGrail

CEIMIA Secretariat
Mathieu Marcotte
Christophe Mariage-Beaulieu
Jacques Rajotte
Réjean Roy

The Future Society Project Team
Sacha Alanoca, Project Manager
Samuel Curtis, Lead Analyst
Nicolas Miailhe, Research Director
Niki Iliadis, Analyst
Durria Rubat, Analyst
Ajit Joakar, Analyst
Suzanne Bays, Advisor
Sarah Cairns-Smith, Advisor

Table of Contents

Abstract

This report constitutes an effort to catalogue and assess a representative set of promising initiatives from around the world that are relevant for the COVID-19 pandemic and beyond. 84 AI tools, applications and platforms underwent a preliminary quantitative evaluation to yield a shortlist of 36 most promising initiatives. This shortlist then underwent a qualitative analysis to determine key enabling factors, common hurdles, and recommendations that the Global Partnership on Artificial Intelligence (GPAI) AI and Pandemic Response Subgroup may consider adopting in order to aid COVID-19 pandemic response, as well as potential future pandemics.

Executive Summary

This report constitutes the first published output of the Global Partnership on AI (GPAI) AI and Pandemic Response Subgroup, an ad hoc subgroup formed from the Responsible AI Working Group in August 2020 to foster and support the responsible development and use of AI-enabled solutions to COVID-19 and future pandemics.

The purpose of this research initiative was to construct a **catalogue** of AI tools, applications, and platforms developed and used in the context of the COVID-19 pandemic, **assess** how AI tools, applications and platforms implement notions of responsible research and development and why they are beneficial applications of AI systems to pandemic response, and to **propose recommendations** to overcome challenges and gaps detected during the assessment.

The catalogue was populated by utilizing survey input from the GPAI AI and Pandemic Response Subgroup and initiative-mapping research conducted by The Future Society. Initiatives were labeled according to a *category* (AI tools and applications, platforms to fast-track research and crowdsource projects, ethical and policy frameworks, or governance mechanisms) and *domain* (biological, clinical, or societal) that best fits each initiative's objective.

When assessment commenced in late October, 2020, 93 initiatives had been identified. Of this total, 65 initiatives were AI tools and applications, 19 were platforms to fast-track research and crowdsource projects, 8 were ethical and policy frameworks, and 1 was a governance mechanism. With respect to the domains, 15 fell within the biological domain, 18 were within the clinical domain, and 60 were within the societal domain.

A first round of assessment was performed, using information obtained via desktop research, to determine which of the AI tools, applications or platforms (84 in total) were scored highest using the following evaluation criteria: (1) Relevance to the current and future pandemics and (2) Availability, adoption and feasibility. The 30 initiatives with the highest scores were shortlisted. Simultaneously, researchers began clustering initiatives by similarity in domain and function, to create a Clustering Framework. This allowed researchers to identify gaps within the shortlist, and an additional 6 initiatives that had high-ranging scores and were added to address blind spots within the Clustering Framework, for a total of 36 shortlisted initiatives.

With a shortlist formed, a second, qualitative round of assessment was performed utilizing desktop research, surveys and interviews with project leads, to develop a more comprehensive understanding of the initiatives with the following criteria: (1) Relevance; (2) Availability, adoption and feasibility; (3) Diversity and inclusiveness; (4) Credibility; (5) Interoperability; (6) Potential for GPAI to make a significant difference to the initiative.

Through the assessment of the shortlisted initiatives, numerous **key enabling factors** were identified. In the context of this report, key enabling factors were defined as distinctive characteristics that underlie their present, and likely future, success, such as an initiative'

organizational architecture, credibility, innovativeness, and implementation of adaptive strategies. The key enabling factors that stood out most amongst the shortlisted initiatives were:

1. **Operationalizing open science**. Initiatives that promoted open science by making use of open-access data, or made their own data, methodologies, models, or findings openly accessible to different levels of inquiry, and made it easier for researchers to make use of their findings.
2. **Interdisciplinary and cross-sectoral collaboration**: Partnerships and collaborations provided initiatives with resources and accountability mechanisms to achieve their goals and meet a degree of credibility and visibility to facilitate their adoption.
3. **Fast-tracking traditional processes**: Initiatives that used AI to fast-track traditional processes that face exceptional strain or congestion during pandemics, such as scientific peer review, online content curation, and disease diagnosis, were desirable and readily adopted.
4. **Transferability**: Initiatives that were likely to be most successful in the long term were those that demonstrate transferability—the capability of being repurposed or reused in future pandemics.

Assessments also exposed some of the common **challenges** faced by initiatives in the shortlist, including:

1. **Ethical and legal barriers**. Initiatives, especially in the clinical and molecular domains, stressed the number of time-consuming procedures necessary to be compliant with existing data protection and privacy regulations.
2. **Public adoption and credibility.** Adoption of AI tools, applications and platforms in the healthcare sector has been a persistent challenge. The current pandemic heightened public concern and scrutiny around the use and collection of sensitive healthcare data, in particular, those of contact tracing applications and cloud-stored data.
3. **Access to reliable data**. Available datasets were often characterized as insufficient, incomplete, context-dependent and quickly evolving. In particular, initiatives building AI-enhanced CT scans, computational protein prediction models, and epidemiological forecasting were limited by insufficient datasets.

With these key enabling factors and challenges in mind, a series of **recommendations** were developed for consideration by the GPAI AI and Pandemic Response Subgroup. These recommendations were bolstered by numerous collective feedback sessions with the Subgroup, one-on-one feedback sessions with Subgroup members, and interviews with experts familiar with the GPAI mandate. There recommendations are as follows:

1. **Co-shape a Global Health Data Governance Framework**. This could be done in collaboration with the GPAI Data Governance Group, the OECD AI Policy Observatory and other multilateral institutions focused on health, such as the WHO, the World Medical Association (WMA), and the International Medical Health Organization (IMHO).
2. **Support a central Portal to fast-track research cross-sectoral and interdisciplinary research**. The portal should contain: (1) A catalogue of existing curated COVID-19 related literature review, (2) A catalogue of existing databases across clinical, biological and societal domains, (3) A catalogue of AI models, (4) A catalogue of most promising

initiatives and associated domain experts (which could derive from the AI and Pandemic Response Catalogue), (5) A catalogue of available funding, (6) An open forum for experts to share and discuss research findings and initiatives.

3. **Address current gaps, such as social acceptability of AI initiatives and drug treatments**. Numerous gaps were identified during the researchers' clustering exercise. In the context of the pandemic, social acceptability is imperative for the public and medical adoption of AI tools and applications, and for widespread adoption of drug treatments such as vaccines. The AI and Pandemic Response Subgroup could encourage initiatives conducting anti-vaccine sentiment analysis and vaccine-related misinformation, and raise public awareness over digital contact tracing applications' technical and ethical safeguards.
4. **Set up targeted Task Force(s) for immediate challenges**. In collaboration with members from all 4 GPAI Working Groups, the Subgroup could establish small, agile task forces to implement the other recommendations in this report.

This report exists to inform existing and future AI-enabled initiatives designed to assist in pandemic response. The findings will also be presented at the inaugural GPAI Multistakeholder Experts Group Plenary in December 2020, and may steer the mission and future research agenda of the GPAI AI and Pandemic Response Subgroup.

Foreword

The Global Partnership on AI (GPAI) is a voluntary, multi stakeholder initiative launched in June 2020 to support the development and use of AI based on human rights, inclusion, diversity, innovation, and economic growth, while seeking to address the United Nations Sustainable Development Goals.

GPAI brings together experts from industry, government, civil society and academia, to advance cutting-edge research and pilot projects on AI priorities. It is supported by four Working Groups looking at Data Governance, Responsible AI, the Future of Work, and Commercialisation and Innovation. In light of the current international context, the GPAI Task Force invited the Responsible Development, Use and Governance of AI Working Group to form an ad hoc AI and Pandemic Response Subgroup. This subgroup was launched this summer and brings together AI practitioners, healthcare experts, and members of international organizations to support the responsible development and use of AI-enabled solutions to the COVID-19 and future pandemics.

Given the many existing initiatives worldwide and the urgency to analyze them, we launched a public tender to find a partner who would assist the subgroup in this project. Our preference to assist us went to The Future Society (TFS). The project had three components: (1) catalogue existing AI tools, applications and platforms in the context of COVID-19; (2) evaluate, shortlist and assess a representative list of relevant and feasible AI initiatives with great potential for current and future pandemics; (3) make recommendations to overcome the identified challenges and fill detected gaps. The first two components are to be seen as an aid to arrive at short-term and long-term recommendations. Therefore, the catalog is not intended to be a comprehensive list, nor should it be regarded as the result of a competition among the AI initiatives.

The Future Society (TFS) acted independently of the working group, but consulted both its members and its steering committee during its mandate. Despite the limited time, TFS was able to study over 90 different initiatives with potential, of which more than 30 were retained for detailed assessment. We are very grateful for their dedicated work.

Alice Oh and Paul Suetens,
Co-Chairs of the AI and Pandemic Response Subgroup

1. Introduction

In light of the COVID-19 pandemic outbreak, in August 2020, the GPAI task force invited the Responsible AI Working Group to form an ad hoc **AI and Pandemic Response Subgroup** to foster and support the responsible development and use of AI-enabled solutions to COVID-19 and future pandemics.

The Subgroup has brought together AI practitioners, healthcare experts, members of international organizations to ensure methodologies, algorithms, and data are shared rapidly, openly, securely, and in a privacy-preserving way. It promotes cross-sectoral and cross-border collaboration, and supports the responsible use of AI among public and healthcare professionals in the global response to pandemics and public health challenges.

This report constitutes the Subgroup's first output, a research initiative to catalogue, analyze, issue recommendations, and suggest future projects on AI tools addressing the pandemic. The three components of this project are delineated as follows:

1. **Catalogue of existing AI tools**, **applications and platforms** developed and used in the context of the COVID-19 pandemic for accelerating research, detection, prevention, response and recovery. The catalogue lists initiatives from academia, governments, the private sector, civil society, and international organizations, among others.
2. **Assess selected AI tools, applications and platforms.** A representative set of relevant and feasible AI initiatives will be selected from the above catalogue for further assessment. The assessment will analyze how these tools implement notions of responsible research and development, and why they are beneficial applications of AI systems to pandemic response.
3. **Recommendations and pathway forward.** Based on the analysis, recommendations are made on best practices to overcome the challenges identified above, along with suggestions for specific projects to fill gaps and overcome problems detected during the assessment.

This research project was launched in late September 2020, with the announcement of a competitive tender to identify a partner organization to assist with the three research objectives above. In early October, The Future Society started collaborating with GPAI's Subgroup on AI and Pandemic Response, with a goal to report findings to the Multistakeholder Experts Group Plenary in early December 2020.

Stemming from Multistakeholder Experts Group Plenary, the findings of this report may steer the mission and future research agenda of the GPAI AI and Pandemic Response Subgroup, and inform existing and future AI-enabled initiatives designed to assist in pandemic response.

2. Reviewing the Landscape of Initiatives

2.1. Context and Objective of the Catalogue

In response to the COVID-19 pandemic, countless groups around the world—spanning industry, government, civil society, academia, and international organizations—have mobilized resources and talent to confront emergent public health challenges with novel AI solutions. AI systems are being developed to address challenges across a wide array of applications including vaccine research and development, epidemiology and government response, and clinical research, diagnosis, and treatment.

> **AI system** (OECD definition):
> *An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy*

The objective of this report is to develop a catalogue with a representative set of AI solutions which can be used to combat the COVID-19 pandemic and future health crises. The catalogue is not intended to be a comprehensive list of pandemic response initiatives that utilize AI, nor should it be considered the result of a competition ranking the retained initiatives; instead, it functions as a catalogue that broadly represents the diversity of existing initiatives.

To identify initiatives, we utilized survey input from the GPAI AI and Pandemic Response Subgroup, landscape-mapping research conducted by The Future Society, and an ongoing survey that sources input on existing initiatives. Furthermore, we conducted extensive interviews with numerous Working Group members, leaders of identified AI initiatives, and experts from the fields of AI, machine learning, data mining, and biochemistry to inform our analyzes of solutions' performance, availability, feasibility, interoperability, and data privacy, among other criteria.

The catalogue and expert interviews have allowed us to identify numerous key enabling factors and common hurdles faced when developing AI solutions for pandemic response. Furthermore, it has allowed us to identify what we believe to be some of the most promising clusters for COVID-19 and future pandemic response, and to draft recommendations to address gaps within and between existing initiatives. These will be discussed in Section 4 of this report.

The catalogue benefits not only from the Working Group's input, but also that of the research community, interested in studying the landscape of pandemic response AI solutions that have launched at the national and international level. It captures a snapshot of the monumental efforts that stakeholders worldwide have put into fighting against COVID-19 and future pandemics.

3.2. The catalogue

The catalogue can be found at the following address:
https://docs.google.com/spreadsheets/d/1uW9N1YspZ07DppBnF6i8kP0-E6-NNZHvk7_d4fLv7po/edit?usp=sharing

3.2.1. Categories

The catalogue separates the landscape of AI and Pandemic Response initiatives into four categories, with a special emphasis on the first two categories:

(1) **AI tools & applications** to limit the spread of COVID-19 and other future pandemics
(2) **Platforms to fast-track research and crowdsource projects** to fight COVID-19
(3) **Ethical and policy frameworks** for the responsible use of AI-enabled solutions during COVID-19
(4) **Governance mechanisms** to operationalize principles and monitor the responsible use of AI-enabled solutions during COVID-19

These categories reflect the complementary AI tools and applications, platforms, frameworks, and mechanisms that have commenced for COVID-19 and future pandemic response. Table 1 provides descriptions and additional examples to illustrate the categorisation.

Table 1: Categories of AI initiatives for current and future pandemics

Category 1: AI tools & applications	**Category 2: Platforms to fast-track research and crowdsource projects**	**Category 3: Ethical and policy frameworks**	**Category 4: Governance mechanisms**
Description			
Software that utilizes AI/ML for COVID-19 drug/vaccine R&D development, clinical diagnosis or treatment, or epidemiology and public health	Organizations or online platforms that serve to aggregate data or source human or fiscal capital for pandemic response initiatives that utilize AI	Literature that addresses ethical and policy aspects of AI-augmented technology for pandemic response	Literature, laws, recommendations or policies that address the governance of AI tools and applications used for pandemic response

response			
Generic examples			
Deep learning for drug-dose and/or drug-drug optimization; Computer vision for diagnostics purposes on X-rays/CT scans; AI-augmented contact tracing and risk assessment	Online platforms crowdsource talent for AI-augmented initiatives; repositories of satellite imagery, molecular morphological data, anonymized foot-traffic or clinical data	Publications by professional committees and civil society organizations that address the use of AI-augmented contact tracing technology	Government recommendations that dictate the proper use and storage of data for technologies that utilize AI
Specific examples			
IDentif.AI (Singapore); Quick Diagnosis of COVID-19 using Medical Images (Mexico); COVI (Canada)	COVID-19 Cognitive City (United States); COVID Symptom Study (United Kingdom); CovBase.AI (India)	IEEE Statement Regarding the Ethical Implementation of Artificial Intelligence Systems (AIS) for Addressing the COVID-19 Pandemic (United States)	European Commision Recommendation 2020/518 on a common Union toolbox for the use of technology and data to combat and exit from the COVID-19 crisis, in particular concerning mobile applications and the use of anonymised mobility data (EU)
Number of initiatives			
65	19	8	1

3.2.2. Domains

The catalogue separates the landscape of responsible AI initiatives into three domains—biological, clinical and societal—as formulated by Bullock, Lucciono, Pham, et al. in their mapping of AI applications used in the COVID-19 pandemic.

(A) ***Biological*** initiatives aimed at better understanding molecular structures and biochemical processes for the purpose of drug/vaccine development

(B) ***Clinical*** initiatives focused on aiding diagnosis and predicting patient outcomes
(C) ***Societal*** initiatives centered on large-scale epistemics, epidemic modeling, decision-making, and operational management

It is important to note that these themes are not mutually exclusive of one another. For instance, there are some tools that were labeled as being within the societal domain, that assist with decision-making or operational management within a clinical setting. In these cases, it was determined that these do not fall under the industry-standard definition as "clinical tools," and are more closely related to the tools within the societal domain. In ambiguous instances, medical and industry experts were consulted to determine the domain in which the initiative fits best.

Table 2: Domains of AI initiatives for current and future pandemics

Domain A: Biological	**Domain B: Clinical**	**Domain C: Societal**
Description		
Initiatives aiding biological research, drug discovery or drug development	Initiatives that assist clinical research, clinical tool research, in-clinical diagnosis, or in-clinical treatment	Initiatives related to infodemiology, epidemiology, or decision-making and operational management
Generic examples		
In silico screening of potentially active biomolecules; optimization of drug dosage; data mining and knowledge mining of scientific and medical literature; access to biological/pharmacological data to train/validate/test deep learning models	Collaborative clinical research studies, secure data sharing platforms, diagnostic research and diagnostic tool development	Content curation and misinformation mitigation tools; epidemiological modeling and risk assessment tools; tools to support decision support and resource allocation
Specific examples		
AlphaFold (UK); IDentif.AI (Singapore); Causaly (UK/Greece)	Quick Diagnosis of COVID-19 using Medical Images (Mexico); RadVid-19 (Brazil); icolung (Belgium); Nference (US/India/UK)	FactMata (United Kingdom); BlueDot (Canada); HANCOM AI CHECK 25 (South Korea)

Number of initiatives		
15	18	60

3.3. Methodology and limitations

The construction of the catalogue utilizes two sources of input: first, a survey within the GPAI AI and Pandemic Response Subgroup, conducted within a two-week period in September 2020, sourcing members' knowledge of existing initiatives that utilize or relate to AI for pandemic response; second, research conducted by analysts at The Future Society to map the landscape of AI initiatives in pandemic response. Attributes of each respective initiative were provided by survey responses and/or desktop research (using official websites, existing literature, press releases, and news coverage).

There were three notable limitations that affected the content of the catalogue. First, the research team faced a constraint of time, with a primary short-term research objective to identify and assess the most promising initiatives; as such, the present contents of the catalogue are skewed towards those initiatives that have more visibility, those that were most familiar to those in the Working Group and analyst team, and those with online material existing in the languages of those in the Working Group and analyst team.

Second, there was a palpable constraint of information presently available on existing initiatives. This is most likely due to novelty as many of these initiatives remain in development as this report is being produced. In some cases, this may also be due to concerns of intellectual property—initiative leads may be concerned that their methodology may be emulated/patented/popularized if they are too immediately transparent. (Interviews confirmed that this factor exists.) There is also the likelihood that information for many initiatives does not yet exist in languages not spoken by the Working Group or analyst team. This is very likely to be the case for initiatives in China, which is remarkably receptive towards AI technologies, but has very few initiatives in the catalogue.

Third, in some instances, there is ambiguity as to whether or not initiatives actually utilize technology that would be considered as AI. For the purpose of this cataloguing process, the OECD definition of AI systems was utilized: *An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy.* Unfortunately, some initiatives' websites or publicly-available documentation contain only ambiguous explanations of the technology their initiative utilizes, preventing researchers from being able to discern whether or not the initiative satisfies the working definition of AI systems. In other cases, initiatives claimed to use advanced statistical modeling methods, such as Monte Carlo simulations, which arguably did not satisfy the working definition. In both of these cases, those initiatives were left out of the Catalogue tav and moved to another tab (titled "Other Surveyed Initiatives") within the Catalogue spreadsheet. In some cases, project

leads were contacted directly for more details about the technology their initiatives used, and initiatives were kept in the Catalogue if their initiatives were determined to use technology that satisfies the working definition of AI systems.

3.4. Catalogue Overview

As of November 23rd 2020, 93 initiatives are listed in the catalogue. These initiatives represent 20 different countries and regions.[1] 65 initiatives are AI tools and applications, 19 are platforms to fast-track research and crowdsource projects , 8 are ethical and policy frameworks, and 1 is a governance mechanism (see Figure 1). This distribution is skewed towards tools & applications and platforms—which were deemed as priorities for identification and assessment, as the AI and Pandemic Response Subgroup felt that these initiatives were most relevant to the Group's present research agenda.

With respect to the domains, 15 fall within the biological domain, 18 are within the clinical domain, and 60 are within the societal domain (see Figure 2). As discussed in "Domains" above (section 3.2.2), numerous initiatives may arguably fit within more than one domain, but were sorted into the domain that most closely aligned with their utility.

Figure 1:

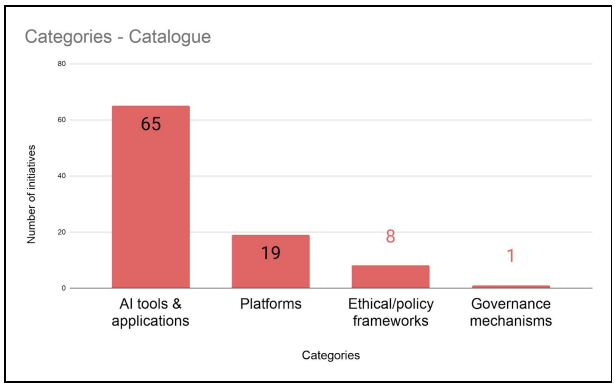


Figure 2:

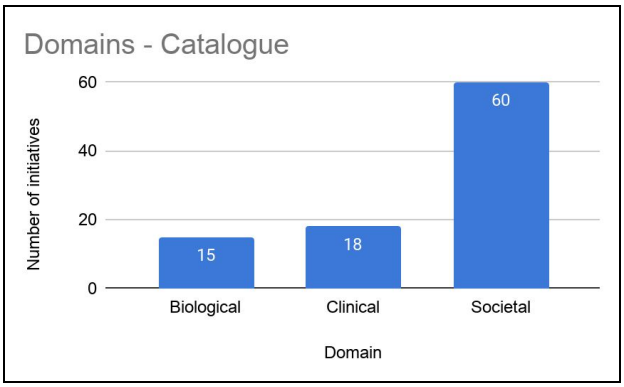
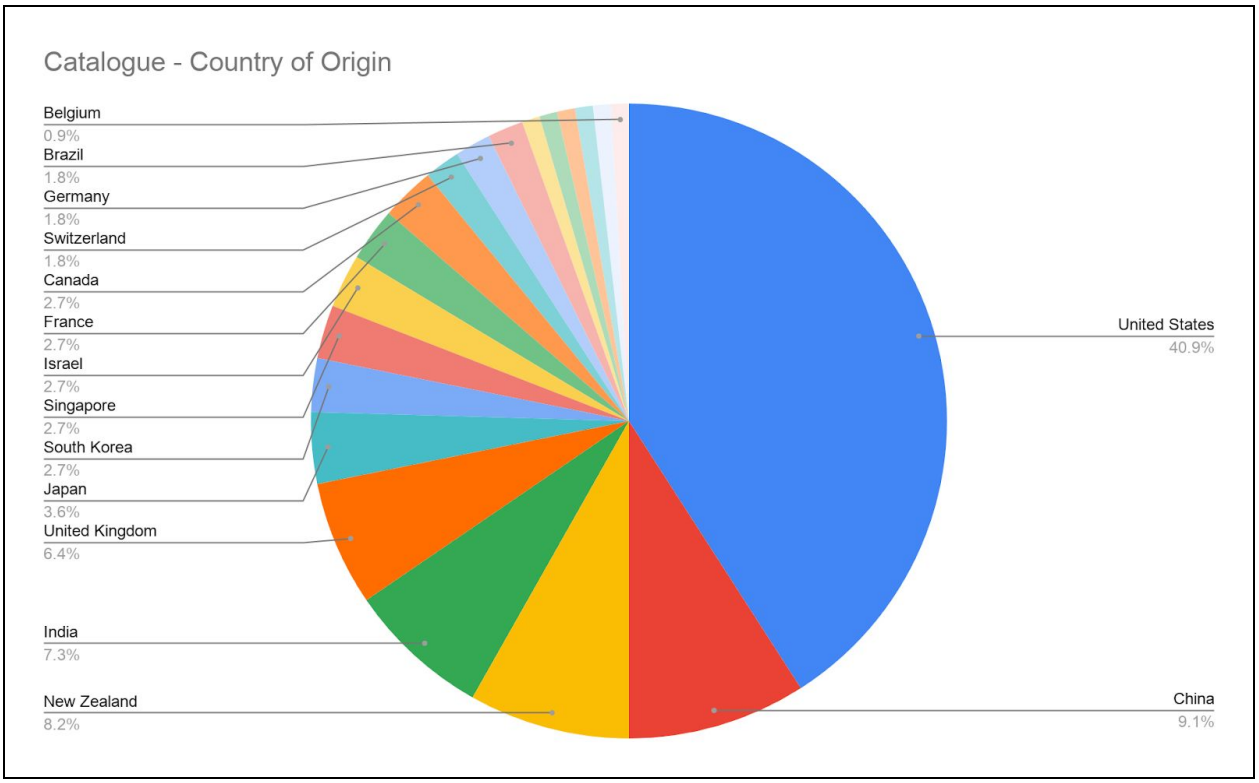


Figure 3 illustrates the geographic distribution of initiatives (including AI tools and applications, platforms, ethical and policy frameworks, and governance mechanisms) captured in the catalogue by country of origin. The United States, China, New Zealand, and India make up the largest proportions of initiatives. This is somewhat reflective of the AI ecosystems of these countries, but also considerably influenced by the geographic representation of AI and Pandemic Response Subgroup and analysts (as discussed in the "Methodology and Limitations" section, above).

Figure 3:

[1] Note that as the catalogue continues to be regularly updated, these figures evolve.



Figures 4 and 5 illustrate the distribution of initiatives across the sectors and their target audiences, respectively. Among sectors, there is a large distribution of initiatives across for-profit and academic organizations. This is most likely due to the incentives of these two sectors compared to others: academia was incentivized by funding agencies who created dedicated funding instruments for pandemic response, while business launched into it as a business opportunity.

Figure 4:

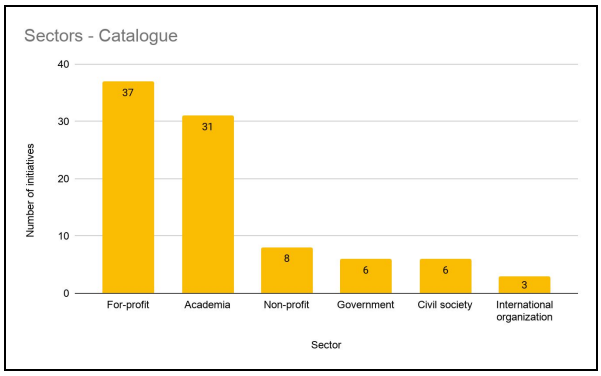


Figure 5:

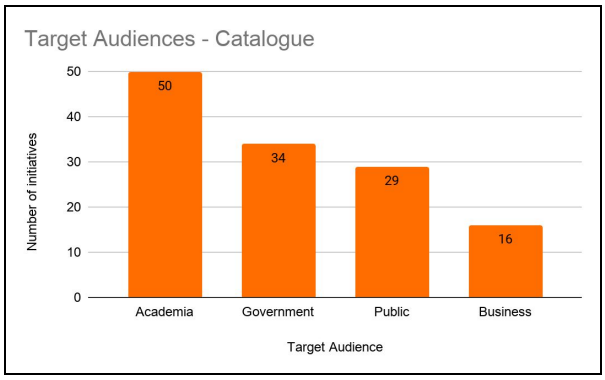
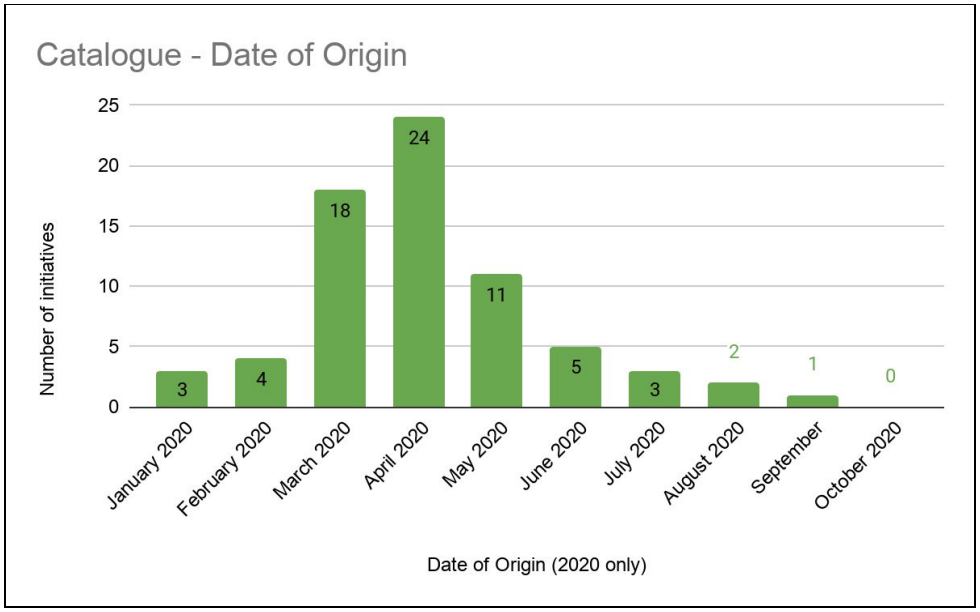


Figure 6 displays the distribution of initiatives by date of origin, not counting initiatives that began before 2020. The histogram shows a majority of initiatives originating in March or April. This may be somewhat skewed right, as newer initiatives are simply less known. It may also

indicate that organizations with the capacity and interest to commit resources to respond to the pandemic made the decision to do so in the earlier half of the year.

Figure 6:



4. Evaluating and Analyzing Shortlisting Initiatives

4.1. Building a Common Assessment Framework

4.1.1. Objective of the Criteria Assessment Framework

The objective of the Criteria Assessment Framework is to evaluate, shortlist and assess a representative list of AI initiatives that have great potential for current and future pandemics. In particular, given the urgent need for coordinated international efforts to limit the spread of COVID-19, the Criteria Assessment framework aims to evaluate AI tools, applications and platforms that have an immediate and concrete impact on the sanitary and social-economic situation. The Criteria Assessment Framework was thus developed to evaluate all initiatives of the catalogue pertaining to Category 1 (AI tools and applications to limit current and future pandemics) and Category 2 (Platforms to fast track research and crowdsource projects to respond to current and future pandemics). In total, 84 initiatives were evaluated across 3 domains: biological, clinical and societal.

Shortlisted initiatives derived from the Criteria Assessment Framework were selected across these domains, and their potential impact was evaluated according to 6 criteria:

(1) Relevance
(2) Availability, Adoption & Feasibility
(3) Diversity & Inclusiveness
(4) Credibility
(5) Interoperability
(6) Potential for GPAI to make a significant difference to the initiatives.

Two additional criteria were originally considered (Data Access & Compliance, and Alignment with OECD AI Principles). However, after the test and iteration of these two criteria, it appeared that AI initiatives were either at a too early stage to be evaluated accordingly, or lacked the necessary information to be evaluated comprehensively.

4.1.2. Methodology, Limitations and Validation

The 6 criteria were all given the same weight, but were considered at different stages of the evaluation process. With the direction and support of the Working Group members, each criterion was associated with a short description and a series of indicators. The indicators were drafted based on their importance to evaluate the criterion, but also available information. Relevant information was sought via interviews with the project leads, questionnaires, and additional desk research. The assessment process was conducted in two stages. First, all 88 initiatives were evaluated quantitatively according to their (1) Relevance and (2) Availability, Adoption & Feasibility. A score scaling from 1 (low) to 5 (high) was given for each criterion, and then averaged to give an overall score for each initiative. A representative sample of 36 promising initiatives was then shortlisted based on their overall score and ability to cover gaps identified with our Clustering Framework (See Table 2 below). The 36 initiatives were then

analyzed qualitatively according to all 6 criteria: (1) Relevance; (2) Availability, Adoption & Feasibility, (3) Diversity & Inclusiveness, (4) Credibility, (5) Interoperability, (6) Potential for GPAI to make a significant difference to the initiative.

One limitation of the assessment framework is access to reliable and up-to-date information on the catalogue's initiatives. Most initiatives have been developed in the context of the pandemic, between March 2020 and now, and either have few information on their webpage and/or are still in the early development stage. In this regard, criteria such as (4) Credibility and (5) Interoperability proved harder to assess for certain initiatives.

Table 3: Criteria Assessment Framework

Criteria	Definition	Indicators
Relevance	Relevance of the AI solution and the problem it intends to solve for current and future pandemics.	• Relevance of the problem to be solved in the context of COVID-19 • Relevance of the problem for future pandemics • Potential of usage beyond initial sectors, target audience and geographic coverage
Availability, Adoption & Feasibility	Degree to which the initiative is available across different regions and population segments, is feasible to deploy, has demonstrated achievement to solve its targeted problem, and is adopted across the population.	• Availability of the tool amongst sectors, target audiences and geographies • Feasibility of deployment • Adoption rates • Ability to deliver the initiative's objectives and according to own metrics (ie. according to mission and description) • Maturity/Level of development • Deployment of monitoring and evaluation tools to assess and report progress
Diversity & Inclusiveness	Degree to which the initiative represents and benefits minorities, underrepresented communities and/or countries.	• Country where originated • Geographic coverage • Geographic diversity of core team and stakeholders • Potential for benefiting marginalized groups or countries in the Global South
Credibility	Degree to which the initiative is considered serious and its	• Team expertise & partnerships (eg. level of seniority, interdisciplinarity

	stakeholders worthy of trust.	with technical and medical expertise, partnership with top research center) ● Budget raised so far (if applicable) ● Awards and achievements (if applicable) ● Main success factors and hurdles
Interoperability	Ability of the AI solution to work with stakeholders from different sectors, regions and technical systems.	● Access of the AI solution across systems and devices - can the AI tool interact with other tools? ● Ability to retrain the AI solution with new data ● Cross sectoral and cross regional collaboration
Potential for GPAI to make a significant difference to the initiative	Degree to which the initiative aligns with the GPAI mandate, and will benefit both local and global populations if shortlisted.	● Geographical scope of the initiative ● Target audience ● Interdisciplinary team ● Ease of access for different population segments (eg. eldery) and levels of connectivity (eg. rural area)

The Criteria Assessment Framework draws heavily from the development aid programs evaluation literature.[2] The indicators selected refer mostly to inputs and activities ("planned work" indicators) and outputs and outcomes (intended results).[3]

Inputs are the resources available and leveraged for the initiative (e.g. geographic scope, country where initiated, budget). The indicators falling within this category are:

- Geographical scope of the initiative
- Sector(s) initiative belongs to
- Relevance of the problem to be solved in the context of COVID-19
- Relevance of the problem for current and future pandemics
- Interdisciplinary and expertise of the team
- Geographic diversity of core team and stakeholders
- Country where it initiated
- Clarity of initiative's objectives and own metrics
- Ability to have access to reliable data
- Budget

Activities are the utilization of these resources in the creation of outputs by the initiative (e.g. target audience, stage of development). The indicators falling within this category are:

[2] World Bank's Independent Evaluation Group, *Designing a Results Framework for Achieving Results: A How-To Guide,* International Bank for Reconstruction and Development/World Bank Group
[3] Pp. 24-25, World Bank's Independent Evaluation Group, *Designing a Results Framework for Achieving Results: A How-To Guide,* International Bank for Reconstruction and Development/World Bank Group

- Target audience
- Geographic coverage
- Cross-sectoral and cross-regional collaboration
- Stage of development
- Deployment of monitoring and evaluation tools to assess and report progress
- Data governance (methodology to collect, store, analyze data) processes
- Compliance with ethical and legal standards, such as privacy protection rules as GDPR

Outputs are the proximate results of the initiative (e.g. availability of the initiative). The indicators falling within this category are:

- Availability of the tool amongst sectors, target audiences and geographies
- Access of the AI solution across systems and devices
- Ability to retrain the AI solution with new data
- Ability to deliver the initiative's objectives and according to own metrics
- Feasibility of deployment
- Maturity/Level of development
- Ease of access for different population segments
- Level of national, regional and/or international adoption/usage
- Potential for benefiting marginalized groups or countries in the Global South
- Potential of usage beyond initial sectors, target audience and geographic coverage

4.1.3. First Assessment

For the first assessment round, all initiatives (n = 93) of the catalogue pertaining to categories 1 and 2 (AI tools, applications and platforms to limit the spread of current and future pandemics) were evaluated according to their relevance (criterion 1) and availability, adoption & feasibility (criterion 2). In total, 84 initiatives were evaluated and given a score of 1 (low) to 5 (high). Two pairs of AI policy researchers and medical experts evaluated each initiative. An average score for both criteria was given by each pair, which then resulted in an average score for both pairs. The 30 initiatives with the highest scores were shortlisted, as well as an additional 6 initiatives with high ranging scores and addressing blind spots identified with our Clustering Framework (eg. that none of the Top 30 initiatives were addressing).

4.1.4. Clustering Framework and Second Assessment

To ensure a representative sample of most promising initiatives, a Clustering Framework was developed to identify potential gaps and missing initiatives. The Clustering Framework derived from a relevant literature review, and especially the articles *Mapping the Landscape of Artificial Intelligence Applications against COVID-19* (Bullock et al, 2020) and *Considerations, Good Practices, Risks and Pitfalls in Developing AI Solutions Against COVID-19* (Luccioni et al, 2020).

Table 4: Clustering Framework with Shortlisted Initiatives

Domain	Cluster	Subcluster	Initiatives
Biological	Biological research	Protein structure and binding prediction	AlphaFold
		Knowledge graphs and inference	BenevolentAI Knowledge Graph pipeline
			Causaly
		Datasets and research crowdsourcing	CORD-19
			COVID-19 Cognitive City
	Drug discovery	Target identification and validation	AI-Enabled Drug Discovery Challenge
			RxRx19
	Drug development	Drug dosage and optimization	IDentif.AI
Clinical	Clinical research	Collaborative clinical research	COVID Symptom Study
			COVID-19 Open AI Consortium
			Nference Platform
		Secure data sharing platform	Secure Data Exchange and Collaboration Challenge
	Clinical tool research	Diagnostic research	Artificial intelligence–enabled rapid diagnosis of patients with COVID-19
			Developing a Covid-19 Diagnostic Tool for Sub-Saharan Africa
	In-clinical diagnosis	Diagnostic tool development	CT Pneumonia Analysis
			icolung
			Quick Diagnosis of COVID-19 using Medical Images
			qXR
			RADLogics CT Exams
			RadVid-19
	In-clinical treatment	**GAP IDENTIFIED**	
Societal	Infodemiology	Content curation	Rapid Reviews: COVID-19
			LitCovid
		Misinformation mitigation	SimSearchNet
		Public acceptance	**GAP IDENTIFIED - See recommendations.**

	Epidemiology	Geoanalytic data	Maxar Open Data Program
			SafeGraph COVID-19 Data Consortium
		Impact studies	*Universal Masking is Urgent in the COVID-19 Pandemic: SEIR and Agent Based Models, Empirical Validation, Policy Recommendations*
		Modeling and prediction tools	*Finding an Accurate Early Forecasting Model from Small Dataset: A Case of 2019-nCoV Novel Coronavirus Outbreak*
			Composite Monte Carlo decision making under high uncertainty of novel coronavirus epidemic
		Risk Assessment	Johns Hopkins US Risk Model
			BlueDot
			COVID Command Center
			Websensors Analytics
	Decision-making and operational management	Resource allocation	**GAP IDENTIFIED**
			PPP Lending AI Solution
		Decision support	Zencity Local Government Response
			CAIAC
		Contact tracing	COVI
			HANCOM AI CHECK 25

4.2. Analyzing Shortlisted Initiatives

4.2.1. Overview of Shortlisted Initiatives

Of the 36 initiatives that were shortlisted, 26 (72.2%) were AI tools and applications, and 10 (27.8%) were platforms (see Figure 7). As discussed in section 3, initiatives categorized as "ethical and policy frameworks" or "governance mechanisms" were excluded from the shortlisting process. 18 (50%) of shortlisted initiatives fall under the societal domain, 10 (27.8%) in the biological domain, and 8 (22.2%) in the clinical domain (see Figure 8).

Figure 7:

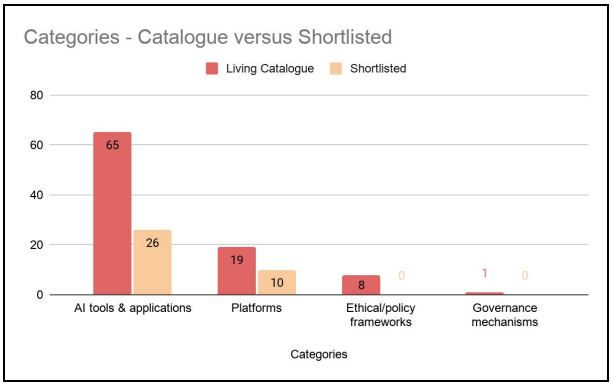
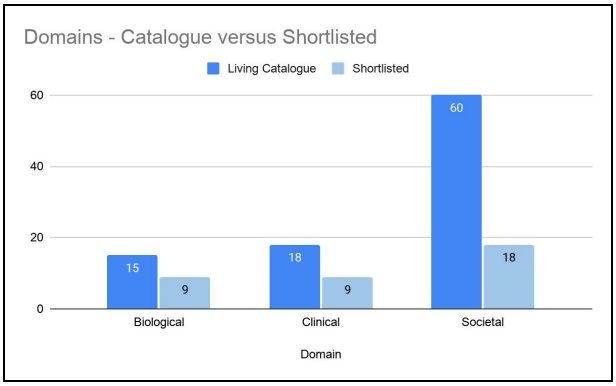
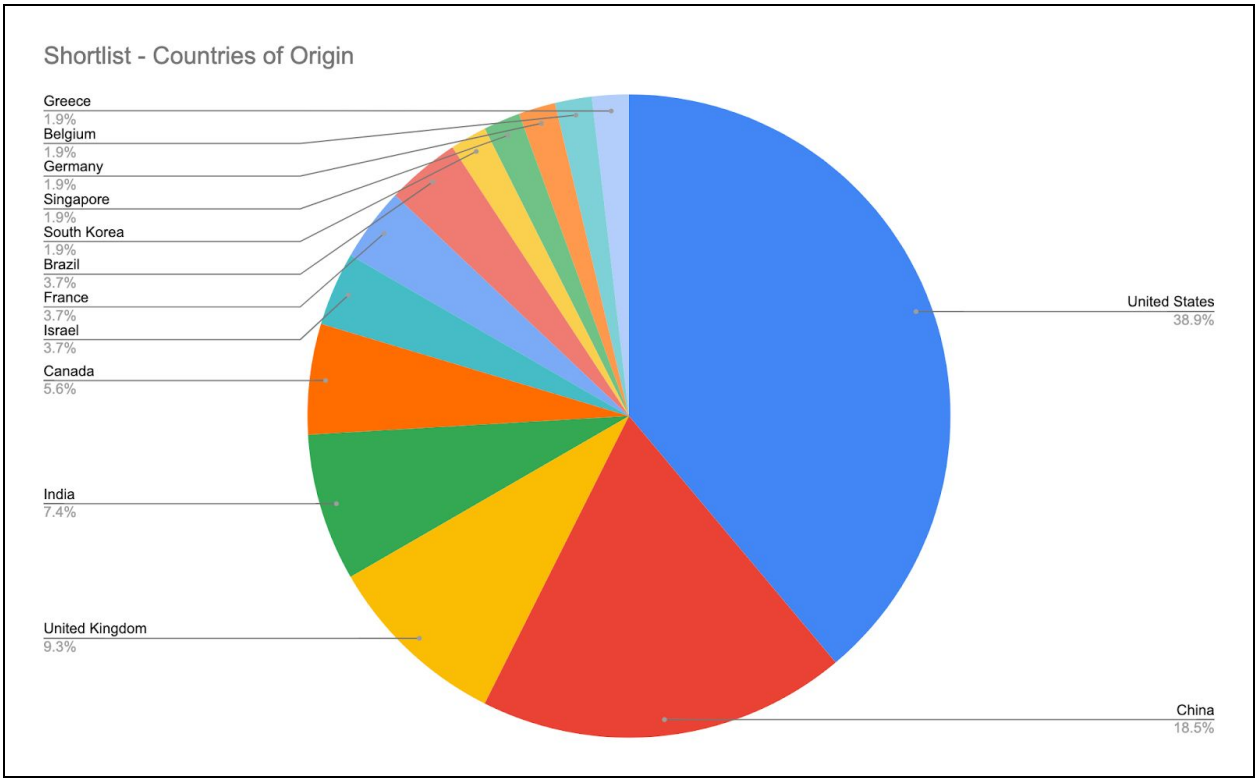


Figure 8:



The distribution of the shortlisted initiatives' countries of origin is similar to that of those in the Catalogue, as a whole, when shortlisting was conducted (see Figure 9).

Figure 9:



55.2% of shortlisted initiatives were created by For-profits, 24.1% by Academia, 10.3% by Non-profits and 10.3% by Public Institutions.

Figure 10:

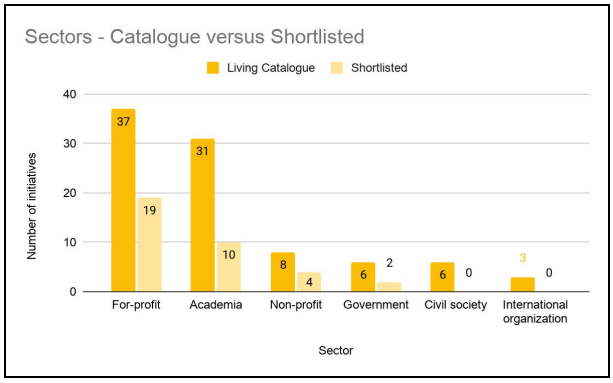
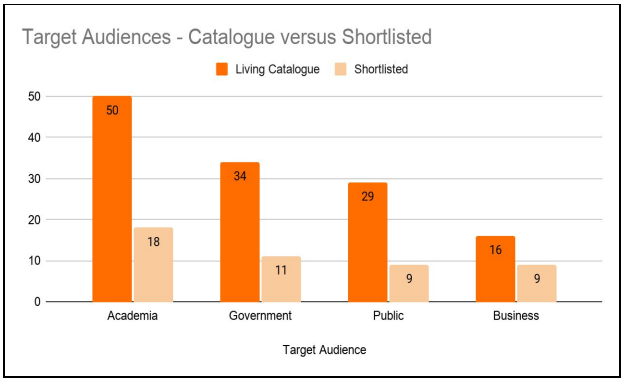


Figure 11:



4.2.2. Analysis of Shortlisted Initiatives

With the shortlist compiled (see Table 3), analysts conducted desktop research, surveys, and interviews with initiative leads to understand initiatives' success and hurdles at a more granular level detail. This section displays the summaries of the information collected for each shortlisted initiative.

Table 5: Shortlisted Initiatives (listed alphabetically by domain)

Domain	Initiative Name	Brief Description
Biological	AI-Enabled Drug Discovery Challenge	To address the need to accelerate drug discovery, the XPRIZE Foundation is partnering with IBM to launch the XPRIZE AI for Accelerating Drug Discovery Challenge to develop a collaborative platform that can rapidly evaluate the clinical trial readiness of drug candidates in months, rather than years, and at a fraction of the cost. Unlocking innovations on such urgent timelines can be accomplished only by leveraging the latest technological advances and by adopting frameworks that lower the barriers for sharing expertise. These advances will not only lead to faster COVID-19 treatment discoveries, but also spur collaborative frameworks that can lead to treatment breakthroughs for other conditions.
	AlphaFold	The AlphaFold team is sharing predicted structures for some of the proteins in SARS-CoV-2.
	BenevolentAI Knowledge Graph	BenevolentAI's knowledge pipeline pulls data

	pipeline	from various structured and unstructured biomedical data sources and curates and standardized this knowledge via a data fabric. A proprietary knowledge graph which extracts and contextualises the relevant information and is made up of a vast number of machine curated relationships between diseases, genes, drugs. Machine learning models also assist with novel target identification, identifying patient-specific treatments, and evaluate molecular structures. With respect to COVID-19, they identified an approved drug that could potentially inhibit the viral progression and the body's inflammatory response to the novel coronavirus.
	Causaly	Causaly uses artificial intelligence to rapidly read, understand and interpret vast databases of biomedical knowledge. Our platform surfaces evidence from 30 million biomedical publications in seconds, enabling researchers to rapidly map epidemiology data, biomarker genes, molecular targets and identify potential treatment options. Causaly has been actively optimising its technology for the current pandemic, working alongside industry, government and academia. UCL has been actively working on a number of Covid-19 related research projects, including the development and delivery of a low-cost breathing aid, trials of a potential antiviral and rapid genome sequencing to better understand the spread of the disease. Following an agreement with UCL Innovation & Enterprise, several researchers and groups within UCL, researchers and groups within UCL are now using Causaly to work on COVID-19 projects ranging from the development of therapeutics and diagnostic approaches, to epidemiological models, mental health-focused strategies and healthcare system logistics.
	CORD-19	A large dataset dataset containing all COVID-19 and coronavirus-related research (e.g. SARS, MERS, etc.) from the following sources: PubMed's PMC open access corpus; Additional COVID-19 research articles from a corpus maintained by the WHO; bioRxiv and medRxiv pre-prints using the same query as PMC (COVID-19 and coronavirus research). They also provide a comprehensive metadata file of

		more than 50,000 coronavirus and COVID-19 research articles with links to PubMed, Microsoft Academic and the WHO COVID-19 database of publications (includes articles without open access full text). The corpus is updated regularly as new research is published in peer-reviewed publications and archival services like bioRxiv, medRxiv, and others.
	COVID 19 Cognitive City	The COVID-19 City is open to the public and designed to grow through user contributions. Exaptive and its partners believe that innovation is not the work of lone geniuses but of connected collaborative networks. As new COVID-19 knowledge assets are being released daily, the COVID-19 City acts as a single place to catalog the growing body of knowledge about the disease. With the help of interactive visualizations and network algorithms, the COVID-19 City connects interdisciplinary teams that might not normally work together and helps them find non-obvious resources that might otherwise escape their searches.
	IDentif.AI	Harnesses an AI-based platform to interrogate drug and dose parameter spaces that are insurmountably large for brute-force testing of all possible combinations
	Nference Platform	Makes unstructured knowledge computable and enables seamless triangulation with various structured databases that are often siloed (such as vitals, lab tests, ICD codes, genomic sequences)
	RxRx19	This group has processed and made publicly available numerous large morphological imaging dataset of COVID-19.
Clinical	Artificial intelligence–enabled rapid diagnosis of patients with COVID-19	This study used AI algorithms to integrate chest CT findings with clinical symptoms, exposure history and laboratory testing to rapidly diagnose patients who are positive for COVID-19. Among a total of 905 patients tested by real-time RT–PCR assay and next-generation sequencing RT–PCR, 419 (46.3%) tested positive for SARS-CoV-2. In a test set of 279 patients, the AI system achieved an area under the curve of 0.92 and had equal sensitivity as compared to a senior thoracic radiologist. The AI system also improved the detection of patients who were

		positive for COVID-19 via RT–PCR who presented with normal CT scans, correctly identifying 17 of 25 (68%) patients, whereas radiologists classified all of these patients as COVID-19 negative.
	COVID-19 Open AI Consortium	COAI will unite collaborators: academic institutions, researchers, data scientists and industrial partners, to fight the Covid-19 pandemic.
	CT Pneumonia Analysis	Algorithm designed to automatically identify and quantify abnormal tomographic patterns in the lungs from chest CT for research purposes.
	icolung	A cloud-based AI software to quantify the degree of lung involvement in COVID-19 patients.
	Quick Diagnosis of COVID-19 using Medical Images	Quick diagnosis of COVID-19 using medical images, in the form of X-Rays or CT Scans, using Convolutional Neural Networks (CNNs).
	qXR	Monitors progression of infected patients via daily bedside chest x-rays.
	RADLogics CT Exams	RADLogics has developed its AI-based CT image analysis tools to automatically and accurately detect the COVID-19 / coronavirus in large numbers of CT studies.
	RadVid-19	RadVid-19 is an action among Brazilian radiologists supported by CBR to collect confirmed or suspected X-rays and tomography exams of COVID-19. The platform is a repository of COVID cases in Brazil, made by a joint action of Brazilian radiologists and will be open for the application of artificial intelligence to aid clinical decision, with the purpose of making this diagnosis more accurate and, in the case of tomography, automate quantitative data on disease involvement.
	Secure Data Exchange and Collaboration Challenge	BurstIQ is offering free platform access for teams participating in the AI-Enabled Rapid Antiviral Design challenge. BurstIQ is a secure data exchange platform that allows teams to build collaboration networks for managing secure and compliant data sharing using granular ownership, consent, and governance.
Societal	BlueDot	Delivers tailored outbreak risk awareness in near real-time, a hub for the latest intelligence about COVID-19, focus reports that examine

		where the pandemic is heading, and a geographic information system combines over 100 datasets to help advanced users quickly perform complex risk assessments.
	CAIAC	CAIAC is a dynamic “sense-making” platform that provides end users with knowledge graphs, intelligent query functionality, and dynamic reports.
	Composite Monte Carlo decision making under high uncertainty of novel coronavirus epidemic using hybridized deep learning and fuzzy rule induction	In this paper, a case study of using CMC that is enhanced by deep learning network and fuzzy rule induction for gaining better stochastic insights about the epidemic development is experimented. Instead of applying simplistic and uniform assumptions for a MC which is a common practice, a deep learning-based CMC is used in conjunction of fuzzy rule induction techniques.
	COVI	Privacy-protecting mobile exposure notification and risk awareness application. Epidemiological simulator.
	COVID Command Center	An online "command center" for surge prediction, AI triage, and critical decisioning.
	COVID Symptom Study	The COVID Symptom Study app has been developed by health science company ZOE. It is endorsed by the Welsh Government, NHS Wales, the Scottish Government & NHS Scotland. Data collected is shared with and analysed by King's College London & ZOE research teams. Over 4 million people have downloaded the app and are using it to regularly report on their health, making it the largest public science project of its kind anywhere in the world.
	Developing a Covid-19 Diagnostic Tool for Sub-Saharan Africa	Researchers at the University of Cambridge are working across disciplines to help health officials in remote and resource-limited settings to rapidly and confidently distinguish between potential outbreaks of COVID-19, and endemic respiratory diseases, based only on clinical and demographic data.
	Finding an Accurate Early Forecasting Model from Small Dataset: A Case of 2019-nCoV Novel Coronavirus Outbreak	In this paper, a methodology that embraces three virtues of data mining from a small dataset is proposed. An experiment that is based on the recent coronavirus outbreak originated from Wuhan is conducted by applying this

		methodology. It is shown that an optimized forecasting model that is constructed from a new algorithm, namely polynomial neural network with corrective feedback (PNN+cf) is able to make a forecast that has relatively the lowest prediction error. The results showcase that the newly proposed methodology and PNN+cf are useful in generating acceptable forecast upon the critical time of disease outbreak when the samples are far from abundant.
	HANCOM AI CHECK 25	Accufly.AI launched its AI Outbound Calling System to assist the South Korean government at no cost and provide information to individuals who have been in close contact with or have had a confirmed coronavirus case.
	Johns Hopkins US Risk Model	Risk model developed at the county level for the United States. Using epidemiological data from publicly available map and repository, along with anonymized mobile phone data, demographic and socioeconomic information, and various behavioral metrics, able to accurately assess the risk presented by COVID-19 in the United States at local, state, and national levels.
	LitCovid	LitCovid is a curated literature hub for tracking up-to-date scientific information about the Coronavirus Disease 2019 (COVID-19). It contains a total of 59927 PubMed articles and is updated daily with new PubMed articles that are relevant to COVID-19.
	Maxar Open Data Program	Maxar's Open Data Program has released an initial set of high-resolution satellite imagery in support of the COVID-19 response efforts. Per requests from humanitarian partners, this release will includes METRO IMAGERY BASEMAPS for the following African cities: Addis Ababa, Abidjan, Dakar, Lagos, Kano, Ibadan, Ouagadougou, Accra, Luanda, Kinshasa, Nairobi and part of northern Ghana.
	PPP Lending AI Solution	Google Cloud is offering the PPP Lending AI Solution, which enables lenders to easily and securely integrate underwriting components into their existing lending systems. This will be available to lending institutions at no cost.
	Rapid Reviews: COVID-19	An open-access overlay journal that accelerates peer review of COVID-19-related research preprints to advance new and important findings,

		and prevent the dissemination of false or misleading scientific news. Uses a natural language processing tool developed by COVIDScholar, an initiative of UC Berkeley and Lawrence Berkeley National Lab that can quickly scan a large number of preprint repositories and identify relevant items to be peer reviewed.
	SimSearchNet	A convolutional neural net–based model built specifically to detect near-exact duplicates.
	Universal Masking is Urgent in the COVID-19 Pandemic: SEIR and Agent Based Models, Empirical Validation, Policy Recommendations	This research presents two models for the COVID-19 pandemic predicting the impact of universal face mask wearing upon the spread of the SARS-CoV-2 virusone employing a stochastic dynamic network based compartmental SEIR (susceptible-exposed-infectious-recovered) approach, and the other employing individual ABM (agent based modelling) Monte Carlo simulation indicating (1) significant impact under (near) universal masking when at least 80% of a population is wearing masks, versus minimal impact when only 50% or less of the population is wearing masks, and (2) significant impact when universal masking is adopted early, by Day 50 of a regional outbreak, versus minimal impact when universal masking is adopted late.
	Websensors Analytics	Websensors Analytics is the first initiative to analyze events in Portuguese and currently contains all the necessary features for extracting and analyzing knowledge from events: (i) web crawling to collect events in real time, (ii) statistical and natural language preprocessing techniques for event extraction (iii) machine learning methods for learning sensors, and (iv) Application Programming Interface (API) using the Websensors Analytics infrastructure. The Websensors Analytics tool is potentially useful for media analytics, opinion mining, web engineering, content filtering and recommendation systems – for both academic research and industrial applications.
	Zencity Local Government Response	Zencity's AI-driven platform helps local governments translate what people want in their cities more effectively and eliminates the guesswork from policymaking. With close to zero integration, we gather and analyze millions of data points from all of the touchpoints

		residents have with their city. Then we deliver reliable, real-time insights that help local governments better prioritize resources, track performance, and connect with their communities. Together with our partner-cities, we're setting a new standard for performance management in local government.

5. Recommendations & Pathway Forward

5.1. Common key enabling factors:

A review of the initiatives in this catalogue revealed a number of commonly-shared *key enabling factors*, in other words, distinctive characteristics that underlie their present, and likely future, success. These enablers are wide-ranging, encapsulating organizational architecture, credibility, innovativeness, and adaptive strategies. In this section, we describe a number of key enabling factors that were common among promising pandemic response initiatives, including: (1) operationalization of open science, (2) fast-tracking of traditional research or funding processes, (3) cross-sectoral and interdisciplinary collaboration, and (4) transferability of an initiative for future pandemics. (Other key enabling factors are covered in greater detail in the Catalogue and the shortlisted initiatives, found in the appendix.)

5.1.1. Operationalizing open science

Scientific pursuits rely on reproducible methodologies and empirical evidence to derive knowledge. During pandemics, there is an acute need to develop scientific knowledge quickly. As such, initiatives tended to demonstrate promise were those that operationalized *open science*, by making use of open-access data, and by making their metadata, algorithms, workflows, models, and software (including code), available to different levels of inquiry. Examples of the former are the structure predictions of several under-studied proteins associated with SARS-CoV-2 using DeepMind's **AlphaFold** system, which primarily uses data from the Protein Data Bank (PDB), a reputable, collaborative entity that curates, annotates, and makes publicly available data deposited by scientists around the globe. Other examples are **Quick Diagnosis of COVID-19 using Medical Images** and **Icolung,** which have made their CT scan diagnosis tool accessible to doctors for free (although doctors are subsequently required to upload CT scans to help improve the algorithms), and **IDentif.AI,** which has promised not to patent any of the combination drug therapies identified by its tool. Such practices allow for research to be conducted more quickly and transparently, and as in the case of **AlphaFold** may ultimately contribute to understanding of diseases and future pandemic response efforts. However, it is also important to note that in the context of pandemics, the sensitive nature of health data and medical records do not always allow organizations to provide full access to their data repository. They can though provide minimal conditions for access, for example by allowing mobile algorithms to screen the data and ask a research question. The result is then returned to the partner organization, and the data itself never leaves the safe repository.

5.1.2. Fast-tracking traditional processes

Another key enabling factor is the use of AI to *isolate and fast-track traditional processes* that face exceptional strain or congestion during pandemics, such as scientific literature review, online content curation, resource allocation, and disease diagnosis. These processes become particularly burdensome during a pandemic, respectively, because of the overwhelming amount of published literature regarding the pathology of concern, and a large number of medical images requiring review. Initiatives that demonstrated promise with respect to this key enabling factor include **LitCovid** and **Rapid Review: COVID**, which both utilize text classification to filter scientific literature and identify papers that are most relevant (to a particular COVID-19 subtopic) and scientifically rigorous. Similar in epistemic aim, **SimSearchNet** uses convolutional neural network-based models to identify near-exact duplicates of text or images on Facebook, indicating that originals may have been altered to include false or misleading information. There are also a number of initiatives that utilize computer vision on X-rays and CT scans to accelerate diagnosis, including **CT Pneumonia Analysis, icolung, qXR, RADLogics CT Exams,** and **RadVid-19**. By targeting and fast-tracking processes that face pandemic-related strain, these initiatives expedite research and alleviate the amount of human labor to complete these processes.

5.1.3. Interdisciplinary and cross-sectoral collaboration

Another factor denoting present, and likely future, success is the degree to which an initiative incorporates *interdisciplinary and cross-sectoral collaboration*. These initiatives demonstrate promise because they are more likely to possess expertise and capacity to design, develop, and scale an initiative. High-level partnerships also confer a degree of authoritativeness, enhancing the likelihood of an initiative to be received well. An example of this is **AI-Enabled Drug Discovery Challenge**, a joint initiative of XPRIZE and IBM, which leverages the logistical talent and financial capital of the former and intellectual property (molecule patents) of the latter. Another initiative is **CAIAC**, a joint initiative of The Future Society, stability.ai, Stanford University's Human-Centered AI, UNESCO, and the Patrick J. McGovern Foundation. With such partnerships established, these initiatives possess the resources and accountability mechanisms to achieve goals and meet deadlines, and a degree of credibility and visibility that will facilitate their participation and adoption.

5.1.4. Transferability

Finally, initiatives that are likely to be the most successful in the long term are those that demonstrate *transferability*—the clear potential for the underlying techniques to be adapted to the prediction, prevention or response to future potential pandemics, or to improve the delivery of healthcare in general (e.g., making it more efficient and agile beyond pandemics). Within the biological and clinical domains this is the case, for example, for those initiatives that construct generalizable models or inferences about pathologies, such as **BenevolentAI** and **Causaly**, which rely upon millions of ingested scientific articles to draw inferences about biomarkers and

molecular targets. This is also the case for many initiatives within the societal domain that are generalizable tools for infectious disease outbreaks. Examples of initiatives that demonstrate transferability are those that target the second-order effects of the pandemic, such as public discourse monitoring, which **Zencity Local Government Response** is designed to assist with. This is also the case with **HANCOM AI Check 25**, a tool that conducts automated medical check-ins and follow-ups over the phone. Another example is **PPP Lending AI Solution** offered by Google Cloud, which uses optical character recognition to parse and process applications for the United States's Paycheck Protection Program (PPP), thereby allowing lenders and borrowers to place transactions faster when under financial strain. In the event of another pandemic, emergent disease outbreak, these tools benefit from being easily repurposable and readily deployable.

These factors are only a handful of those that have belied the success and adoption of the initiatives analyzed in this report, but we believe them to be some of the most prominent, and hence "key," factors of initiatives that may impart a positive impact in this pandemic and future pandemics. For this reason, they are also factors that novel initiatives may wish to optimize towards.

5.2. Common challenges

5.2.1. Ethical and legal barriers

Several initiatives reviewed in our mapping, especially in the clinical and biological domains, highlighted time-consuming procedures to be compliant with existing data protection and privacy regulations. AI-enhanced CT scans, for example, expressed the burden of having to report to the Food and Drug Administration (FDA) each time they wanted to retrain their Deep Learning algorithms with new datasets. These new datasets first have to be approved by the FDA, which according to their experiences can take up to one month. In times of pandemic, and especially with new viruses, there are initially few available datasets of symptoms, X-rays, etc. It is therefore crucial that regulatory frameworks support emerging AI tools and applications with more agile approval processes, allowing algorithms to retrain data in time to respond to the pandemic.

Another burden highlighted by several initiatives is the lack of a global health data governance framework, especially applied for medical devices developed during public health crises. Most initiatives are confronted with different data privacy regulations around the world, and it is not always clear what level of data pseudonymization is sufficient to be compliant across jurisdictions. If organizations wish to deploy their AI solution, they must first investigate the cost-benefit of scaling up without losing too much time and/or resources to meet the different data protection requirements. Health practitioners also expressed the concern that there was a lack of guidance or evaluation criteria for health institute procurement/commission bodies to evaluate technologies that utilize AI. CT scans initiatives, based in Europe particularly, shared

the concern of not being able to compete with countries with less strict privacy policies, such as China. These ethical and legal challenges are also related to cultural ones: countries across the globe have different levels of conservatism when it comes to healthcare technologies. This is reflected by different privacy and data protection policies, but also adoption rates. In Germany for example, there is a certain reluctance to upload chest X-rays to cloud-databases, despite their usefulness for AI-enhanced CT scanning.

5.2.2. Access to reliable data

Across all three clinical, molecular and societal domains, reviewed initiatives face the common hurdle of accessing reliable datasets. In the context of COVID-19, available datasets are often characterized as insufficient, incomplete, context-dependent and quickly evolving. In particular, initiatives building AI-enhanced CT scans, computational protein prediction models, and epidemiological forecasting are limited by insufficient datasets. AI-powered CT scanning tools tend to be very US- and Europe-centric, with limited chest X-rays from patients across different geographies. This may create diagnosis bias if these tools are too quickly deployed around the world. Likewise, the AI system **AlphaFold** developed by DeepMind primarily trains data from the Protein Data Bank (PDB), which currently contains few data for proteins associated with SARS-CoV-2. In the epidemiological domain, the platform **BlueDot** was among the first to identify the emerging COVID-19 risk from Hubei province and notify its users. However, its main source of data is web and news article scraping, which may be challenged by ongoing COVID-19 related disinformation campaigns.

Reviewed initiatives also have limited access to clinical expertise to supervise the development of their models. This is partly due to the increasing pressure posed on front-line healthcare workers. Several AI-enhanced CT scan initiatives would benefit from further cooperation and iterative processes with clinicians. Likewise, biological research and drug discovery initiatives expressed the need for more feedback loops between computer scientists, biologists, virologists, industry R&D experts, among other domain experts. In general, creating conference forums and digital resources that allow interaction between different stakeholders could be extremely valuable, for instance more interaction between domain experts would enable molecular-related initiatives to know on which proteins to focus their research efforts, and to revise their prediction models based on the feedback received.

5.2.3. Lack of public adoption and credibility

Adoption of AI tools, applications and platforms in the healthcare sector has been a longstanding challenge. The current pandemic heightened public concern and scrutiny around the use and collection of sensitive healthcare data. Several promising initiatives were impacted by such preoccupations, such as **COVI**, the digital contact tracing application launched by Mila and Covi Canada to notify people exposed and potentially exposed to COVID-19. In contrast to

most digital contact tracing applications, COVI relies on Machine Learning (ML) for the probabilistic risk assessment of individuals based on symptoms and past interactions. COVI provides users with a granular understanding of their real-time risk of contracting the virus, empowering them to monitor and protect themselves to limit the virus' spread. COVI's epidemiological simulator also offers a "heatmap" of symptoms to guide citizens and public health authorities' crisis response.

Given its objectives and ML model, the app collects more sensitive data than most traditional contact tracing apps. This resulted in lower public acceptance and adoption of the app. Another relevant example is **Quick Diagnosis of COVID-19 Using Medical Image**, a CT scanning tool developed in Mexico by the National Institute of Astrophysics, Optics and Electronics. It is one of the few AI and Pandemic Response initiatives identified from Latin America. The initiatives' founders were confronted with the lack of practitioners' digital and AI literacy, and were unable to convince local hospitals that their tool would alleviate clinicians' workload.

5.3. Recommendations:

The recommendations that follow aim to resolve initiatives' common challenges by leveraging the expertise and resources of GPAI and the AI and Pandemic Response Subgroup. It should be noted that each recommendation is beneficial within a different time horizon, due to the duration of time it would take to implement (keeping in mind logistical and political challenges that may be incurred) and the length of time that the recommendation provides a benefit. For example, Recommendation 1: Co-shape a Global Health Data Governance Framework, would be tremendously beneficial for overcoming ethical and legal barriers faced by initiatives in the long term, but may take months or years to fully implement. Thus, as the Subgroup considers implementing these recommendations, it should also consider methods in which it could aid more immediate pandemic relief by providing direct support to initiatives that demonstrated responsible AI stewardship and a promising outlook to provide pandemic relief.

5.3.1. Recommendation 1: Co-shape a Global Health Data Governance Framework to help overcome ethical and legal barriers (in collaboration with the Data Governance Working Group)

To facilitate the development of tools that utilize AI and medical data for drug discovery and clinical treatment, GPAI is well-positioned to facilitate the development of a Global Health Data Governance Framework. In particular, GPAI's Data Governance Working Group and the AI and Pandemic Response Subgroup have the expertise, credibility and legitimacy to steer such conversation. Working with the OECD AI Policy Observatory and multilateral institutions focused on health, such as the World Health Organization (WHO), the World Medical Association (WMA), and the International Medical Health Organization (IMHO), GPAI could drive guidance for innovators, on how they ought to anonymize data and adhere to privacy regulations, and for

regulators, on how they could fast-track the development of tools that utilize AI, especially in time-critical development cycles.

A Global Health Data Governance Framework would enable innovators to develop tools in an accelerated and sufficiently responsible manner and support regulators in holding innovators accountable for handling data responsibly. It would also support public health institutions as they evaluate and commission the tools available to them. This would be particularly beneficial in regions where there is insufficient regulatory infrastructure.

In close collaboration with the relevant partners mentioned above, GPAI could co-shape a Global Health Data Governance Framework in two steps. First, by leveraging existing work helping initiatives' address their immediate needs, such as the OECD's Recommendation concerning Access to Research Data from Public Funding and Recommendation on Health Data Governance, the European Commission's Recommendation on Access to and Preservation of Scientific Information, and UNESCO's upcoming Recommendation on Open Science. Second, GPAI could build on these efforts to address some challenges that appeared during the pandemic, especially regarding data qualification, data aggregation, and monitoring and evaluation tools. It is necessary for the academic and scientific community to learn from the lessons of the "Lancet-gate", and for a Global Health Governance Framework to pay particular attention to data collection, management, and qualification. The development of monitoring and evaluation tools, such as algorithmic impact assessments and audits, institutional review boards, independent ethics committees and procurement guidelines could help initiatives gain credibility and public adoption.

5.3.2. Recommendation 2: Support a central portal to fast track cross-sectoral and interdisciplinary research

Over the course of the COVID-19 pandemic, numerous groups have developed portals to aid research, hosting catalogues and repositories to authoritative resources, data lakes, and models. Though many such portals exist, a common comment from interviews with project leads is that there is still no single entry point to pandemic related information. GPAI has the authoritative standing and expertise to support an AI and Pandemic Response Portal, which could be developed with key stakeholders, such as those mentioned above to co-shape a Global Health Data Governance Framework—the WHO, the WMA, the IMHO and the OECD AI Policy Observatory. It may also wish to build on relevant sources such as the OECD's Open Science Initiatives related to the COVID-19 pandemic**,** which was developed in collaboration with CODATA and the European Commission's Research and Innovation Directorate, among others. The Portal's goal would be to centralize all resources related to the pandemic, while leveraging and synergizing with existing efforts.

The Portal could include one or several of the following pillars, which reflect needs identified via our analysis of shortlisted initiatives and interviews with project leads: (1) Catalogue of existing portals with curated COVID-19 related literature review such as **CORD-19**, **LitCovid**, **Rapid**

Reviews: COVID; (2) A catalogue of existing databases across clinical, biological and societal domains; (3) Access to relevant AI models, including NLP tools to screen and filter information, and softwares to annotate datasets; (4) A catalogue of most promising initiatives and associated domain experts (which could derive from the AI and Pandemic Response Catalogue) to encourage cross-sectoral collaboration and a well-balanced feedback loop between computational scientists, virologists, biologists but also policymakers and business leaders; (5) A catalogue of available funding and grant applications, to enable smaller but promising actors to develop their research and products; (6) A forum interface to allow experts and entrepreneurs from different domains to explain, discuss and diffuse their findings and initiatives.

Such Portal would be a dedicated space for the responsible development of AI tools for pandemic response, with information supported by organizations with authoritative and legitimate academic, policy, public health, and industry expertise. The Portal would also be particularly beneficial for communities with less robust public health, technological, and information infrastructures, as it would lower the barrier to accurate, authoritative information, data, and models.

5.3.3. Recommendation 3: Address current gaps such as social acceptability of AI initiatives and drug treatments

Social acceptability can be loosely defined as the degree of endorsement by public opinion. In the context of the pandemic, social acceptability is imperative for the public and medical adoption of AI tools and applications, and for widespread adoption of drug treatments such as vaccines, which can significantly contribute to limiting the spread of the pandemic and avoiding heavy lockdown restrictions.

At the time of this publication, laboratories recently released encouraging test results of COVID-19 vaccines, achieving over 90% effectiveness in mid-stage trials, and medical experts suggest vaccinations could begin by the end of the year. However, we can expect there to be a degree of pushback from the long-standing and growing vaccine hesitancy amongst the adult population. In 2019, the World Health Organization (WHO) named vaccine hesitancy as one of the ten leading threats to global health, citing complacency, inconvenience in access, and a lack of confidence as the driving factors. In the context of COVID-19, long-standing vaccine hesitancy is heightened by the virulent disinformation campaigns surrounding the pandemic's origin and transmission channels. Our mapping of AI initiatives to respond to pandemics highlights a gap concerning the social acceptability and public adoption of vaccines. The AI and Pandemic Response Subgroup could address this gap by encouraging two sets of AI initiatives. First, it could encourage the development of anti-vaccine sentiment analysis tools to monitor and understand populations' evolving perceptions towards COVID-19 vaccination. To achieve this, AI initiatives could rely on NLP for web scraping as well as other computer vision tools. Second, the sub working group could encourage further initiatives to detect fake news on social media regarding vaccines efficiency and public health authorities' statements. In this regard, SimSearchNet, a tool developed by Facebook to filter misleading information, could be a helpful model to diffuse and/or replicate.

Similarly, the AI and Pandemic Response Subgroup could encourage further social acceptability of AI tools and applications such as contact tracing applications. Public hesitancy has emerged over their purpose, performance, impacts on privacy, data protection, human agency, and risks of stigmatization. Many of these emanate from mistrust in public authorities or technology firms, and fear of establishing mass surveillance. Disinformation and lack of pedagogy have in some cases polarized the public debate, even when applications presented sufficient technical and privacy safeguards. GPAI could contribute to these applications' adoption by raising public awareness and pedagogy over the applications technical settings and data governance framework.

5.3.4. Recommendation 4: Set up Task Force(s) for immediate challenges

In order to implement all three recommendations mentioned above, the AI and Pandemic Response Subgroup could create a Task Force (or numerous Task Forces), collaborating with members of the Data Governance, Future of Work, and Innovation and Commercialization working groups. COVID-19 is affecting all sectors and segments of society, and as such, mitigating the current pandemic is therefore an imminent challenge which transverses all of GPAI's working groups. A Task Force with about 3-4 members from each working group would allow for further alignment, synergy and impact. Depending on the recommendations' prioritization and members' availability and desired engagement, there could be one or several AI and Pandemic Response Task Forces - for example, one Taskforce to implement each recommendation in a timely and incremental approach.

6. Appendix

6.1. Catalogue:

The catalogue can be accessed here (must be granted access to view): https://docs.google.com/spreadsheets/d/1uW9N1YspZ07DppBnF6i8kP0-E6-NNZHvk7_d4fLv7po/edit?usp=sharing

6.1.1. Catalogue Attributes

For further assessment, specific attributes are assigned to the initiatives based on our research. Note that as the catalogue was a collaborative document, the definition of each attribute is socially constructed and could vary from initiative to initiative.

- **Initiative:** The name to help identify the initiative, whether it is its official name or simply a common way of referring to the initiative.
- **Organization(s):** The group(s) or institution(s) that have launched, produced, developed or undertaken the initiative.
- **Brief description:** A brief summary of the initiative, explaining what the initiative does and what (briefly) what technology, mechanisms or actors it employs.
- **Mission:** A brief summary of what the initiative aims to achieve.
- **Sector:** The sector from which the initiative's lead organization pertains to, such as academia, a non-profit organization, a for-profit organization, civil society, public (non-academic) sector, or international organization.
- **Technology used (if applicable):** An explanation of the AI technologies used in a particular tool or application.
- **Geographical scope:** The country or region that the initiative intends to affect.
- **Target audience:** The group or type of individuals that the initiative intends to affect, such as government, healthcare, academia, or the public. In many cases, initiatives had one or more target groups; initiatives were labeled as such.
- **Stage of development:** The most recent stage (to our knowledge) of development the initiative, such as ideation, in development, deployed/published, on hold, or terminated.
- **Budget (if applicable):** A concrete or approximate measurement of the current amount of funding secured to develop the initiative.
- **Date of origin:** Approximate date at which the initiative was launched. In some cases, for companies whose work is adjacent to public health or government response, organizations had to make only adjustments to their research or workstream. For those that made little or no change to their research or workstream, the date of origin of the company is demarcated. For those that made significant adjustments to their agenda or workstreams, the date of these adjustments are marked.
- **Country/region of origin:** Area from which the initiative has started, regardless of its geographical scope.
- **key enabling factors:** Distinctive characteristics underlying the initiative's success. Examples might include organizational architecture, reputation, innovation, strategic assets, or adaptive strategies.

- **Main hurdles:** Characteristics, internal or external to an initiative, hindering development or scaling-up.
- **Monitoring & evaluation:** Tools that initiatives currently use, or intend to employ (based on their feedback), such as an algorithmic impact assessment, external audit, institutional review board, procurement guidelines or requirements, or peer review.
- **Contact person:** The person or person(s) best to contact to obtain more information about the initiative.
- **Link:** Access to further information on the initiative, whether it is its official webpage or relevant and thorough news coverage.
- **Notes:** Additional comments that the contributors have about the initiative, including additional publications or notable observations.

6.2. Criteria Assessment Framework:

The Criteria Assessment Framework can be viewed here:
https://docs.google.com/document/d/1Rmw0kVyJKEpjBhmfzf6pelYWsxP2RrOPDAp_MXWROtw/

6.3. Overview Shortlisted Initiatives:

The Overview Shortlisted Initiatives can be viewed here:
https://docs.google.com/document/d/1tRy7WNfspzAhuLz-wdmp7itMnv4MejsLF6O1SnTvCdU/edit

6.3.1. Shortlisted initiatives within the biological domain

This section contains the findings acquired of initiatives that fall within the biological domain—Initiatives aiding biological research, drug discovery or drug development.

AI-Enabled Drug Discovery Challenge	
Organization(s)	XPRIZE
Brief description	To address the need to accelerate drug discovery, the XPRIZE Foundation is partnering with IBM to launch the XPRIZE AI for Accelerating Drug Discovery Challenge to develop a collaborative platform that can rapidly evaluate the clinical trial readiness of drug candidates in months, rather than years, and at a fraction of the cost. Unlocking innovations on such urgent timelines can be accomplished only by leveraging the latest technological advances and by adopting frameworks that lower the barriers for sharing expertise. These advances will not only lead to faster COVID-19 treatment discoveries, but also spur collaborative frameworks that can lead to treatment breakthroughs for other conditions.

Sector	Non-profit
Technology used (if applicable)	N/A
Geographical scope	Global
Target audience	Business; academia; public
Stage of development	In development
Budget (if applicable)	US$ 6,000,000
Date of origin	April 2020
Country/region of Origin	United States
Monitoring & Evaluation	Algorithmic impact assessment, External audit, Institutional review board, Procurement guidelines / requirements, Peer-review
Key enabling factors	Initiative provides a credible, well-funded platform to stimulate AI-enabled drug discovery, involving teams from leading research institutes.
Main hurdles	Participants are likely to face some degree of resource challenge; this initiative does not yet offer any tool, and a tool is not a definite outcome.
Relevance	Reputable competition platform with robust challenge structure and high incentives for competitors; competition aims to create tools that will not only be helpful in COVID-19, but in identifying future drug therapies.
Availability, Adoption & Feasibility	Competition format already designed and published on site, with IBM as a partner and several tens of research teams formed.
Potential for Current and Future Pandemics	Deep generative models, such as variational autoencoders and generative adversarial networks, are considered promising for computational creation of novel molecules due to their state-of-the-art results in virtual synthesis of images, text, speech, and image captions.
Diversity & Inclusiveness	Large prize intended to stimulate participation from a global contingency; organizers also able to provide some funds to resource-strapped participants for 6 months; currently seeking partners to help source capital/resources for molecule production.
Credibility	XPRIZE and IBM are credible, well-funded, and expertise-rich organizations; combined purse prize and operation budgets are $6 million.
Interoperability	Not possible to assess without AI tools developed; goal is to develop a robust, trusted, scalable, and re-purposable community-based platform for discovery acceleration.
Potential for GPAI to make a significant difference to the initiative	The organization based in the US, and the majority of participating teams are likely to be reputable, well-funded research institutions, but the initiative is also trying to foster participation from a diverse field of teams. More visibility would help in this regard.

AlphaFold	
Organization(s)	DeepMind
Brief description	Using the latest version of its AlphaFold deep learning system, DeepMind shared predicted structures for several under-studied proteins associated with SARS-CoV-2. The predictions were intended to contribute to the scientific community's interrogation of how the virus functions, and serve as a hypothesis generation platform for future experimental work in developing therapeutics.
Sector	For-profit
Technology used (if applicable)	Deep learning system
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020
Country/region of Origin	United Kingdom
Monitoring & Evaluation	Not specified
Key enabling factors	AlphaFold builds on decades of prior research using large genomic datasets to predict protein structure.
Main hurdles	Feedback loop between computational/structural scientists/biologists and other biologists (virologists/subject matter experts). For COVID, the team received feedback from virologists at the Francis Crick Institute, and it would be beneficial if there was a more robust interface between them and virologists/domain experts. It would also be beneficial if there were other reliable sources of data in addition to the Protein Data Bank (PDB).
Relevance	State of the art protein structure prediction, which could assist in future pandemic response efforts and accelerate understanding of disease.
Availability, Adoption & Feasibility	Predictions of six SARS-CoV-2 protein structures were published; rate-limiting factor is the limited networking capacity with virologists and domain experts.
Potential for Current and Future Pandemics	Has been useful to identify proteins during this pandemic; may provide more utility in future pandemics/public health crises.
Diversity & Inclusiveness	Team based in the UK. The structure predictions of the proteins associated with COVID-19 were published and shared publicly. Not clear whether these methods would benefit disadvantaged regions disproportionately.

Credibility	DeepMind is a very reputable AI/ML organization, likewise are biologists/virologists at the Francis Crick Institute.
Interoperability	The training data for experimentally determined protein structures and their associated sequences are primarily from the Protein Data Bank (PDB). Protein structures are contributed by researchers from around the world and are made available under a very permissive license as a freely and publicly available resource. Additional inputs are evolutionary related sequences (e.g. from a similar species), which can be found in databases such as UniProt using tools such as hhblits. The model also uses similar protein structures from the PDB as templates. Findings are published as files readable by PDB.
Potential for GPAI to make a significant difference to the initiative	Would benefit from more structured community interfaces for cross-sectoral and interdisciplinary collaboration: 1) To know where to focus energy/which prediction models to build for proteins; 2) To have feedback on prediction models and how to make their work more effective.

BenevolentAI Knowledge Graph pipeline	
Organization(s)	BenevolentAI
Brief description	BenevolentAI's knowledge pipeline pulls data from various structured and unstructured biomedical data sources and curates and standardized this knowledge via a data fabric. A proprietary knowledge graph, which extracts and contextualises the relevant information and is made up of a vast number of machine curated relationships between diseases, genes, drugs. Machine learning models also assist with novel target identification, identifying patient-specific treatments, and evaluate molecular structures. With respect to COVID-19, they identified an approved drug that could potentially inhibit the viral progression and the body's inflammatory response to the novel coronavirus.
Sector	For-profit
Technology used (if applicable)	AI-based natural language processing algorithms
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	2015
Country/region of Origin	United Kingdom; United States
Monitoring & Evaluation	Algorithmic impact assessment
Key enabling factors	Access to a wide-body of high quality scientific literature, in-house proprietary algorithms and expertise.

Main hurdles	The inherent complexity of biology, and the challenge of mapping it into a coherent, machine-readable and usable format.
Relevance	Knowledge graph capable of predicting drugs that may inhibit COVID-19 infection in human cells. Easy to port for other/future diseases.
Availability, Adoption & Feasibility	Tool already deployed and demonstrating promising results. For example, they identified baricitinib as a potential treatment to inhibit viral infection, validated by randomized control trial.
Potential for Current and Future Pandemics	The tool uncovered potential antiviral activity in an approved rheumatoid arthritis drug, baricitinib, which had not been previously explored. The knowledge graph is an evolving unified database of the latest curated data, enhanced by machine-reading of the most significant literature in the biomedical domain. The focus on disease mechanisms and fundamental biology positions us such that future pandemics can be investigated, by targeting their underlying process, even in the absence of specifics around novel diseases.
Diversity & Inclusiveness	The team based in the UK; methods such as these may benefit marginalized groups or countries, as they are likely to identify drugs that could be repurposed, rather than propose new therapies.
Credibility	Leadership includes executives with robust educational backgrounds from leading research universities and prior experience in medical/pharmaceutical industries.
Interoperability	Tool is a part of BenevolentAI's drug-discovery platform; access seems restricted to research team and collaborators; The knowledge graph can be readily supplemented with additional data, with additional tools in place allowing users to add or expand upon concepts in the graph, and to extract further high quality relations from the literature.
Potential for GPAI to make a significant difference to the initiative	Team expressed willingness to collaborate with AllenAI/SciSight, OntoForce & Disqover COVID19, and Google/COVID19 literature explorer

Causaly	
Organization(s)	Causaly

Brief description	Causaly uses artificial intelligence to rapidly read, understand and interpret vast databases of biomedical knowledge. Our platform surfaces evidence from 30 million biomedical publications in seconds, enabling researchers to rapidly map epidemiology data, biomarker genes, molecular targets and identify potential treatment options. Causaly has been actively optimising its technology for the current pandemic, working alongside industry, government and academia. UCL has been actively working on a number of Covid-19 related research projects, including the development and delivery of a low-cost breathing aid, trials of a potential antiviral and rapid genome sequencing to better understand the spread of the disease. Following an agreement with UCL Innovation & Enterprise, several researchers and groups within UCL, researchers and groups within UCL are now using Causaly to work on COVID-19 projects ranging from the development of therapeutics and diagnostic approaches, to epidemiological models, mental health-focused strategies and healthcare system logistics.
Sector	For-profit
Technology used (if applicable)	Natural language processing
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020
Country/region of Origin	United Kingdom and Greece
Monitoring & Evaluation	We are designing tools to track the use of our application by the academic community (e.g. number of users, number of queries per unit time). We have implemented user feedback tools which can be used by academic users or internal inference scientists. For example, one tool in our Study Explorer allows a user to flag cell type annotations as likely correct, likely incorrect, or uncertain. Such "flags" are then addressed by inference scientists to ensure optimal data quality.
Key enabling factors	Pre-existing database of over 100 million drug interactions; close partnerships with UCL, government entities, among others.
Main hurdles	Cannot provide the entire biomedical dataset, because it is used to develop commercial products; unclear what monitoring and evaluation exists.
Relevance	Enables the rapid identification of all previously reported drugs for the betacoronavirus genus and also uncovers relationships that would not be obvious by traditional literature review search; allows users to find biomarker genes and potential molecular targets of a disease. Has a partnership with University College London and is working with other industry and government partners.

Availability, Adoption & Feasibility	Tool already deployed; has a partnership with University College London and is working with other industry and government partners.
Potential for Current and Future Pandemics	NLP methods for entity and relationship extraction have shown promising results during COVID-19 and are likely to be more valuable and feasible tools for target/drug identification as the technology progresses.
Diversity & Inclusiveness	Based in the UK; similar to other NLP approaches, provides opportunities to repurpose existing drugs, which is more feasible, strictly in terms of inclusivity, than manufacturing new drugs.
Credibility	Cofounders are computer science and intelligent systems experts; has established partnerships with Copyright Clearance Center, EBRD Venture Capital Investment Programme, Marathon Venture Capital, and Pentech.
Interoperability	Seems to be continually be trained with corpus of scientific literature; seems accessible via website interface or downloadable app.
Potential for GPAI to make a significant difference to the initiative	Providing recommendations on how to increase visibility of their open-access tool.

CORD-19	
Organization(s)	Semantic Scholar team, Allen Institute for AI; Chan Zuckerberg Initiative; The White House of the United States; bioRxiv; medRxiv; Center for Security and Emerging Technology; Microsoft; Amazon AWS; Kaggle; National Institutes of Health; IBM
Brief description	A large dataset containing all COVID-19 and coronavirus-related research (e.g. SARS, MERS, etc.) from the following sources: PubMed's PMC open access corpus; Additional COVID-19 research articles from a corpus maintained by the WHO; bioRxiv and medRxiv pre-prints using the same query as PMC (COVID-19 and coronavirus research). They also provide a comprehensive metadata file of more than 50,000 coronavirus and COVID-19 research articles with links to PubMed, Microsoft Academic and the WHO COVID-19 database of publications (includes articles without open access full text). The corpus is updated regularly as new research is published in peer-reviewed publications and archival services like bioRxiv, medRxiv, and others.
Sector	Non-profit
Technology used (if applicable)	Natural language processing
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published

Budget (if applicable)	Not specified
Date of origin	March 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	Urgent need for the research community to learn more about coronavirus disease. Preprint servers faced the challenge of providing easy access to huge volumes of research that had not yet been peer-reviewed while minimizing potential misinformation. NLP tools can help filtering most promising articles and/or tools and screening potential misinformation. Entire corpus of coronavirus, going back to the 1960s and 1970s, is available via CORD-19. Cross sectoral partnerships with relevant stakeholders.
Main hurdles	Screening all potential misinformation, and signaling articles not peer-reviewed yet to the readers. Cross-regional collaboration, and non-Western authors?
Relevance	A large, and growing, dataset of COVID-19 scientific papers and historical literature. Useful for building AI tools for coronavirus research; would need to be reoriented for viruses/diseases of different families of virus/bacteria.
Availability, Adoption & Feasibility	Tool already deployed and widely used within research communities. Research available to scientists who wanted to analyze the entire universe of coronavirus-related research. When CORD-19 started in March, it contained 29,000 papers. It now has more than 280,000.
Potential for Current and Future Pandemics	Strong potential. In terms of content, the entire universe of coronavirus-related research is available. In terms of process, urgency and information flows spanning from pandemics/new diseases, will make the research community increasingly rely on NLP tools to analyze and screen content.
Diversity & Inclusiveness	Tool is open source and built by several organizations spanning from different sectors (public policy, academic, tech). Most collaborators appear to be from the US though.
Credibility	Papers listed in reknowned platforms such as arXiv, bioRxiv and medRxiv. CORD-19 now contains more than 280,000 papers, from 29,000 in March.
Interoperability	Signs of cross-sectoral collaboration between US government, public health authorities, scientific research community and tech companies.
Potential for GPAI to make a significant difference to the initiative	Potential to raise awareness globally and lead to further scientific contributions.

COVID-19 Cognitive City	
Organization(s)	Exaptive; Bill & Melinda Gates Foundation

Brief description	The COVID-19 City is open to the public and designed to grow through user contributions. Exaptive and its partners believe that innovation is not the work of lone geniuses but of connected collaborative networks. As new COVID-19 knowledge assets are being released daily, the COVID-19 City acts as a single place to catalog the growing body of knowledge about the disease. With the help of interactive visualizations and network algorithms, the COVID-19 City connects interdisciplinary teams that might not normally work together and helps them find non-obvious resources that might otherwise escape their searches.
Sector	For-profit
Technology used (if applicable)	Machine learning
Geographical scope	Global
Target audience	Academia; healthcare; public
Stage of development	Deployed/Published
Budget (if applicable)	Not specified; supported by Bill & Melinda Gates Foundation
Date of origin	March 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	Large community of contributors. Using network analytics to drive research collaborations. Prestigious partnership with the Bill and Melinda Gates Foundation. Over 1900 members.
Main hurdles	Goal of the platform is being used as a single place to catalog the tools, datasets, and articles being generated by the global community about coronavirus - but several platforms aim to do the same. Might overlap/create potential confusion. Unclear if the platform is still active.
Relevance	Platform serves as a problem-solving clearing house—a social network for researchers to find experts, share ideas, and share datasets. Hosted a virtual conference in late September on the data and tools used in response to COVID-19 pandemic, as well as topics on data visualization and responsible publication, among others. High potential to connect researchers in the AI/ML fields, but does not seem that it was used much towards that end.
Availability, Adoption & Feasibility	Platform developers made several clever tools to visualize talent pools and ongoing projects—high potential for future collective action problems. Has over 1,900 registered users from around the world, including many in China, Brazil, and India, but seems to no longer be active.
Potential for Current and Future Pandemics	Centralized platform to catalogue all revent tools, data and articles always relevant to advance current and future pandemics. Use of network algorithms to facilitate interdisciplinary collaboration is an asset.

Diversity & Inclusiveness	Platform is open source and includes tools, articles and data from different parts of the world (including China and India)
Credibility	Prestigious partnership with the Bill and Melinda Gates Foundation. Since platform launch though, other platforms have collected more contributions in terms of users, articles, tools and datasets listed.
Interoperability	N/A
Potential for GPAI to make a significant difference to the initiative	Potential for GPAI to synergize existing catalogues of COVID-19 scientific literature, leveraging technological tools (eg. here network algorithms) and valuable partnerships (eg. here Bill and Melinda Gates Foundation)

IDentif.AI	
Organization(s)	National University of Singapore, DSO National Labs, Singapore, Osmosis, USA, Shanghai Jiao Tong University, PRC
Brief description	Harnesses an AI-based platform to interrogate drug and dose parameter spaces that are insurmountably large for brute-force testing of all possible combinations
Sector	Academia
Technology used (if applicable)	rapid optimisation of combination therapy development; multi-drug interaction regression analysis
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	January 2020
Country/region of Origin	Singapore; United States; China
Monitoring & Evaluation	Algorithmic impact assessment
Key enabling factors	Our teams at WisDM and N.1 include experts in AI/digital medicine, infectious diseases, global health security/surveillance, operations research, health economics, behavioural sciences, and beyond. This multidisciplinary team has resulted in the rapid development and deployment of IDentif.AI. In a very short amount of time, IDentif.AI has shown that certain promising drugs must be delivered in combination with other unexpected therapies in order to properly harness unforeseen drug interactions to optimise treatment outcomes. Importantly, this initiative has shown that we need to move beyond the traditional mechanism of action-based drug selection followed by dose finding.
Main hurdles	A unique attribute of IDentif.AI is that the final drug combination ranking lists have shown that certain drugs that are virtually ineffective on their

	own may comprise top-ranked combinations. These outcomes typically occur as the drug mediates unforeseen drug interactions to boost the efficacy of other drugs. This can represent a very different approach from traditional drug development. It can take substantial time to build bridges with teams/prospective collaborators that use traditional methods for drug development.
Relevance	This tool is an AI-based platform to interrogate drug and dose parameter spaces that are insurmountably large for brute-force testing of all possible combinations.
Availability, Adoption & Feasibility	Certainly transferrable for future disease outbreaks and pandemics; the performance is dependant on quantity/quality of existing literature.
Potential for Current and Future Pandemics	IDentif.AI successfully pinpointed an experimentally-backed list of actionable combination therapies against a patient-derived strain of the SARS-CoV-2 live virus (in vitro); IDentif.AI's methodology could easily be transferred to identify therapy combinations in future bacterial/viral outbreaks.
Diversity & Inclusiveness	Research involved those from Singapore, the US, and China; this method may provide some benefit to marginalized groups, as it optimizes combinations of pre-existing, pre-approved drugs, which may already be in supply, rather than identifying drugs that would need to be manufactured.
Credibility	Engages researchers from numerous credible medical/health organizations, including the National University of Singapore, Boston University School of Medicine, and Shanghai Jiao Tong University. Success in identifying experimentally-backed list of actionable combination therapies for COVID-19.
Interoperability	Tools used by research collaborators; unclear if it will be made more widely accessible to the research community. Commitment not to patent therapy combinations identified for COVID-19 treatment.
Potential for GPAI to make a significant difference to the initiative	Assess and make recommendations for how ML (and data governance) are used most effectively and responsibly in drug discovery/drug research. Explore how collaboration could benefit their initiative.

RxRx19	
Organization(s)	Recursion
Brief description	This group has processed and made publicly available numerous large morphological imaging dataset of COVID-19.
Sector	For-profit
Technology used (if applicable)	6-channel fluorescent microscopy; siRNA-mediated gene knockdown
Geographical scope	Global

Target audience	Academia
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified.
Key enabling factors	RxRx19a provides the largest publicly available set of human cellular morphological data to researchers trying to accelerate COVID-19 drug discovery. Use of morphological datasets with specific ML embeddings.
Main hurdles	Unknown.
Relevance	Large morphological datasets with deep learning embeddings are provided for researchers without the instruments or compute to collect this data themselves. Scientific researchers can use the data to further demonstrate how high-content imaging can be used for compound efficacy screening. Results and conclusions drawn from the in vitro experiments and targeted hypothesis-driven research will contribute to the growing body of scientific data in the fight against COVID-19.
Availability, Adoption & Feasibility	Such datasets are very useful for determining morphological effects of viral/bacterial infections. Will be beneficial to keep abreast of discoveries made with their research tool. Would be helpful to clarify what their "deep learning embeddings" are in their datasets.
Potential for Current and Future Pandemics	Large morphological datasets useful to understand the effect of viral/bacterial infections - both for current and future pandemics.
Diversity & Inclusiveness	Datasets are available globally.
Credibility	Largest publicly available set of human cellular morphological data. Composed of 305,520 images and corresponding deep learning embeddings at nearly 450 gigabytes of data.
Interoperability	N/A
Potential for GPAI to make a significant difference to the initiative	Potential for GPAI to give further visibility to the initiative.

6.3.2. Shortlisted initiatives within the clinical domain

This section contains the findings acquired of initiatives that fall within the clinical domain—initiatives that assist clinical research, clinical tool research, in-clinical diagnosis, or in-clinical treatment.

Artificial intelligence–enabled rapid diagnosis of patients with COVID-19

Organization(s)	BioMedical Engineering and Imaging Institute, Icahn School of Medicine at Mount Sinai; Department of Genetics and Genomic Sciences, Icahn School of Medicine at Mount Sinai; Department of Radiology, West China Hospital, Sichuan University; Department of Diagnostic, Molecular and Interventional Radiology, Icahn School of Medicine at Mount Sinai; Department of Radiology, The Second Affiliated Hospital of Zhejiang University; Department of Radiology, The First Affiliated Hospital of Bengbu Medical College; Guangdong Provincial Key Laboratory of Biomedical Imaging, The Fifth Affiliated Hospital of Sun Yet-sen University; Department of Radiology, Nanxishan Hospital; Department of Radiology, The Second People's Hospital; Department of Radiology, Bozhou Bone Trauma Hospital Image Center; Department of Radiology, Remin Hospital of Wuhan University; East River Medical Imaging, New York; Department of Radiology, Weill Cornell Medicine; Department of Oncological Sciences, Icahn School of Medicine at Mount Sinai; Department of Radiology, Massachusetts General Hospital
Brief description	This study used AI algorithms to integrate chest CT findings with clinical symptoms, exposure history and laboratory testing to rapidly diagnose patients who are positive for COVID-19. Among a total of 905 patients tested by real-time RT–PCR assay and next-generation sequencing RT–PCR, 419 (46.3%) tested positive for SARS-CoV-2. In a test set of 279 patients, the AI system achieved an area under the curve of 0.92 and had equal sensitivity as compared to a senior thoracic radiologist. The AI system also improved the detection of patients who were positive for COVID-19 via RT–PCR who presented with normal CT scans, correctly identifying 17 of 25 (68%) patients, whereas radiologists classified all of these patients as COVID-19 negative.
Sector	Academia
Technology used (if applicable)	Convolutional neural network on CT scans and clinical information; support vector machine (SVM); random forest and multilayer perceptron (MLP) classifiers to classify patients
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	February 2020
Country/region of Origin	China
Monitoring & Evaluation	Not specified.
Key enabling factors	Publication shows promising accuracy.
Main hurdles	Unclear whether it will be applied in the clinic
Relevance	Local to 1 hospital in China. Would be helpful in Covid 19 but limited explanation of how this algorithm works, so difficult to postulate whether relevant to future pandemics.

Availability, Adoption & Feasibility	Single centre study of 950 patients. Not clear which imaging programme was used or how integrated into the worklist for clinicians. Not yet mature but has made some headway towards solving the problem.
Potential for Current and Future Pandemics	If works then may be able to use similar methodology for pandemics.
Diversity & Inclusiveness	It is local to China only. Need more information on whether this work has been used clinically and if so, how. Need more information on how this would be used in other systems. i.e. is it compatible with systems like PACs.
Credibility	Not peer reviewed.
Interoperability	No information on this at present.
Potential for GPAI to make a significant difference to the initiative	Has proven proof of concept. Is being developed in China. Would benefit from working with an international team.

COVID Symptom Study	
Organization(s)	ZOE
Brief description	The COVID Symptom Study app has been developed by health science company ZOE. It is endorsed by the Welsh Government, NHS Wales, the Scottish Government & NHS Scotland. Data collected is shared with and analyzed by King's College London & ZOE research teams. Over 4 million people have downloaded the app and are using it to regularly report on their health, making it the largest public science project of its kind anywhere in the world.
Sector	For-profit
Technology used (if applicable)	Software algorithms
Geographical scope	United Kingdom
Target audience	Government; academia; healthcare; public
Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	March 2020
Country/region of Origin	United States
Monitoring & Evaluation	Data protected under GDPR
Key enabling factors	A tool that piggybacked on a popular weight-loss app in England, to track users symptoms and enable research based on large anonymized datasets of symptoms. Given the lack of evidence and emerging scientific literature about coronavirus, access to such symptom databases is very valuable for the research community. Can also allow for epidemiological modelling of where the virus is most likely to spread.

	App is currently used by 4 million people, making it one of the largest open public health science projects to this date. Relevant cross-sectoral partnerships between academia, tech company Zoe, public health and public policy authorities, and research community.
Main hurdles	Lack of information on the technology used (other than "software algorithm") and app's ability to evaluate spread of the virus. Even if the app is not for profit, adoption rates can be low because of sensitivity of health data and fear of being discriminated against for having COVID-19.
Relevance	Given the lack of evidence and emerging scientific literature about coronavirus diseases, a database with user/patient symptoms can be extremely useful to better understand and track the spread of COVID-19.
Availability, Adoption & Feasibility	Over 4 million people currently use the app. Originated in England but growth is spreading — now used in Wales and Scotland. Many government/academia partnerships have made it a functional tool in the UK; not clear if a plan exists to expand the research out of that region.
Potential for Current and Future Pandemics	App creators hope to be able to use the tool in the future to help the NHS support sick individuals. Concerning future pandemics, novel diseases and unprecedented symptoms will always benefit from a large symptom database. App being currently used by 4 million people, who could potentially continue using the app and reporting their symptoms in case of other pandemics.
Diversity & Inclusiveness	Relevant cross-sectoral collaboration between academia, tech company, and public health and public policy authorities. App is currently only available in England and Wales.
Credibility	Renowned partners from the academic field (King's College, Harvard, MIT, Berkeley, Tufts, etc.) and leading public health authority in the UK (NHS). Lack of info on the technology used (other than mention of "software algorithm").
Interoperability	N/A
Potential for GPAI to make a significant difference to the initiative	Potential to expand the app beyond the UK. COVID-19 symptom database would benefit from global users' updates.

CT Pneumonia Analysis	
Organization(s)	Siemens Healthineers; Hôpital Foch, Northwell Health, New York, NY; University Hospital Basel, Clinic of Radiology & Nuclear Medicine, Basel, Switzerland; Vancouver General Hospital, Vancouver, Canada; Clínica Universidad de Navarra, Navarra, Spain; Health Time, Jaén, Spain; Houston Methodist, Texas, USA; and multiple other frontline hospitals

Brief description	Algorithm designed to automatically identify and quantify abnormal tomographic patterns in the lungs from chest CT for research purposes.
Sector	For-profit
Technology used (if applicable)	"With our unique AI research and development team in Princeton, NJ, USA our software development center in Bangalore, India, our CT product experts in Forchheim, Germany, our customer collaboration partners in Paris, France and the power of our Sherlock supercomputer, we were able to enhance our AI portfolio one step further with an algorithm dedicated to CT imaging. We are stepping up as a partner to support healthcare systems delivering high-value care to patients and families by developing an AI algorithm for CT pneumonia analysis."
Geographical scope	Global
Target audience	Healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	July 2020
Country/region of Origin	Germany
Monitoring & Evaluation	Not specified
Key enabling factors	Collaboration with Siemens, so have access to funding, promotion and a team that specialises in developing and deploying technology. Siemens provides many imaging devices so compatibility with their hardware and software is a strong advantage.
Main hurdles	At the time of the assessment, there seemed to only be a small dataset, so accuracy is difficult to assess. However, this may be an old piece of research and more images have likely been acquired since.
Relevance	AI-powered analysis of radiological images has the potential to increase diagnosis rates and take burden off of radiologists. Work is very specific to COVID-19. But can probably be used in other respiratory-disease pandemics. Has produced cloud-accessible algorithms to make it accessible to different institutions. Need more information on accuracy and peer review process.
Availability, Adoption & Feasibility	Relevant to Covid 19. Needs to develop algorithms to widen scope. No information on if this is being done specifically. There is a research scheme, more information needed on what this is.
Potential for Current and Future Pandemics	Work is very specific to Covid 19. But can probably be used in other pandemics. Has produced cloud-accessible algorithms to make it accessible to different institutions. Need more information on accuracy and peer review process.
Diversity & Inclusiveness	Local to America and Germany but as cloud based this may not be a significant limitation.

Credibility	Collaboration with Siemens, Princeton. Need to know if their algorithms have been peer reviewed and whether they perform better than clinicians
Interoperability	DICOM and cloud based, so interoperability would be high. However, no technology developed which would be used across different sectors.
Potential for GPAI to make a significant difference to the initiative	Could work with other CT focussed initiatives to expand the dataset. However, is a for profit organization.

Developing a Covid-19 Diagnostic Tool for Sub-Saharan Africa	
Organization(s)	Cambridge Infectious Diseases
Brief description	Researchers at the University of Cambridge are working across disciplines to help health officials in remote and resource-limited settings to rapidly and confidently distinguish between potential outbreaks of COVID-19, and endemic respiratory diseases, based only on clinical and demographic data.
Sector	Academia
Technology used (if applicable)	Bayesian algorithm for aetiological identification of outbreaks based on case clinical features
Geographical scope	Sub-saharan Africa
Target audience	Government; healthcare
Stage of development	In development
Budget (if applicable)	Fundraising ongoing; £60K funding secured of approx. £215K needed (for full development and on-the-ground field-testing with partner research institutions in Ghana, Kenya and Uganda
Date of origin	May 2020
Country/region of Origin	United Kingdom
Monitoring & Evaluation	Not specified
key enabling factors	Funding for tool development and field-testing; database development; partners with local knowledge and expertise
Main hurdles	The main innovation is not clear; nor is it clear how data-dependent it is. It is using a Bayesian approach, but it is not clear how to evaluate this result in the timeframe and to demonstrate to others that the results are superior to traditional methods.
Relevance	A Bayesian algorithm to make aetiological assessments in resource-poor settings; could be very useful in less-developed regions.
Availability, Adoption & Feasibility	Adoption would depend on performance and visibility; these sorts of tools very transferrable to future disease outbreaks or pandemics.
Potential for Current and Future Pandemics	It could apply to future pandemics—especially the bayesian approach—and its emphasis on Sub-Saharan Africa.

Diversity & Inclusiveness	Includes Sub-Saharan region and Cambridge University along with the Gates Foundation.
Credibility	Cambridge and Gates Foundation are credible associations. However, is in the process of acquiring funding.
Interoperability	Deployed in one domain, and has the ability to retrain the AI solution with new data.
Potential for GPAI to make a significant difference to the initiative	GPAI could help to internationalise to beyond the Sub-Saharan Africa region.

icolung	
Organization(s)	icometrix; KU Leuven and UZ Leuven; King's College London; Vrije Universiteit Brussel and UZ Brussel; Universitätsklinikum Heidelberg; Centre Hospitalier Universitaire de Liège, Universite de Liege; University of Oxford; Maastricht University; The Medical Cloud Company
Brief description	A cloud-based AI software to quantify the degree of lung involvement in COVID-19 patients.
Sector	For-profit
Technology used (if applicable)	Deep learning
Geographical scope	European Union
Target audience	Healthcare
Stage of development	Deployed/Published
Budget (if applicable)	EU€ 3,100,000
Date of origin	March 2020
Country/region of Origin	Belgium
Monitoring & Evaluation	External audit, Institutional review board, Peer-reviewed publication
Key enabling factors	Close collaboration between partners; experience with CE marking and FDA clearance; experience with software as a medical device; expertise with AI and cloud computing in radiology; existing platform to bring the technology to clinical practice. The AI-tool has been offered and installed pro-bono.
Main hurdles	Data privacy regulations are different around the world; reluctance to use cloud application in some countries (eg Germany); conservatism in healthcare when it comes to technology; funding in the initial critical phase (currently offered free-of-charge to help many patients); the project is now being continued with support from the EU. Limited access to clinical expertise to supervise model building and obtain ground truth due to work pressures on front-line clinicians.

Relevance	Manually annotating datasets is very time consuming. DL algorithms trained to annotate images are relevant for other AI applications and future pandemics. DL algorithms can extract relevant parts from less clinically relevant parts. External audit, Institutional review board, Peer-reviewed publication.
Availability, Adoption & Feasibility	Icolung's approach is very iterative - making sure it fits the workflow of radiologists and clinicians. It has already been submitted for FDA clearance and is available in most countries. Examples of countries where Icolung is used: Italy, France, UK, US, Peru, Iran, Japan.
Potential for Current and Future Pandemics	Relevant to Covid 19 and future respiratory pandemics.
Diversity & Inclusiveness	Based in Europe. Pending use in the USA.
Credibility	Peer review mentioned, so assumption that has credibility. Need more information on accuracy and whether it has helped clinicians.
Interoperability	Unable to comment
Potential for GPAI to make a significant difference to the initiative	GPAI could provide data compliance oversight/advice. Could also connect with international partners.

Nference Platform	
Organization(s)	nference
Brief description	Makes unstructured knowledge computable and enables seamless triangulation with various structured databases that are often siloed (such as vitals, lab tests, ICD codes, genomic sequences)
Sector	For-profit
Technology used (if applicable)	NLP + ML crawling through 100s of 1000s of pharmacology related literature in both open source as well as private collections
Geographical scope	Global
Target audience	Business
Stage of development	Deployed/Published
Budget (if applicable)	US$ 60,000,000
Date of origin	January 2020
Country/region of Origin	United States; India; Canada
Monitoring & Evaluation	Algorithmic impact assessment, External audit, Institutional review board, Procurement guidelines / requirements, Peer-review
Key enabling factors	This initiative adds value to nference's capabilities and enriches our current offering. We have taken our collaboration with Janssen to spearhead innovation and benefit the scientific community at large by providing them first-in-class tools to combat the Covid-19 public health crisis.

Main hurdles	The end-to-end automation of single cell study identification, processing, and annotation is the greatest challenge for the Single Cell resource. Efficient study identification involves regular scraping of various resources in the public domain including literature and data repositories. Study processing involves the download of large quantities of data in formats that are compatible with subsequent steps including transcript alignment and index assignment. Study annotation involves accurately labeling each single cell with relevant metadata including its tissue of origin, likely cell type, and "patient-level" characteristics including disease status, age, sex, and other demographics.
Relevance	Relevant collaboration with innovative partners, such as Mayo Clinic, which since COVID-19 started organizing virtual patient visits to continue long term treatments. Examples of relevant Nference research (which is done in collaboration with clinics/practitioners) has shown that prior influenza and measles immunization provides partial protection against COVID-19. Beyond the pandemic, Nference trying to identify new cures for patients with rare diseases.
Availability, Adoption & Feasibility	Open to allowing use of their platform by academic researchers, but getting this access at scale and low cost for a wider research community might be a hurdle for tool availability/adoption.
Potential for Current and Future Pandemics	By enabling researchers to study intricate molecular patterns and investigate the heterogeneity of healthy and pathologic tissues alike, the resource will help scientists to rapidly generate and pressure-test new hypotheses. The resource is envisioned to help researchers respond to the coronavirus outbreak, including decoding molecular signatures of viral infection, human-to-human transmission, and increased mortality risk from underlying health conditions or medication regimen.
Diversity & Inclusiveness	Organization has headquarters in the US (Massachusetts and Minnesota), India (Bangalore), and Canada (Toronto).
Credibility	The team has over 150+ employees who predominantly received their advanced degrees from premier academic institutions such as Massachusetts Institute of Technology (MIT), Harvard College and Harvard Medical School, Nference is viewed by senior executives in the Biopharma industry as having one of the most distinguished scientific and engineering teams. The team has a 50:50 split between technologists (computer science & artificial intelligence engineers, software developers, mathematicians, statisticians) and biomedical scientists (PhD in Biology/Omics, or MD/PhD physician scientists)
Interoperability	The Mayo Clinic partnership provides Nference exclusive access to all clinical data and samples from Mayo Clinic. Using a federated architecture model, the de-identified patient data is maintained in a Cloud platform in Mayo's span of control. Clinical Data Analytics Platform servers operate in that Cloud framework and expose a privacy preserving Application Programming Interface (API) through which Nference servers provide the synthesized information. Researchers access the synthesized information through the nference Cloud

	platform, and thus never directly access any de-identified patient level data.
Potential for GPAI to make a significant difference to the initiative	Recognition would increase awareness, penetration and adoption among researchers / academic medical centers and support the initiative in the fight against COVID-19.

Quick Diagnosis of COVID-19 using Medical Images	
Organization(s)	Instituto Nacional de Astrofísica, Optica y Electronica, MEXICO
Brief description	Quick diagnosis of COVID-19 using medical images, in the form of X-Rays or CT Scans, using Convolutional Neural Networks (CNNs).
Sector	Public
Technology used (if applicable)	Convolutional Neural Networks (CNNs)
Geographical scope	Mexico
Target audience	Healthcare
Stage of development	In development
Budget (if applicable)	Not specified; in need of funding
Date of origin	May 2020
Country/region of Origin	Mexico
Monitoring & Evaluation	Algorithmic impact assessment, External audit
Key enabling factors	This tool is able to use X-rays as well as CT scans. Clinicians upload images to a cloud-database where the algorithm is applied. Offering for free. Useful in primary, secondary and tertiary care. Many facilities will not have access to CT scans.
Main hurdles	Lack of cooperation from clinicians. Need to raise profile and would benefit from international collaboration to expand the dataset. Funding may also be a hurdle.
Relevance	In comparison with PCR, the proposed tool is cheaper, can be performed in minutes, and scales up rapidly, as all hospitals have imaging equipment which can be used for this purpose. However, not using a particularly innovative approach: the system uses a pre-trained convolutional deep network on ImageNet which is fine-tuned for X-rays images. However, the team has expertise in the use of deep learning networks which can be used to produce very competitive results. Relevant also because only one of two initiatives coming from Latin America (user adoption can be connected to where the tool is created).There are not enough expert radiologists in Mexico. The AI Solution on the other hand can be made available to every health center in Mexico and provides a quick and inexpensive diagnosis that can provide additional information to the medical doctors to decide how to handle potential COVID-19 patients.

Availability, Adoption & Feasibility	According to the founders, high level of accuracy for prediction, recall/sensitivity and specificity. The initiative was planned to help Mexico in a proper management of the pandemic, but could be used as well in other countries. Although a large number of images used - their algorithms have mostly been trained on non-COVID pneumonias.
Potential for Current and Future Pandemics	Helpful in a resource-poor environment as it utilizes x-rays as well as CT scans. May also be useful in future respiratory pandemics.
Diversity & Inclusiveness	Based in Mexico and deployed locally. However, health care systems across latin america are similar (although not homogenous). Being cloud based also means that clinicians can access the technology remotely.
Credibility	Appears to work and has been taken up by several hospitals in Mexico
Interoperability	Uses DICOM images for CT scans and also JPEG so relatively large interoperability.
Potential for GPAI to make a significant difference to the initiative	GPAI could help increase the profile of the initiative and thus increase uptake, locally and internationally. They would also benefit from international collaboration which GPAI could suggest/facilitate. As this is a not-for-profit and one of the very few (only?) from Latin America, this would be beneficial to a large region. The use of x-rays/JPEG is important as it makes it accessible to health care facilities that may not be as resource rich, particularly in times of pressure.

qXR	
Organization(s)	qure.ai
Brief description	Monitors progression of infected patients via daily bedside chest x-rays.
Sector	For-profit
Technology used (if applicable)	Deep learning
Geographical scope	Global
Target audience	Healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020
Country/region of Origin	India; United States
Monitoring & Evaluation	Not specified
Key enabling factors	AI powered algorithm to read x-rays. Has application. Provides automated reports which need to be reviewed by a clinician. Focused on clinical use so has developed a product with consideration to clinical workflow, particularly references first responders (i.e. emergency departments or acute medical units where patients will be seen first)

Main hurdles	Data compliance is not clear.
Relevance	Relevant to Covid 19. Focuses on monitoring of disease burden via bedside x ray (daily), pandemic response platform (checking symptom progression and contract tracing)
Availability, Adoption & Feasibility	May be transferable to future pandemics by building contact tracing infrastructure and by developing imaging algorithms
Potential for Current and Future Pandemics	Relevant to Covid 19. Focuses on monitoring of disease burden via bedside x ray (daily), pandemic response platform (checking symptom progression and contract tracing)
Diversity & Inclusiveness	Based in India (one of few). Uses x-ray images like some other initiatives. Has experts from all over the world, including America.
Credibility	Unclear, however, appears to have sophisticated infrastructure based on their website.
Interoperability	X-rays mean available to a larger number of facilities and institutions and to those who can not afford CT scans.
Potential for GPAI to make a significant difference to the initiative	Potential for collaboration with international partners. Privacy and data protection oversight. Look at different platforms to see which methodology works best

RADLogics CT Exams	
Organization(s)	RADLogics; Tel-Aviv University; Affiliated Taizhou Hospital of Wenzhou Medical University; Mount Sinai Hospital; University of Maryland School of Medicine
Brief description	RADLogics has developed its AI-based CT image analysis tools to automatically and accurately detect the COVID-19 / coronavirus in large numbers of CT studies.
Sector	For-profit
Technology used (if applicable)	Deep learning image analysis
Geographical scope	Global
Target audience	Healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	March 2020
Country/region of Origin	United States; Israel
Monitoring & Evaluation	Not specified
Key enabling factors	Is well developed. Has FDA clearance so is clearly deployed
Main hurdles	Privacy. Not clear about how it is used in clinical settings.

Relevance	AI-powered analysis of radiological images has the potential to increase diagnosis rates and take burden off of radiologists. Work is very specific to Covid 19. But can probably be used in other pandemics. Has produced cloud-accessible algorithms to make it accessible to different institutions. Need more information on accuracy and peer review process.
Availability, Adoption & Feasibility	Very sophisticated integration with DICOM and PACs. Very useful integration into workflow for clinical use.
Potential for Current and Future Pandemics	Relevant to Covid 19.
Diversity & Inclusiveness	Used datasets from China but unclear how much of an international collaboration or commitment to work outside of the west. Only 157 patients from China Dataset.
Credibility	Unclear. However, appears to have been deployed in some hospitals already which suggests that they are quite a way along the development process
Interoperability	Use of PACs means probably large interoperability. There is a potential for collaboration with other CT scan initiatives
Potential for GPAI to make a significant difference to the initiative	Potential for collaboration. GPAI could suggest a central dataset for CT scans.

RadVid-19	
Organization(s)	The Radiology Institute of the Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo; Brazilian College of Radiology and Diagnostic Imaging
Brief description	RadVid-19 is an action among Brazilian radiologists supported by CBR to collect confirmed or suspected X-rays and tomography exams of COVID-19. The platform is a repository of COVID cases in Brazil, made by a joint action of Brazilian radiologists and will be open for the application of artificial intelligence to aid clinical decision, with the purpose of making this diagnosis more accurate and, in the case of tomography, automate quantitative data on disease involvement.
Sector	Public
Technology used (if applicable)	Computer vision
Geographical scope	Brazil
Target audience	Healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020

Country/region of Origin	Brazil
Monitoring & Evaluation	Not specified
Key enabling factors	Large uptake inBrazil.10,700 x rays and CT scans Has funding from Inter-American development bank. Uses x rays. Based in Latin America. Possibility of collaboration with Mexico and India? Provides it for free in some institutions.
Main hurdles	Privacy policy unclear. Accuracy unclear.
Relevance	AI-powered analysis of radiological images has the potential to increase diagnosis rates and take the burden off of radiologists. Work is very specific to Covid 19. But can probably be used in other pandemics. Has produced cloud-accessible algorithms to make it accessible to different institutions. Need more information on accuracy and peer review process.
Availability, Adoption & Feasibility	Very sophisticated integration with DICOM and PACs. Very useful integration into workflow for clinical use.
Potential for Current and Future Pandemics	Developing this infrastructure would be beneficial in future pandemics. Useful in this pandemic at times of diagnostic uncertainty
Diversity & Inclusiveness	Based in South America.
Credibility	Unclear, but has been used by several institutions.
Interoperability	unclear
Potential for GPAI to make a significant difference to the initiative	Potential for collaboration and providing data compliance/privacy oversight

Secure Data Exchange and Collaboration Challenge	
Organization(s)	BurstIQ; XPRIZE
Brief description	BurstIQ is offering free platform access for teams participating in the AI-Enabled Rapid Antiviral Design challenge. BurstIQ is a secure data exchange platform that allows teams to build collaboration networks for managing secure and compliant data sharing using granular ownership, consent, and governance.
Sector	For-profit
Technology used (if applicable)	Not specified
Geographical scope	Global
Target audience	Business; academia
Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	Not specified

Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	Sensitive character of health data and lack of clear governance framework are strong barriers to adoption of AI tools and collaboration. Secure data exchange platform can facilitate sharing of sensitive datasets and accelerate COVID-19 related drug discovery. In this case, the platform BurstIQ is available for free for teams participating in XPRIZE's AI-enabled Rapid Antiviral Design Challenge.
Main hurdles	Building trust in the platform and its blockchain protocol to ensure it is being used (overcoming adoption barriers because of the sensitive nature of health data).
Relevance	Data sharing and compliance with existing regulations are significant hurdles to research, test and deploy AI tools in the context of COVID-19. A platform using blockchain to enable researchers to securely share health data and collaborate while maintaining patient privacy, compliance, traceability, immutability, intellectual property ownership can be a huge asset. Both for the present and future pandemics.
Availability, Adoption & Feasibility	The platform BurstIQ is for profit and currently used by over 80 organizations. However, it has been shared for free with the X-Prize challenge, to facilitate entrepreneurs and researchers using sensitive health data for the "AI-Enabled Rapid Antiviral Design challenge".
Potential for Current and Future Pandemics	Ensuring secure and compliant health data sharing relevant for all health crises.
Diversity & Inclusiveness	Platform available globally to all teams participating in AI-enabled Rapid Antiviral Design Challenge.
Credibility	According to its founders, one of the most advanced blockchain platforms, facilitating advanced data exchange.
Interoperability	Platform available globally and allows for secure sharing of different types of data (not just health-related).
Potential for GPAI to make a significant difference to the initiative	Platform can help selected AI tools and applications further enhance their collaboration thanks to secure data exchange.

6.3.3. Shortlisted initiatives within the societal domain

This section contains the findings acquired of initiatives that fall within the societal domain—Initiatives related to infodemiology, epidemiology, or decision-making and operational management.

BlueDot

Organization(s)	BlueDot
Brief description	Delivers tailored outbreak risk awareness in near real-time, a hub for the latest intelligence about COVID-19, focus reports that examine where the pandemic is heading, and a geographic information system combines over 100 datasets to help advanced users quickly perform complex risk assessments.
Sector	For-profit
Technology used (if applicable)	Natural language processing; machine learning
Geographical scope	Global
Target audience	Government; business; healthcare; public
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	2013
Country/region of Origin	Canada
Monitoring & Evaluation	Data governance methodologies.
Key enabling factors	Speed (rapid turn around) and unique data (access to airline data and foreign language news sources). These factors help spot early incidents, as they did for COVID.
Main hurdles	The main source of data is foreign-language news reports, and there may be some countries now where such reports are actively suppressed.
Relevance	Was among the first in the world to identify the emerging risk from COVID-19 in Hubei province and notify clients via their Insights platform. Also published the first scientific paper on COVID-19, accurately predicting eight of the first ten cities to import the novel coronavirus.
Availability, Adoption & Feasibility	Tool already deployed; adoption seems to depend on visibility and pricing models across different sectors.
Potential for Current and Future Pandemics	This tool has proven in previous and current epidemics, and hence is to be considered to have a high potential for future pandemics. Its data sources (public news reports) are also valid for future pandemics.
Diversity & Inclusiveness	Bluedot considers international reports for its data.

CAIAC	
Organization(s)	Stanford HAI, UNESCO, The Future Society, Patrick J McGovern Foundation, Stability.ai
Brief description	CAIAC is a dynamic “sense-making” platform that provides end users with knowledge graphs, intelligent query functionality, and dynamic reports.

Sector	Non-profit
Technology used (if applicable)	Natural language processing, named entity extraction, content filtering & clustering, domain mapping, sentiment analysis, cluster analysis, natural language generation, adaptive recommendation systems, dynamic visualization, semantic search.
Geographical scope	Global
Target audience	Government; business; healthcare; public
Stage of development	In development
Budget (if applicable)	The current phase of CAIAC is kindly supported by Patrick J McGovern Foundation through a grant of the total $350,000 USD. This funding has secured the development of a fully functioning prototype A functioning prototype version of the CAIAC platform for the initial user (The World Health Organization). Specifically, the prototype will ingest, structure, and label data from multiple key sources -- including expert interviews, research papers and other sources -- and present findings through three primary front-end interfaces: (i) Query interface: Free text 'question & answer' functionality; (ii) Knowledge graph visualization that will show questions policy makers would/should ask, entities, properties of those entities and relationships; (iii) Briefings on each of the three use cases. CAIAC is engaging in fundraising discussions with foundations and institutions like the World Bank and IMF to scale the initiative after its current phase. CAIAC funding will be augmented by a range of in-kind provisions from researchers to help map and maintain core knowledge areas to software, cloud and other research resources.
Date of origin	June 2020
Country/region of Origin	United States; United Kingdom
Monitoring & Evaluation	Algorithmic impact assessment, Institutional review board, CAIAC will conduct a comprehensive algorithmic impact assessment, utilizing the OECD Observatory of Public Sector Innovation Algorithmic Impact Assessment (AIA) questionnaire, originally published by the Canadian Government. The questionnaire was developed to reflect the requirements of the Canadian Directive on Automated Decision-Making, but is applicable anywhere that business processes, data, and system design decisions involve automated decision systems, and it is firmly endorsed by the OECD. In addition to the ethics by design processes described in the previous response, CAIAC is also in the process of developing an Ethics Committee, which will be responsible for overseeing, evaluating, and fine-tuning the approaches that the organization takes to monitor and mitigate biases and errors in its

	platform. In the near future, CAIAC also plans to employ an external algorithmic auditing company, after exploring the existing landscape of auditing agencies in this space. To contribute to the quickly-growing need for evaluation and auditing by other organizations that utilize artificial intelligence and machine learning, CAIAC will produce peer-reviewed articles outlining the design and implementation of the automated decision-making platform, weighing the hazards and benefits of such technology, and actions taken by the organization to mitigate risks and optimize outcomes.
Key enabling factors	CAIAC's platform presents comprehensive, authoritative, and up-to-date insights and solutions, empowering decision makers across the globe to take timely and holistic action to mitigate the effects of the COVID-19 pandemic. Setting it apart from other crisis response tools, CAIAC offers: CAIAC is being developed as an open, generalized platform that can be immediately implemented for future pandemics and other large-scale collective action problems.The success of CAIAC thus far lies in its top-down approach, forming alliances across major multilateral organizations, including UNESCO, the WHO, and the World Bank, that share a common interest in developing an authoritative, global response effort. This high-level support will be necessary to design and implement solutions across borders, institutions, and communities. CAIAC's continued success will rest in its ability to scale upwards and branch outwards, by rapidly forming connections with governments and organizations, and in fine-tuning its real-time, information-capturing capabilities in order to provide timely insights for every class of end user. The team is currently institutionalizing processes to streamline coalition building and research acquisition. These processes are being augmented by a variety of artificial intelligence technologies that will further aid the development of CAIAC into an authoritative, comprehensive, up-to-date and ethical platform. These technologies enhance the ability of the human participants in the system to aggregate and absorb knowledge, as well as helping put the necessary checks and balances in place so over time it can move from relying on authority to helping identify new insights.

Main hurdles	Stakeholder commitment and engagement in identifying and 'filling' knowledge gaps: CAIAC is dependent on access to authoritative knowledge from multilateral, academic and governmental experts. Stakeholder alignment: CAIAC execution and implementation is dependent on continued multi-party alignment. Product-market fit: CAIAC will achieve impact as it is adopted by front-line policy makers, multilaterals, healthcare leaders, the scientific community, and other decision-makers. Data bias: CAIAC is dedicated to providing a product that is ethical and humane. To this end, CAIAC is embracing ethics by design, by establishing policies around the collection and storage of data, institutionalizing processes to assess biases in its own platform, and developing a plan to responsibly disclose decisions made with respect to automated decision making.
Relevance	Attempts to build authoritative knowledge graphs and dynamic reports to address issues across COVID-19 lifecycle; system easy to port for future pandemics or public health crises.
Availability, Adoption & Feasibility	Initiative set to have a functional prototype by December; aims to make its tool free for developing markets and create affordable pricing models for developed governments and businesses.
Potential for Current and Future Pandemics	Feasible decision-support tool for current pandemic once prototype is complete; pending on adoption, could be a useful decision-support mechanism for future pandemics and public health crises.
Diversity & Inclusiveness	Core team based in UK/US, but researchers more geographically representative. Prototype planned to have a first use case oriented towards providing targeted aid to marginalized groups.
Credibility	Partnership of machine learning and medical experts from the AI Initiative at The Future Society, stability.ai, and Stanford's Institute for Human-Centered AI (HAI).
Interoperability	Tools to be accessible via an online portal; will adapt to input as research papers and expert interview transcripts are ingested, and include mechanisms to identify and remove "poisoned" data.
Potential for GPAI to make a significant difference to the initiative	Drafting guidance on automated decision-making for decision support systems; visibility and credibility to support tool roll-out.

Composite Monte Carlo decision making under high uncertainty of novel coronavirus epidemic using hybridized deep learning and fuzzy rule induction	
Organization(s)	Department of Computer and Information Science, University of Macau; DACC Laboratory, Zhuhai Institutes of Advanced Technology of the

	Chinese Academy of Sciences; Department of Information Technology, Techno India College of Technology; Universidad Internacional de La Rioja; University of Granada
Brief description	In this paper, a case study of using CMC that is enhanced by deep learning network and fuzzy rule induction for gaining better stochastic insights about the epidemic development is experimented. Instead of applying simplistic and uniform assumptions for a MC which is a common practice, a deep learning-based CMC is used in conjunction of fuzzy rule induction techniques.
Sector	Academia
Technology used (if applicable)	Composite Monte-Carlo (CMC) simulation
Geographical scope	Global
Target audience	Academia
Stage of development	Deployed/Published
Budget (if applicable)	Financial support for this work was funded by the following research grants: (1) Nature-Inspired Computing and Metaheuristics Algorithms for Optimizing Data Mining Performance, Grant no. MYRG2016-00069-FST, by the University of Macau; (2) A Scalable Data Stream Mining Methodology: Stream-based Holistic Analytics and Reasoning in Parallel, Grant no. FDCT/126/2014/A3, by FDCT Macau; and 2018 Guangzhou Science and Technology Innovation and Development of Special Funds , (3) Grant no. EF003/FST-FSJ/2019/GSTIC, Code: 201907010001.
Date of origin	April 2020
Country/region of Origin	China; India; Spain
Monitoring & Evaluation	Not specified.
Key enabling factors	The possibility of making decisions under a high uncertainty framework.
Main hurdles	This is a specific technique, which is the key innovation and is proposed as a research paper. It will need some effort to commercialise and deploy. It would also need to be proven to work.
Relevance	Deep learning-based composite Monte Carlo (CMC) simulations provide better-fitting prediction models with small sample sizes than more simplistic Monte Carlo (MC) simulation alternatives — providing policy/decision-makers with more realistic predictions.
Availability, Adoption & Feasibility	Feasible for adoption even when working with small datasets / little data available.
Potential for Current and Future Pandemics	The idea of small datasets and uncertainty for prediction is sound. It should be explored more for future pandemics and compared to other similar techniques.
Diversity & Inclusiveness	Paper collaborators are from China, India, and Spain.

Credibility	Not very credible as a venture, as it is only a research paper, but the paper is technically credible in terms of the approach and evaluation from the authors.
Interoperability	Deployed in one problem domain and has the ability to retrain the AI solution with new data.
Potential for GPAI to make a significant difference to the initiative	Not much potential to make a difference, since this is simply a technology. However, GPAI could help in acquiring and providing data.

COVI	
Organization(s)	Mila and COVI Canada
Brief description	Privacy-protecting mobile exposure notification and risk awareness application. Epidemiological simulator.
Sector	Non-profit
Technology used (if applicable)	Machine learning for probabilistic risk assessment based on symptoms and contacts
Geographical scope	Canada
Target audience	Public
Stage of development	Published
Budget (if applicable)	Not specified
Date of origin	March 2020
Country/region of Origin	Canada
Monitoring & Evaluation	Envisioned algorithmic impact assessment, external audit, peer-reviewed publication.
Key enabling factors	A multi-disciplinary effort combining software development, behavioral psychology, epidemiology and machine learning.Placed emphasis on providing early warning signals to contacts using user-reported symptoms. One of the few contact tracing applications using AI and being open source.
Main hurdles	Public acceptance of digital contact tracing and fears for privacy yielding low adoption rates for digital contact tracing.
Relevance	A decentralized, peer-to-peer contact tracing and risk awareness application — relevant to COVID-19 and also potentially future pandemics.
Availability, Adoption & Feasibility	Being developed in Canada with Quebec AI Institute. Would need to meet privacy requirements for other countries.The team is working with UN global Pulse, among other stakeholders. Therapeutics is promising too and that would be more transferable.

Potential for Current and Future Pandemics	Multiple streams of research, including AI for personalised risk prediction and ML for therapeutics. High likelihood that these are transferable methodologies. Creating this infrastructure could be beneficial in future epidemics as focus shifts as appropriate.
Diversity & Inclusiveness	Local to Canada.
Credibility	Working with many well-renowned experts within their respective fields and with Quebec AI institute. Have a human rights lawyer on an independent data protection body, which is a mechanism developed by the team to address privacy concerns.
Interoperability	Presently unavailable on mobile devices, but its code is compatible with most smartphones (both iOS and Android). However, it appears to be a sophisticated ML tool to create live risk assessments.
Potential for GPAI to make a significant difference to the initiative	Main hurdle is lack of international/national consensus over data compliance regulations. It would be helpful to have an international agreed minimal requirement over independent data protection/privacy.

COVID Command Center	
Organization(s)	CloudMedx
Brief description	An online "command center" for surge prediction, AI triage, and critical decisioning.
Sector	For-profit
Technology used (if applicable)	Deep learning
Geographical scope	United States
Target audience	Government; business; healthcare; public
Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	June 2020
Country/region of Origin	United States
Monitoring & Evaluation	
Key enabling factors	Whitelisting by Anthem provides credibility and assists with product rollout.
Main hurdles	The solution is presently US-centric, and it will need access to reliable sources of data in all geographies where it is to be used.
Relevance	Command Center offers two tools: C19-explorer, an interactive US map detailing transmission trends based on available data; C19 Privilege, a tool designed to help predict surges, only available for clients. Both are only oriented towards users based in the United States.

Availability, Adoption & Feasibility	The risk prediction tool is only available for paying users, and is only designed for users based in the US.
Potential for Current and Future Pandemics	Difficult to see a unique angle—another dashboard aggregating public data.
Diversity & Inclusiveness	Difficult to ascertain diversity of team; project seems to be US-centric and based in the US.
Credibility	Whitelisted by Anthem and has over a dozen institutional users.
Interoperability	Tool is web-based, and can easily adapt as more data sources are integrated.
Potential for GPAI to make a significant difference to the initiative	GPAI could help to internationalise beyond the US.

Finding an Accurate Early Forecasting Model from Small Dataset: A Case of 2019-nCoV Novel Coronavirus Outbreak	
Organization(s)	Department of Computer and Information Science, University of Macau; DACC Laboratory, Zhuhai Institutes of Advanced Technology of the Chinese Academy of Sciences; Department of Information Technology, Techno India College of Technology; Universidad Internacional de La Rioja; University of Granada
Brief description	In this paper, a methodology that embraces three virtues of data mining from a small dataset is proposed. An experiment that is based on the recent coronavirus outbreak originated from Wuhan is conducted by applying this methodology. It is shown that an optimized forecasting model that is constructed from a new algorithm, namely a polynomial neural network with corrective feedback (PNN+cf) is able to make a forecast that has relatively the lowest prediction error. The results showcase that the newly proposed methodology and PNN+cf are useful in generating acceptable forecasts upon the critical time of disease outbreak when the samples are far from abundant.
Sector	Academia
Technology used (if applicable)	Machine learning
Geographical scope	Global
Target audience	Academia
Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	March 2020
Country/region of Origin	China; India; Spain
Monitoring & Evaluation	Not applicable

Key enabling factors	The ability to forecast from a small dataset. Process is proposed as a research paper.
Main hurdles	Only tested in one place Wuhan, and it is unclear what is innovative. (Unclear what its 'panel selection' is.)
Relevance	Very important to optimize forecasting methods with small datasets—useful wherever infection information is sparse.
Availability, Adoption & Feasibility	Research team has already put methodology to use; this paper served as the precursor to Composite Monte Carlo decision making under high uncertainty of novel coronavirus epidemic using hybridized deep learning and fuzzy rule induction.
Potential for Current and Future Pandemics	It addresses a real problem. Not sure if it actually can be demonstrated to be working. Note: paper is NOT peer reviewed.
Diversity & Inclusiveness	Paper authors are from multiple countries; it includes strategies that could lead to diversity such as data augmentation.
Credibility	Not very credible as a venture, as it is only a research paper, but the paper is technically credible in terms of the approach and evaluation from the authors.
Interoperability	Deployed in one domain, and has the ability to retrain the AI solution with new data.
Potential for GPAI to make a significant difference to the initiative	Not much potential to make a difference, since this is simply a technology. However, GPAI could help in acquiring and providing data.

HANCOM AI CHECK 25	
Organization(s)	Hancom.Inc and Accufly.ai
Brief description	Accufly.AI launched its AI Outbound Calling System to assist the South Korean government at no cost and provide information to individuals who have been in close contact with or have had a confirmed coronavirus case.
Sector	For-profit
Technology used (if applicable)	1. The Mass Outbound Call Making System(OBS): development modules that work with existing call center systems. 2. Natural Language and AI Processing Modules: STT-TTS, intent classification, natural language processing, and machine learning. 3. Voice Data Analysis and Inspection System(DGate): The data annotation tool for labeling and validating large amounts of voice data.
Geographical scope	South Korea
Target audience	Government, public
Stage of development	Deployed/Published
Budget (if applicable)	The cost varies depending on the amount of calls sent by local governments, and further discussions are needed.

Date of origin	April 2020
Country/region of Origin	South Korea
Monitoring & Evaluation	1. A web-based management tool: It provides key monitoring results such as the total number of calls made and call success rates for a set period of time, the average duration of calls and users' health conditions through the dashboard. 2. Displays the result of each call: It shows individuals' call status and history(If they finished the calls, or ended at what point in the middle of the calls.) 3. Call voice data: It provides voice data from each call mission. 4. A voice data inspecting system: It allows automatic or human inspection for call data. It also shows the inspection status and statistical results.
Key enabling factors	It meets clients' needs; efficiently monitors health conditions and guides the necessary information within a short period of time; supports rapid adoption, which can be installed in a short time; works with existing systems (the period may vary depending on the firewalls and telecommunication networks of local government agencies.); partnership of iFLYTEK and Hancom Group.
Main hurdles	1. Difficulty in learning initial data: At the beginning stage of the service, insufficient data made voice learning difficult and slow. However, the actual operation has accumulated voice data rapidly, and it has affected the quality of voice recognition. 2. Poor initial operational experience: Lack of operational experience in AI call service and COVID-19 situation led to frequent changes in the internal development and external service aspects. Continued and proactive response has resulted in a current systematic and stable operating system.
Relevance	This tool can take a large burden off of healthcare workers by conducting healthcare checkups with those who are symptomatic and conducting check-ups after individuals have recovered.
Availability, Adoption & Feasibility	Tools such as these can be incredibly efficient for conducting routine, remote check ins for symptomatic or recovering individuals, providing public health guidance, and conducting contact-tracing surveys.
Potential for Current and Future Pandemics	Can be used in Covid 19. Use of AI powered calling/monitoring of self isolation.Have multiple initiatives. May be used in future pandemics. Appears to be most useful in checking those who are supposed to be quarantined, are. Doing risk assessments.
Diversity & Inclusiveness	Is based in South Korea only but has partnered with China. This is a potential big market. Need to keep privacy concerns in mind as the philosophies and requirements vary across continents
Credibility	Has solved the problem they set out to solve. Not clear about how this was developed and whether it went through peer review process and what accuracy is/what questions are, or whether or how this has helped manage the pandemic. Having phone checks would also help check population compliance with self-isolation.

Interoperability	May not need interoperability. However, it isn't a clinical tool. Used by government/companies.
Potential for GPAI to make a significant difference to the initiative	Could be a good tool for other countries that are struggling with resources to check whether people are recovering/seeking help as appropriate /self isolating as necessary.

Johns Hopkins US Risk Model	
Organization(s)	Johns Hopkins
Brief description	Risk model developed at the county level for the United States. Using epidemiological data from publicly available map and repository, along with anonymized mobile phone data, demographic and socioeconomic information, and various behavioral metrics, able to accurately assess the risk presented by COVID-19 in the United States at local, state, and national levels.
Sector	Academia
Technology used (if applicable)	Forecasting model using an empirical machine learning (ML) and mobility data
Geographical scope	United States
Target audience	Government; business; healthcare; public
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	September 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	The methodology of using mobile, epidemiological and social-economic data can give both early warnings but also very authoritative insights
Main hurdles	The assessment of the risk model in situations where data is not available would need to be verified
Relevance	Relevant tool to inform policymakers and citizens decisionmaking related to COVID-19. The platform calculates the level of COVID-19 risks at a local, state and national level using mobile, epidemiological and social-economic (eg. chronic diseases, smoking) data. Gives a more granular perspective on risk levels related to COVID-19 than just the number of infections and deaths.
Availability, Adoption & Feasibility	Tool launched recently in September 2020, and for now just available in English and focused on the US. However, if risk assessment model performant and dashboard easy to navigate could be deployed for further geographies.
Potential for Current and Future Pandemics	The methodology of using mobile, epidemiological and social-economic data can be applied to other pandemics.

Diversity & Inclusiveness	Data is being considered from first principles. which would help to ensure diversity. Also, when it is deployed to other locations, the same principles would apply, ensuring diversity.
Credibility	Very credible due to the background and experience of Johns Hopkins in terms of seniority, interdisciplinarity with technical and medical expertise
Interoperability	The solution has been tested in different geographies and appears to work across countries.
Potential for GPAI to make a significant difference to the initiative	Definitely—if GPAI could help something which is authoritative to scale globally, its would serve to benefit.

LitCovid	
Organization(s)	NCBI
Brief description	LitCovid is a curated literature hub for tracking up-to-date scientific information about the Coronavirus Disease 2019 (COVID-19). It contains a total of 59927 PubMed articles and is updated daily with new PubMed articles that are relevant to COVID-19.
Sector	Public
Technology used (if applicable)	machine learning; text classification
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	Not specified; government funded
Date of origin	March 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	More narrow than CORD-19, by providing only published PubMed literature related to SARS-CoV-2 (not other coronaviruses). One of the most comprehensive resources with over 67,000 PubMed articles. Use of ML and text classification tools to filter content and improve reading.
Main hurdles	Overlap with other potential platforms also curating COVID-19 scientific literature and tools.
Relevance	Relevant tool to showcase up to date and promising articles in the Computational Biology Branch. LitCovid has a more sophisticated search function than most existing resources. According to its founders, it identifies roughly 35% more relevant articles than do conventional keyword-based searches for entries such as ‘COVID-19’ or ‘nCOV’. The articles are also categorized by topic — overview, disease mechanism,

	transmission dynamics, treatment, case report and epidemic forecasting — as well as by geographic location for visualization on a world map.
Availability, Adoption & Feasibility	Platform is free of use and available across the world. It was launched in March 2020, and has since collected over 64,000 articles in PupMed. Articles are updated daily on the platform. With the exception of African countries, it seems like articles touch on most regions of the world.
Potential for Current and Future Pandemics	Comprehensive PubMed literature relevant for current and other coronaviruses diseases. Promising articles in the Computational Biology Branch particularly relevant for this pandemic.
Diversity & Inclusiveness	With the exception of East African countries, most geographies seem to be covered in the current literature (according to abstract mention). Tool is available globally.
Credibility	One of the most comprehensive platforms with over 64,000 articles.
Interoperability	N/A
Potential for GPAI to make a significant difference to the initiative	Potential for GPAI to synergize existing catalogues of COVID-19 scientific literature and leverage developed AI models.

Maxar Open Data Program	
Organization(s)	Maxar Technologies
Brief description	Maxar's Open Data Program has released an initial set of high-resolution satellite imagery in support of the COVID-19 response efforts. Per requests from humanitarian partners, this release will includes METRO IMAGERY BASEMAPS for the following African cities: Addis Ababa, Abidjan, Dakar, Lagos, Kano, Ibadan, Ouagadougou, Accra, Luanda, Kinshasa, Nairobi and part of northern Ghana.
Sector	For-profit
Technology used (if applicable)	Satellite imagery
Geographical scope	Global
Target audience	Healthcare; academia
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	April 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	Giving free access to high-resolution satellite imagery to help scientific and humanitarian communities' crisis response efforts. In particular, collaboration with humanitarian partners to release Metro imagery base maps for several African cities.

Main hurdles	Gaining visibility across humanitarian communities and different geographies to ensure people who need it the most benefit from the platform.
Relevance	Access to reliable data is key to support COVID-19 response efforts. Non profit actors and/or less-developed regions can be disadvantaged by the prohibitive cost to access high resolution data such as satellite imagery. Maxar supports the geospatial and humanitarian community by providing high resolution imagery and accurate data and analytics during the pandemic.
Availability, Adoption & Feasibility	High-resolution satellite imagery in support of the COVID-19 response has been shared with humanitarian partners. This includes METRO IMAGERY BASEMAPS for the following African cities: Addis Ababa, Abidjan, Dakar, Lagos, Kano, Ibadan, Ouagadougou, Accra, Luanda, Kinshasa, Nairobi and part of northern Ghana.
Potential for Current and Future Pandemics	High resolution satellite imagery relevant for crisis response beyond the current pandemic (eg. ecological or political crisis).
Diversity & Inclusiveness	Tool is available globally and proactively seeks to benefit communities/countries with less access to reliable and high resolution data.
Credibility	Maxar Open Data Program has a solid database of satellite imagery as it contains data from 26 countries, 50 events and nearly 500sqkm of imagery.
Interoperability	Associated imagery and crowdsourcing layers are released into the public domain under a Creative Commons 4.0 license, allowing for rapid use and easy integration with existing humanitarian response technologies.
Potential for GPAI to make a significant difference to the initiative	Give wider visibility to the platform so that scientific and humanitarian communities benefit from their satellite imagery for crisis response.

PPP Lending AI Solution	
Organization(s)	Google Cloud
Brief description	Google Cloud is offering the PPP Lending AI Solution, which enables lenders to easily and securely integrate underwriting components into their existing lending systems. This will be available to lending institutions at no cost.
Sector	For-profit
Technology used (if applicable)	Optical character recognition; machine learning
Geographical scope	Global
Target audience	Business

Stage of development	Deployed/Published
Budget (if applicable)	Not specified
Date of origin	May 2020
Country/region of Origin	United States
Monitoring & Evaluation	Not specified
Key enabling factors	This initiative has the financial and human capital support of the Google Cloud team.
Main hurdles	Ethical challenges of automated decision-making resulting in determinations of whether or not to lend capital.
Relevance	COVID-19 has a significant economic impact and creates new unemployment threats. In order to retain their employees, small businesses for example must issue new loan applications. This tool can help both lenders and borrowers: lenders, by integrating underwriting components into lending systems at no cost, and thus helping them face volume of loan applications; and borrowers as lenders can now better respond to their demands. Relevant tool both for current and future pandemics/crisis.
Availability, Adoption & Feasibility	AI tool/solution available at not cost. Potential for high feasibility as developed by Google with all necessary resources. Need more info on current level of adoption, also beyond Western countries.
Potential for Current and Future Pandemics	Viable option for businesses during this pandemic; capable of being used in future pandemics, public health crises, or in between.
Diversity & Inclusiveness	Increases accessibility of lenders, services, and processors to small businesses, and small businesses to lending opportunities, but genuine inclusivity depends on the rates/risk that lenders decide on.
Credibility	Google Cloud is a credible and very-well funded organization.
Interoperability	Tool in fact contains numerous seemingly swappable APIs, and is accessible by lenders and borrowers via a website on a computer or mobile device.
Potential for GPAI to make a significant difference to the initiative	Drafting guidelines on automated processes that make financial decisions, and bringing visibility to those that demonstrate responsible use of AI.

Rapid Reviews: COVID-19	
Organization(s)	School of Public Health, University of California Berkeley
Brief description	An open-access overlay journal that accelerates peer review of COVID-19-related research preprints to advance new and important findings, and prevent the dissemination of false or misleading scientific news. Uses a natural language processing tool developed by COVIDScholar, an initiative of UC Berkeley and Lawrence Berkeley

	National Lab that can quickly scan a large number of preprint repositories and identify relevant items to be peer reviewed.
Sector	Academia
Technology used (if applicable)	Natural language processing (COVIDscholar)
Geographical scope	Global
Target audience	Academia; healthcare
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	June 2020
Country/region of Origin	United States
Monitoring & Evaluation	Review guidelines and ethics statement
Key enabling factors	Accelerates peer review process of COVID-19 related preprints. Filtering and screening of promising articles but also misleading information thanks to NLP tool COVID Scholar and manual fact checking by graduate students and experts. Platform is available in open-access and promotes multi-disciplinary and global perspective.
Main hurdles	Overlap with other potential platforms also curating COVID-19 scientific literature and tools.
Relevance	This platform uses an NLP tool to identify promising papers, and allows to fast-track the peer review process to respond to the pandemic's urgent needs. Methodology, ressources and NLP tools allow also to scan through articles lacking scientific rigor or potentially sharing misleading information.
Availability, Adoption & Feasibility	Platform easily accessible across the world, with a nicely designed interface. Articles are organized around 6 different themes. Platform is available in open access, but just in English at this stage.
Potential for Current and Future Pandemics	Relevance of open access journal accelerating peer review of preprints both for current and future pandemics. Can accelerate research in other domains.
Diversity & Inclusiveness	Seeking global and multi-disciplinary perspective. Reviewing papers across different disciplines: medicine, public health, physical, biological, engineering, social sciences and humanities. Several editorial board members are based outside of the US. Platform aims to pay close attention to the pandemic’s impacts in countries across the world.
Credibility	Relevant partnership between academic and healthcare sector. Ethics statement and peer review guidelines articulated transparently on the website.
Interoperability	N/A

Potential for GPAI to make a significant difference to the initiative	Potential for GPAI to synergize efforts of existing platforms accelerating access to COVID-19 preprints.

SimSearchNet	
Organization(s)	Facebook
Brief description	A convolutional neural net–based model built specifically to detect near-exact duplicates.
Sector	For-profit
Technology used (if applicable)	Computer vision
Geographical scope	Global
Target audience	Public
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	May 2020
Country/region of Origin	United States
Monitoring & Evaluation	Unknown
Key enabling factors	Leverages Facebook AI's work on training state-of-the-art backbones on billions of hashtagged photos. It also employs data augmentation techniques that allow us to bootstrap models with limited amounts of data while still catering to the diversity seen in Marketplace product photos.
Main hurdles	Ability of the algorithm to screen and filter all potentially misleading information, and to flag it properly to the user.
Relevance	Many pervasive disinformation campaigns going around during COVID-19, especially via popular social media platforms such as Facebook. AI tools to prevent the spread of false and misleading information on Facebook's platform can be very relevant to ensure clear understanding of the pandemic and social cohesion. Such image checking and fact checking tools can be useful for the current and future pandemics, but also beyond.
Availability, Adoption & Feasibility	Team works with over 60 fact-checking organizations around the world to review content in more than 50 languages. In April, put warning labels on 50 million content related to COVID-19 on FB. Since March, removed more than 2.5 million pieces of content for the sale of masks, hand sanitizers, surface disinfecting wipes and COVID-19 test kits.
Potential for Current and Future Pandemics	High potential for current and future pandemics, and time in between to identify false or misleading public health information claims.

Diversity & Inclusiveness	Potential to benefit Global South in countries where Facebook is the predominant (or only) social media platform. Operable in more than 50 languages.
Credibility	Boasts a cohort of research / computer scientists and engineers from Facebook. Also supported by a team of fact-checkers, which collaborates with 60+ other fact-checking organizations.
Interoperability	Functions across Facebook's site; feasible to co-opt across other sites owned by Facebook conglomerate. Training dependent on labeling of false information, which is performed by Facebook's fact-checking team.
Potential for GPAI to make a significant difference to the initiative	Potential for GPAI to draft guidance for information curation/governance involving AI.

Universal Masking is Urgent in the COVID-19 Pandemic: SEIR and Agent Based Models, Empirical Validation, Policy Recommendations	
Organization(s)	HKUST (University of Science & Technology), Hong Kong; International Computer Science Institute, Berkeley; Ecole de Guerre Economique, Paris; University of Cambridge; Manifold Research, Cambridge; University College London; ELU AI Ltd, London; Royal Free Hospital, London; Population Research Institute, The Family Federation of Finland
Brief description	This research presents two models for the COVID-19 pandemic predicting the impact of universal face mask wearing upon the spread of the SARS-CoV-2 virusone employing a stochastic dynamic network based compartmental SEIR (susceptible-exposed-infectious-recovered) approach, and the other employing individual ABM (agent-based modelling) Monte Carlo simulation indicating (1) significant impact under (near) universal masking when at least 80% of a population is wearing masks, versus minimal impact when only 50% or less of the population is wearing masks, and (2) significant impact when universal masking is adopted early, by Day 50 of a regional outbreak, versus minimal impact when universal masking is adopted late.
Sector	Academia
Technology used (if applicable)	Agent-based modeling
Geographical scope	Global
Target audience	Government; public
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	May 2020
Country/region of Origin	Hong Kong, China; France; United Kingdom
Monitoring & Evaluation	Not specified

Key enabling factors	An agent-based model that highlights the significance of masking. could be used to model situations where small lapses in wearing masks lead to wider impact in virus spread
Main hurdles	This initiative is not a venture, i.e. it is purely academic. There are a number of other agent based simulation models, and it is hard to determine the uniqueness of the approach.
Relevance	There have been a lot of miscommunication and disinformation campaigns about the need to wear a mask, even though scientific evidence shows it is one of the least costly and efficient ways to limit the virus spread. Such visualizations show in an accessible and pedagogical way the benefits of wearing a mask.
Availability, Adoption & Feasibility	The tool is already deployed and available in English. However, the powerful visualizations make its key insights accessible across different geographies.
Potential for Current and Future Pandemics	At this stage, wearing of masks is accepted. So while the results are interesting to convince people, it may not be relevant from here onwards.
Diversity & Inclusiveness	The team is diverse and also the masking strategy could benefit communities which are marginalised.
Credibility	Not very credible as a venture, as it is only a research paper, but the paper is technically credible in terms of the approach and evaluation from the authors.
Interoperability	This solution is a modelling process. It is using mostly a simulation, but there does not appear to be restrictions on the use of other devices and data.
Potential for GPAI to make a significant difference to the initiative	Because the solution is a simulation for the significance of wearing masks, there is potential for GPAI to popularise as a venture, ie help in creating a business since the solution is mostly a paper for now.

Websensors Analytics	
Organization(s)	Federal University of Mato Grosso do Sul (UFMS); Onion Technology ParqTec - Science Park; Mathematical and Computer Science Institute (ICMC/USP)
Brief description	WebSensors Analytics is the first initiative to analyze events in Portuguese and currently contains all the necessary features for extracting and analyzing knowledge from events: (i) web crawling to collect events in real time, (ii) statistical and natural language preprocessing techniques for event extraction (iii) machine learning methods for learning sensors, and (iv) Application Programming Interface (API) using the WebSensors Analytics infrastructure. The WebSensors Analytics tool is potentially useful for media analytics, opinion mining, web engineering, content filtering and recommendation systems – for both academic research and industrial applications.

Sector	Academia
Technology used (if applicable)	Natural language processing; machine learning
Geographical scope	Global
Target audience	Academia; business
Stage of development	Deployed/Published
Budget (if applicable)	N/A
Date of origin	2017
Country/region of Origin	Brazil
Monitoring & Evaluation	Not specified
Key enabling factors	The project has displayed success in one local area: Brazil. It claims to be used in the early stage of the pandemic.
Main hurdles	Local approach. Appears to be a research initiative that used existing data.
Relevance	WebSensors Analytics uses ML for learning sensors to monitor and understand the pandemic's evolution. It originated in Brazil and is the first initiative to analyze events in Portuguese. Considering the pandemic's evolution in Latin America, and specifically in Brazil, a tool such as WebSensors Analytics can be useful to inform the population and local authorities about clusters and virus evolutions, and avoid disinformation.
Availability, Adoption & Feasibility	The tool is available in English and Portuguese, and although it focuses on Brazil, it monitors and analyzes events across the world. Given the current pandemic situation in Brazil and more broadly in Latin America, there is a real need for clear communication and optimized crisis management. A tool available in Portuguese (and maybe one day in Spanish?) could be more easily adopted by local authorities and populations.
Potential for Current and Future Pandemics	The main innovation is unclear as uses existing data, eg. Johns hopkins.
Diversity & Inclusiveness	The team is from a single location and the solution benefits that location, Brazil. But it could also work for many in Brazil who are marginalised. Hence, the solution can seem to be inclusive.
Credibility	It is not credible as a venture. It appears like a research initiative, however, it could have strong credibility in Brazil, its country of origin.
Interoperability	This is a dashboard; not applicable.
Potential for GPAI to make a significant difference to the initiative	Not much potential for GPAI to make a difference since this is a technology. However, GPAI could help in internationalising out of Brazil.

Zencity Local Government Response

Organization(s)	Zencity
Brief description	Our AI-driven platform helps local governments translate what people want in their cities more effectively and eliminates the guesswork from policymaking. With close to zero integration, we gather and analyze millions of data points from all of the touchpoints residents have with their city. Then we deliver reliable, real-time insights that help local governments better prioritize resources, track performance, and connect with their communities. Together with our partner-cities, we're setting a new standard for performance management in local government.
Sector	For-profit
Technology used (if applicable)	machine learning; sentiment analysis
Geographical scope	Global
Target audience	Government
Stage of development	Deployed/Published
Budget (if applicable)	US$ 13,500,000
Date of origin	March 2020
Country/region of Origin	Israel; United States
Monitoring & Evaluation	Not specified
Key enabling factors	Zencity works with 150 local governments, including those of large cities like Los Angeles and Chicago and smaller towns like State College, Pennsylvania. The company works with municipalities in four countries and across 29 states in the U.S.
Main hurdles	Appears to be US centric—unclear how it would scale outside the USA.
Relevance	Using ML and sentiment analysis to collect public online discourse in real-time. Useful interface between citizens and local authorities to more efficiently manage post-crisis recovery, local needs and perceptions. Local authorities can prioritize services, optimize efforts, and avoid disinformation.
Availability, Adoption & Feasibility	AI tool is already deployed and used by 160 local governments across the US, and 4 different countries. A significant amount of funding has been secured (over 13M USD).
Potential for Current and Future Pandemics	The solution has good potential for future pandemics since the concept is not dependent on specific datasets.
Diversity & Inclusiveness	Team includes 50% women and spans numerous countries.
Credibility	Well-funded and a strong diverse team.
Interoperability	No issues, since it is a web cloud-based alert platform.
Potential for GPAI to make a significant difference to the initiative	Effort needed for a US-centric site to be global. GPAI could help open doors to other countries.

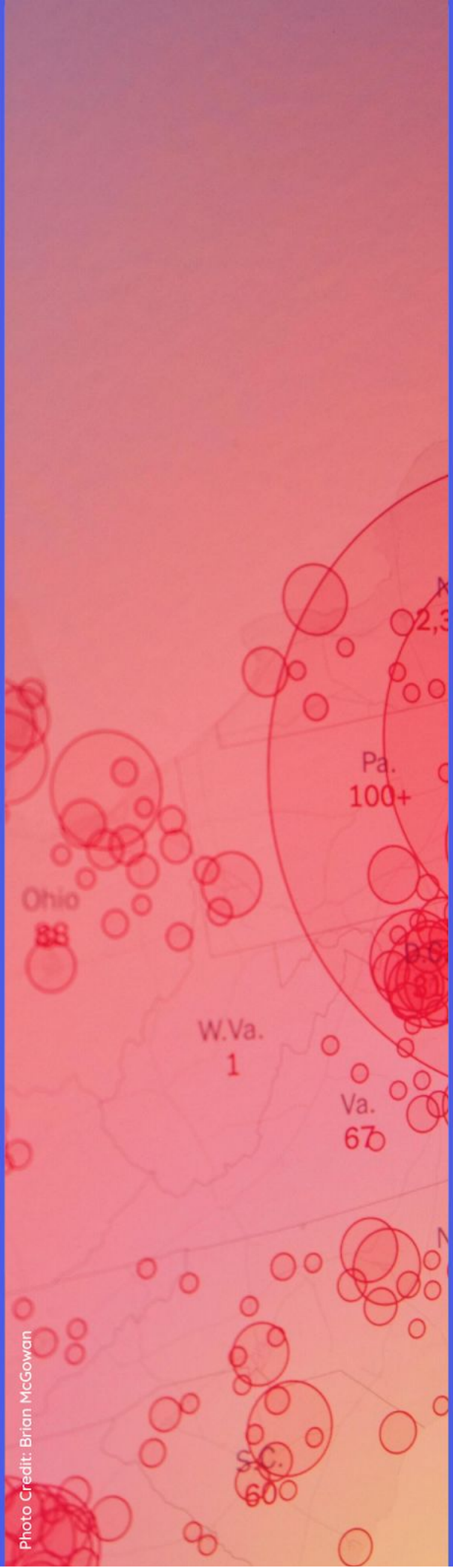


Photo Credit: Brian McGowan

THE FUTURE SOCIETY

The Future Society is a nonprofit think-and-do tank with the mission to advance the responsible adoption of AI and other emerging technologies for the benefit of humanity.

GLOBAL PARTNERSHIP ON AI (GPAI)

GPAI is an international and multistakeholder initiative to guide the responsible development and use of artificial intelligence consistent with human rights, fundamental freedoms, and shared democratic values, as reflected in the OECD Recommendation on AI.

INTERNATIONAL CENTRE OF EXPERTISE IN MONTREAL FOR THE ADVANCEMENT OF ARTIFICIAL INTELLIGENCE (CEIMIA)

CEIMIA is a Montreal-based Centre of Expertise, established to support GPAI's working groups.

The Future Society
867 Boylston Street, 5th Floor, Boston MA 02116, United States
www.thefuturesociety.org