TACTICAL DESIGN
for Pandemics

Learn about design solutions that can address public health needs in times of pandemics and help us better prepare for the future.

IIT Institute of Design

EXECUTIVE SUMMARY

The global mobilization of resources and knowledge in response to the COVID-19 pandemic has triggered a spur of new solutions across borders. A team of designers, researchers, and faculty at IIT Institute of Design (ID) have conducted a real-time analysis of emerging infrastructures for public health from a tactical design perspective. ID Associate Professor Carlos Teixeira conducted this study with support of André Nogueira, ID alum and Associate Researcher.

This study investigated the current infrastructures being deployed in response to pandemics through real-time analysis of design interventions in 5 focus areas and across USA, Italy, South Korea and China.

This report captures a collection of infrastructures and the new possible fields of action that are enabled by the combination of these infrastructures. The learnings of analysis indicate tactical design considerations for professionals working in response to pandemics.

THE CALL FOR DESIGN

Design is integral to everyday life because it provides the products, services, communication, and data ecologies that give shape to interactions and people's daily routines around the world. Design is so ubiquitous that we seldom notice how these things work and how much we depend on them to perform our most mundane activities. Nevertheless, when they don't work, we become quickly frustrated and disoriented, because our habits and routines get disrupted and we need to improvise. Failure in the things that shape our everyday life, is a reminder of how important is for things to work well for enabling our livelihoods.

The COVID-19 created multiple global crises. It has also disrupted the everyday life of billions of people around the world. Therefore, this unfolding crisis and its future aftermath has two interconnected fronts.

One is public health and safety, which depends on health experts to guide us on how to deal with the virus. A second front is how to deal with the multiple disruptions affecting our livelihoods. That's where design matters.

Design expertise is a critical resource for creating interventions that help us adapt to new conditions. It understands how micro actions and interactions develop into large patterns of social behavior, cultural norms, and economic activities. In this report we present tactical design with a focus on products, services, interaction, communication, and data ecologies that have been used to mitigate disruptions affecting people's life, as well as paving the way for resilient infrastructures against future large scale disruptions, such as the COVID-19 global pandemic.

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KEY CONCEPTS

TACTICAL DESIGN

Tactical design identifies and leverages the patterns and logics within infrastructures and the consequent enabling resources of a given situation to iteratively generate alternative pathways.

COMBINATORIAL POSSIBILITIES

Combinatorial Possibilities seeks to generate new interventions that improve patterns of daily life by combining and integrating existing and novel infrastructural

ARCHETYPE

An archetype is the transferable core logic of a designed solution defined by its goal, features and affordances, meaning the actions it enables us to take.

AFFORDANCE

An affordance is a tangible clue in a designed artifact that indicates a specific action that is enabled by the artifact.
(ex. Mug handle *affords* grasping motion)

ENTREPRENEURIAL ECOSYSTEM

Entrepreneurial ecosystems are growth-oriented regional clusters of actors that support the development of new initiatives and incentivize risk-taking organizational behavior.

INFRASTRUCTURE

Infrastructures are the assemblages of social, ecological, and technical components that determine access, mobilization, and allocation of resources within a region or domain.

EMERGING INFRASTRUCTURES

Moments of disruption require change because new imperatives are at play. Unexpectedly and overnight the COVID-19 virus triggered governance systems to impose a series of new tactics including social distancing, self-isolation, use of protective gears, travel bans, remote work, frequently washing hands, and many others. However, current infrastructures composed by products, services, communication, data ecologies and the resulting interactions were not designed considering such needs. New solutions are being designed and deployed as first responses to deal with the challenges of COVID-19, individuals and organizations are struggling to understand what it takes to create new infrastructures for public health in a time of pandemics.

As a way of learning from current real- time developments, this study mapped a total of 14 components that emerged during the period of January-April 2020 in four different countries: China, South Korea, Italy, and the US. The goal was to understand the complex interconnectivity between the health of the public and their activities of daily life, and how a complex web of new products, services, communication, and data ecologies mediates this interconnectivity and the interactions among various agents.

We explored over 50 interventions being deployed in different countries, each with its own contextual variations. By deconstructing them through their various components, we were able to identify several patterns that can give shape to new infrastructural archetypes.

		USA	CHINA	SOUTH KOREA	ITALY
PRODUCTS	SURVEILLANCE TOOLS	The government is using techniques of symptom checking to get real-time data of recent travel, location, age, and existing health conditions.	China mobilized its mass surveillance tools to monitor quarantined people and track the spread of the coronavirus.	South Korea is using a combination of different technologies to trace the movements of infected patients.	N/A
	ANTIBODY TEST AND TREATMENT	Drug and biotech companies have been searching for a cure among which the most promising candidates is antibody.	Chinese scientists are seeking potential COVID-19 treatment antibodies. But currently no proven effective treatment.	N/A	N/A
SERVICES	REMOTE PATIENT MONITORING	Digital screening, monitoring, and consultation provided at home to mitigate the spread of infection.	Remote diagnosis, monitoring, and care conducted by doctors via remote control of medical equipment.	Government-funded testing for people with cars lessens exposure risk, provides results within 3 days.	N/A
	DRIVE-THRU TESTING	Appointment-only service for medical professionals; lacks unified communication and standardization.	N/A	Government-funded testing for people with cars lessens exposure risk, provides results within 3 days.	N/A
	GROCERY DELIVERY	Instacart partners with national, regional, and local chains to pick and deliver orders in given time slots.	Online group purchases for scheduled, communal delivery utilize shared labor from culinary industry.	Online stores of biggest grocery vendors provide next day/same day grocery deliveries to home.	Cicalia.com has launched with the promise of delivering orders to smaller and remote provincial towns.
INTERACTIONS	OFFICE SPACE RECONFIGURATIONS	Office real estate are planning new service plans for office layouts for returning workers.	Many office buildings have security personnel to give temperature checks for people wanting to enter.	The country's largest mobile operator SK Telecom said it's staff will return to work starting early May.	Companies are allowed to reopen on the condition that they respect strict security protocols in the workplace.
	DRIVE-THRU TESTING	Quick and safe testing voluntarily provided by healthcare services. Insurance and affordance of a vehicle is a must in the States.	N/A	Government implemented drive thru testing to decentralize the testing process to minimize contamination.	N/A
	MICRO-MOBILITY SYSTEMS	Cities have temporarily limited access to vehicles on certain corridors in order to help pedestrians in social distancing.	Integrating their fragmented delivery systems into the last mile reach using autonomous robots.	The "virus patient travel log" (govt) is publishing the movements of people before they were diagnosed with the virus.	Only cycling for essential trips is permitted, and for physical activity, so long as people stay one meter apart.
COMMUNICATION	HASHTAG	US residents use hashtag to share their daily life. Organizations like Red Cross are sharing knowledge with hashtag.	Many residents and NGO are using hashtag to raise the attention and action from government.	South Korea is using hashtag like "Work from home" to start their manifestation for certain call.	The Red Cross in Italy is using hashtag as a way to ask help and share the volunteers work.
	VR/AR TRAINING	NowThis in US media shared the VR what COVID-19 looks like inside the lungs.	The FXG, a VR company in China shared the situation of Hangzhou through VR contents.	Zipview real-estate company in South Korea introduced VR real-estate, as a case of successful growth under COVID-19.	Italian hospital utilized VR to combat clinician stress during COVID-19 crisis.
	LIVE STREAM	The San Diego Zoo has been deploying the live cameras all around the filed with animals.	The Great Palace has recored panoramic videos to see 360 degrees view of the exhibitions.	Over 400 museums and archaeological sites have joined a portal website launched by the ministry of culture.	The National Museum of Modern and Contemporary Art in Seoul (MMCA) has uploaded exhibition videos to YouTube.
DATA ECOLOGIES	SOCIAL DISTANCING	Enforced on the state and local level to "flatten the curve" and protect vulnerable populations.	China's one time intervention (early 2020) is insufficient to avoid an outbreak in summer and autumn months.	Deploying contract tracing measures, public where able to trace virus infected areas and avoid them.	Reducing exposure rate of vulnerable populations by limiting non-essential travel and group gatherings.
	CONTACT TRACING	No mass testing makes contact tracing hard to implement because of the limited data on who has the virus.	China deployed many tools for mass surveillance and created movement maps for those infected to keep close contacts informed and quarantined.	Government implemented Orwellian surveillance and has warrantless access to public data.	Government contracted startup developing opt-in app that tracks contacts via anonymized Bluetooth data.
	MASS TESTING	Shortage of test kits from the start of outbreak make it difficult to implement mass testing.	China did not practice mass testing, which the reason for an anticipated second wave.	Tested every single individual. Started preparing testing kits before the outbreak.	Testing entire municipality to reduce spread rate by identifying & isolating.

In addition to its unique features and affordances, each archetype is enabled by an ecosystem of actors within the local context, consequently conditioning the interactions of its constituencies.

While products, services, communication, and data ecologies can give shape to various interactions depending on the context, they can assume similar functions within the systems they are embedded, regardless the diverse forms and shapes through which they do that.

PRODUCTS

DRONE SURVEILLANCE

CHINA

Drones with thermal cameras are being used to check quarantined residents' temperatures and drop face masks in bid to control corona virus outbreak. The devices can identify the person with the body temperature in a crowd. They were also used to drop food items, face masks and disinfectant products.

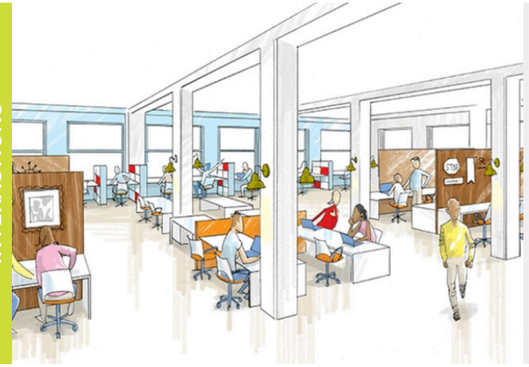
SERVICES

GROCERY DELIVERY

CHINA

China utilizes communal grocery delivery, serving more people in fewer trips. Bulk deliveries are dropped at local pick-up stations, where individuals find their specific order.

INTERACTIONS



OFFICE SPACE RECONFIGURATION

USA

As companies call their office workers to return to work, new social distancing measures will be implemented according to new safety measures in these spaces.

COMMUNICATION

VR TRAINING IN COVID-19

USA, UK

Oxford Medical Simulation offered 17,000 doctors and nurses training for COVID-19 pandemic using VR technology to help busy hospitals and medical facilities as they are being crushed by large numbers of patients during the pandemic.

DATA ECOLOGIES

MASS TESTING

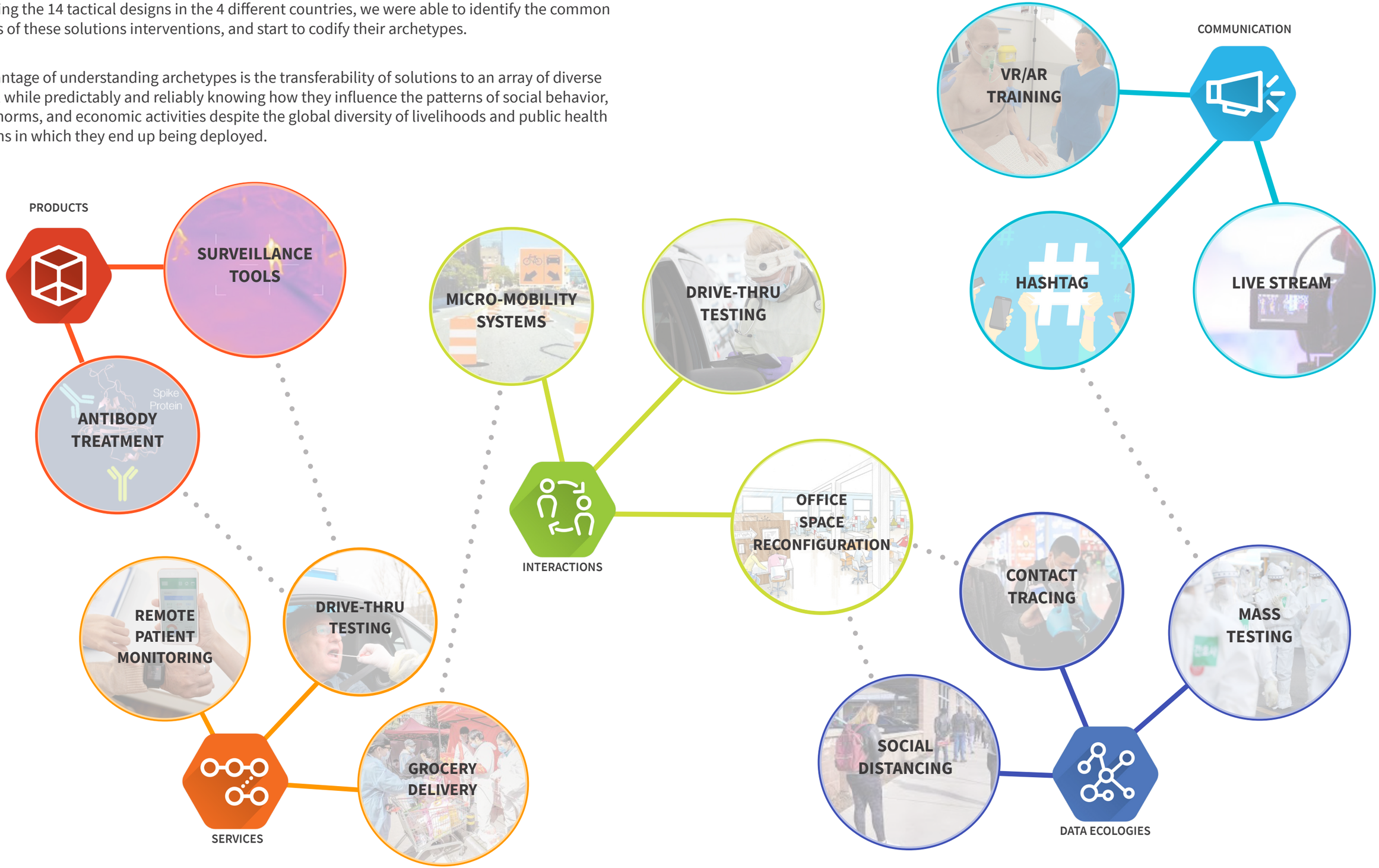
SOUTH KOREA

South Korea has reduced its number of new cases using free testing at walk-in and drive-through locations. By mid-March the country of 51M had tested over 270,000. Strategies were adapted from lessons learned during the MERS outbreak.

ARCHETYPES OF INFRASTRUCTURES

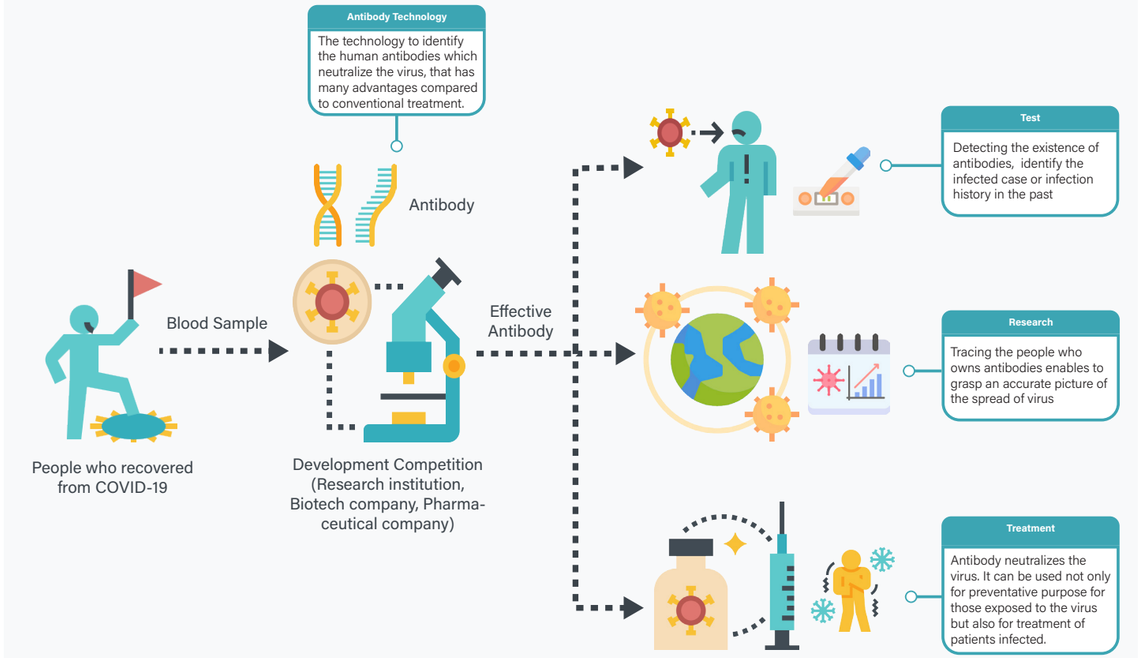
By studying the 14 tactical designs in the 4 different countries, we were able to identify the common functions of these solutions interventions, and start to codify their archetypes.

The advantage of understanding archetypes is the transferability of solutions to an array of diverse contexts, while predictably and reliably knowing how they influence the patterns of social behavior, cultural norms, and economic activities despite the global diversity of livelihoods and public health conditions in which they end up being deployed.



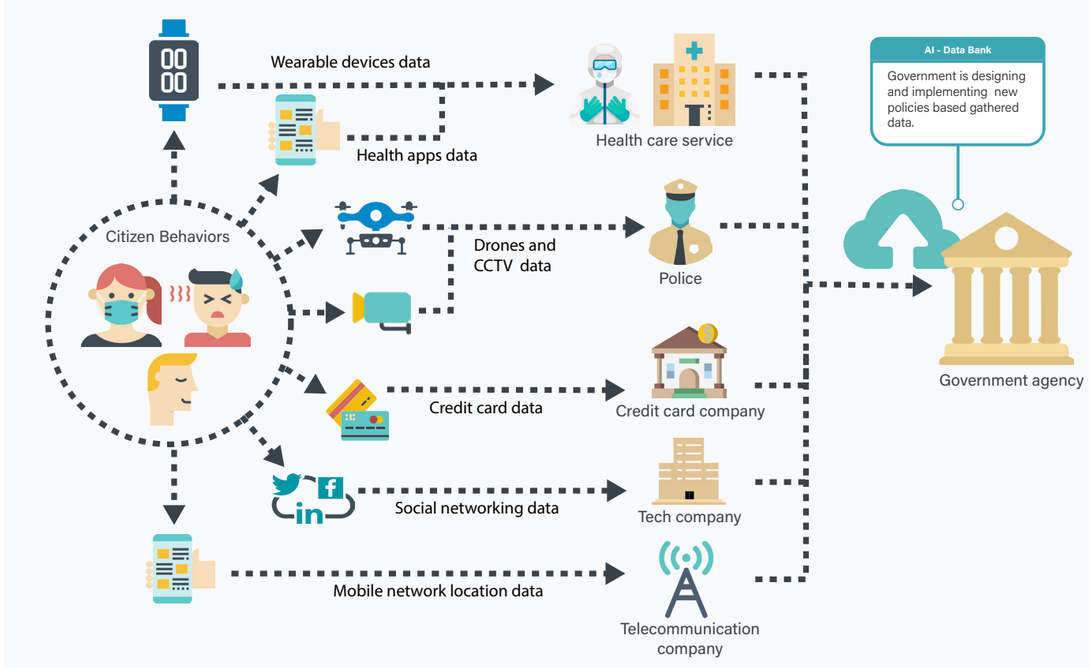
ANTIBODY TREATMENT

Antibody technology is expected to utilize for multiple purposes: Test, Analysis of Spread and Treatment to prevent the spread of pandemic.



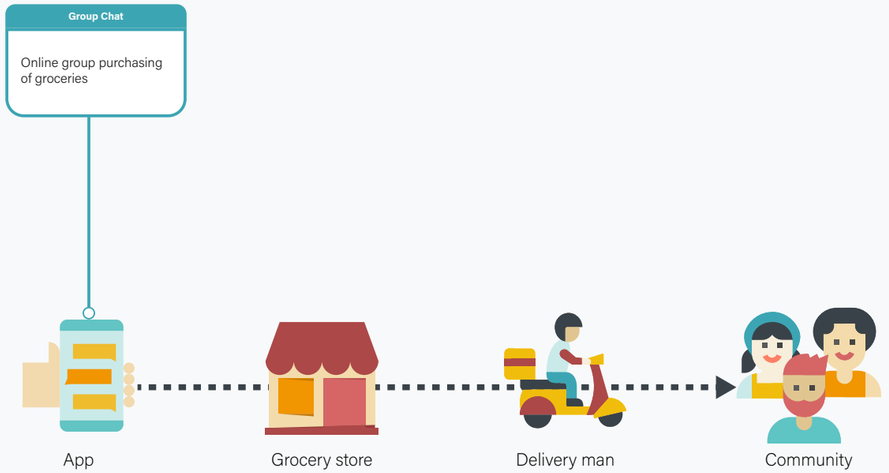
SURVEILLANCE SYSTEM

Using various surveillance tools, the government assembles and integrates the citizen data to monitor and prevent pandemic spread.



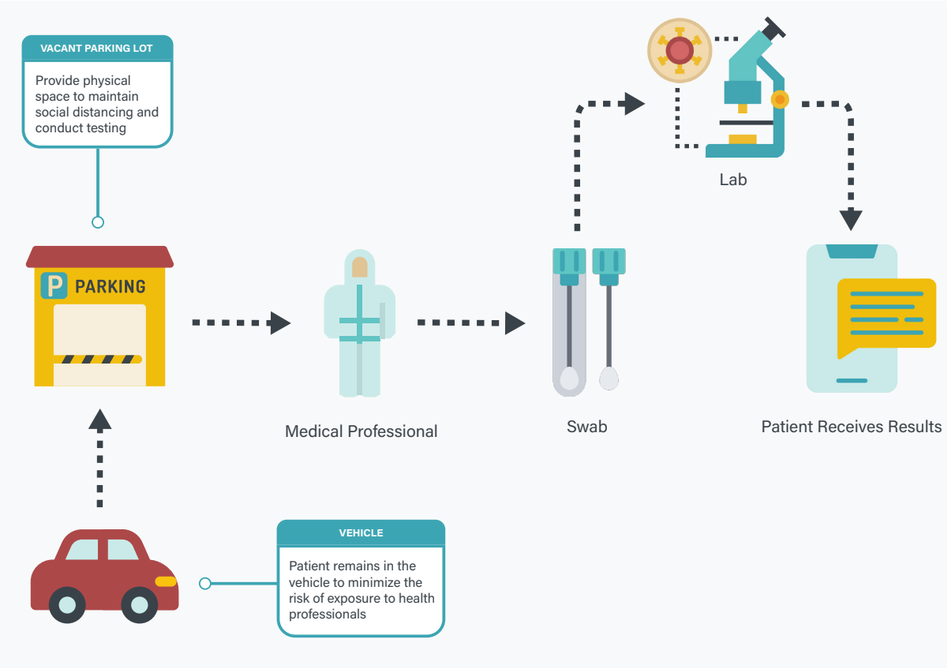
GROCERY DELIVERY

Grocery orders are grouped by neighborhood and delivered to a communal drop-off location for individual pick-up.



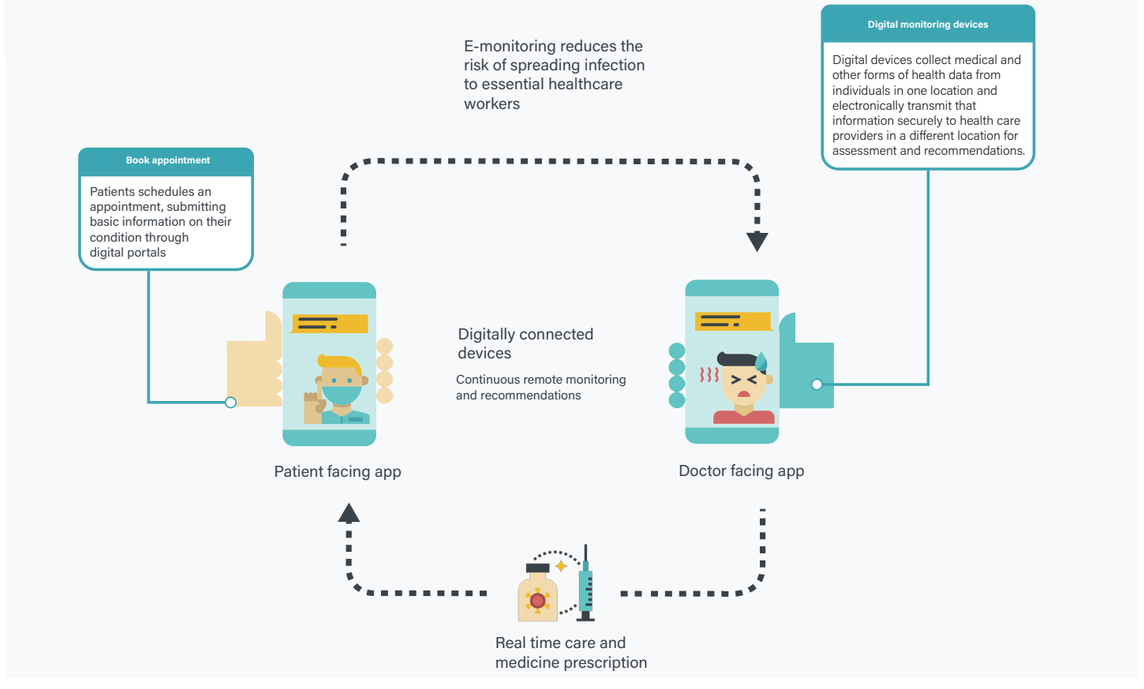
DRIVE-THRU TESTING

Parking lots are converted into drive-thru testing centers.



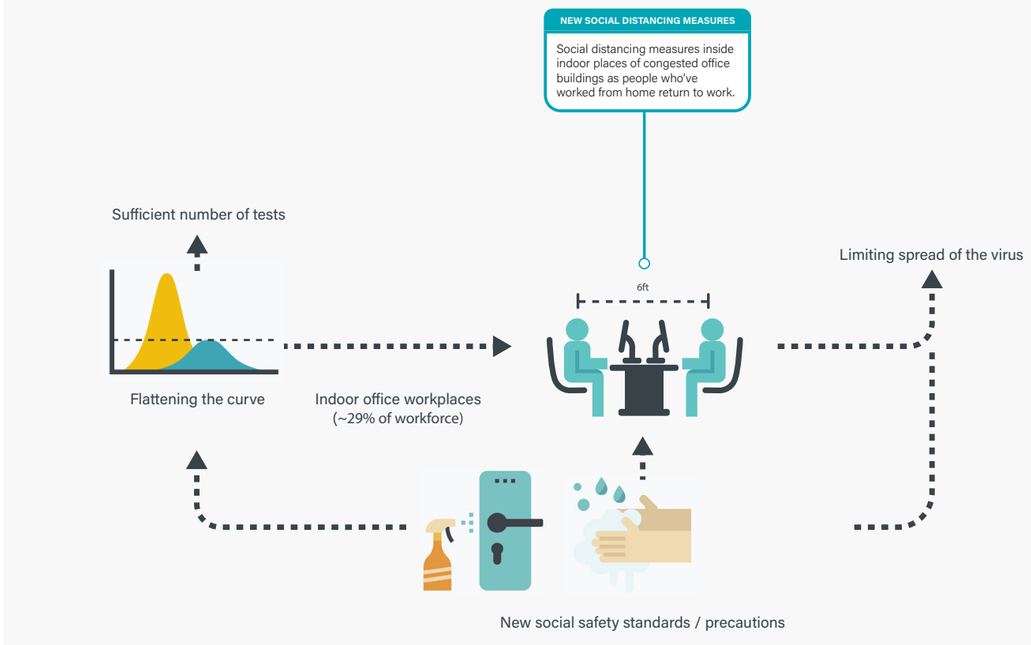
REMOTE PATIENT MONITORING

Providing medical care at home through digitally connected devices to mitigate the spread of infection



OFFICE SPACE CONFIGURATION

Companies of office space and commercial real estate will be providing services and policy updates of office layout operations for their buildings and for the returning workforce.



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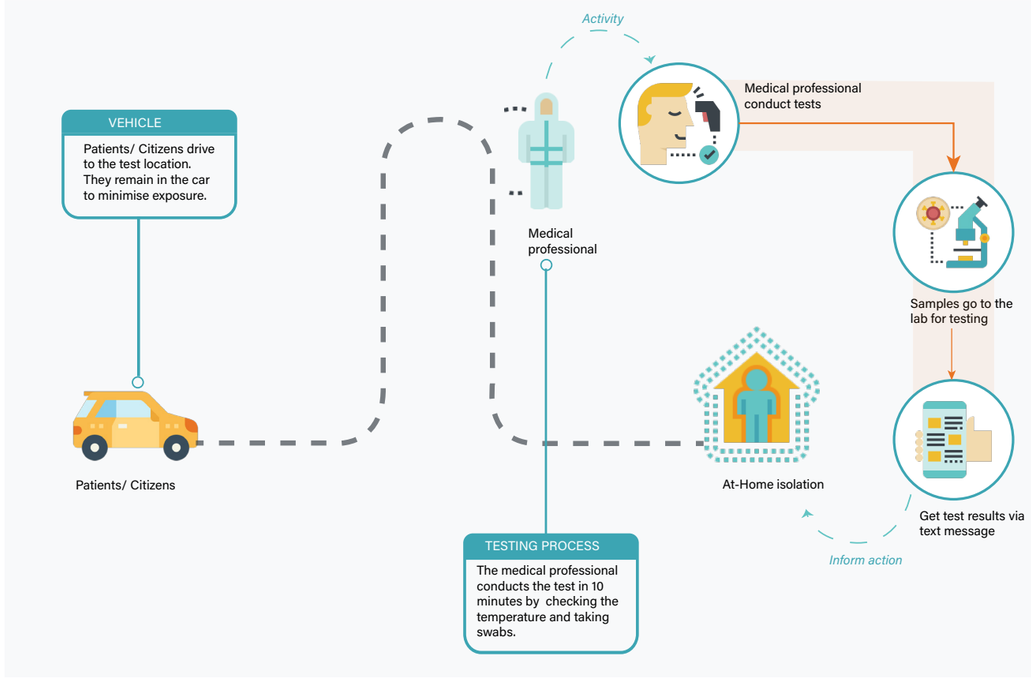
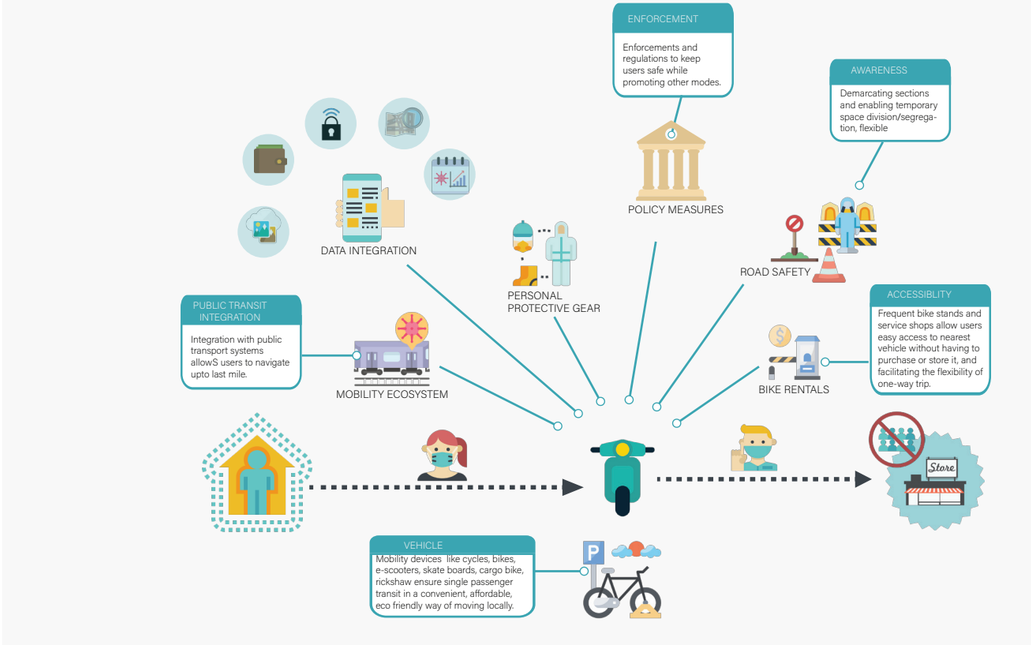


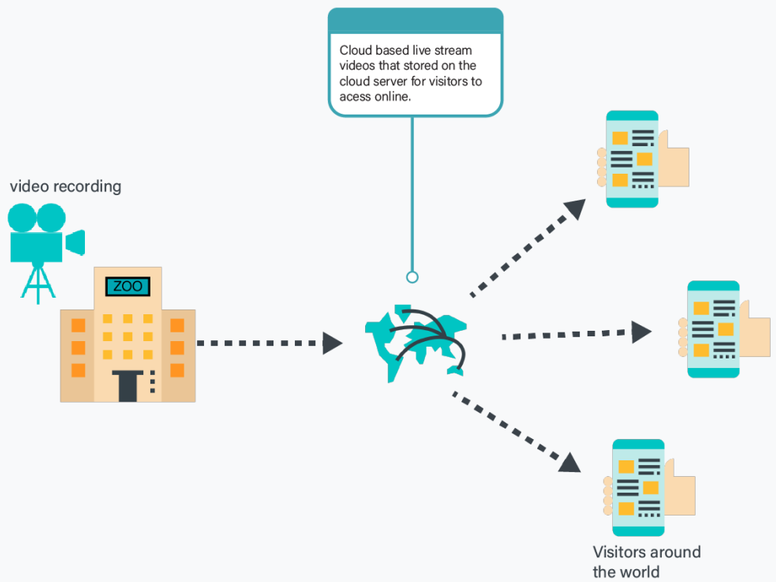
MICRO MOBILITY SYSTEMS

Providing means to facilitate social distancing protocols while meeting peoples immediate transit needs using alternate modes of commute.



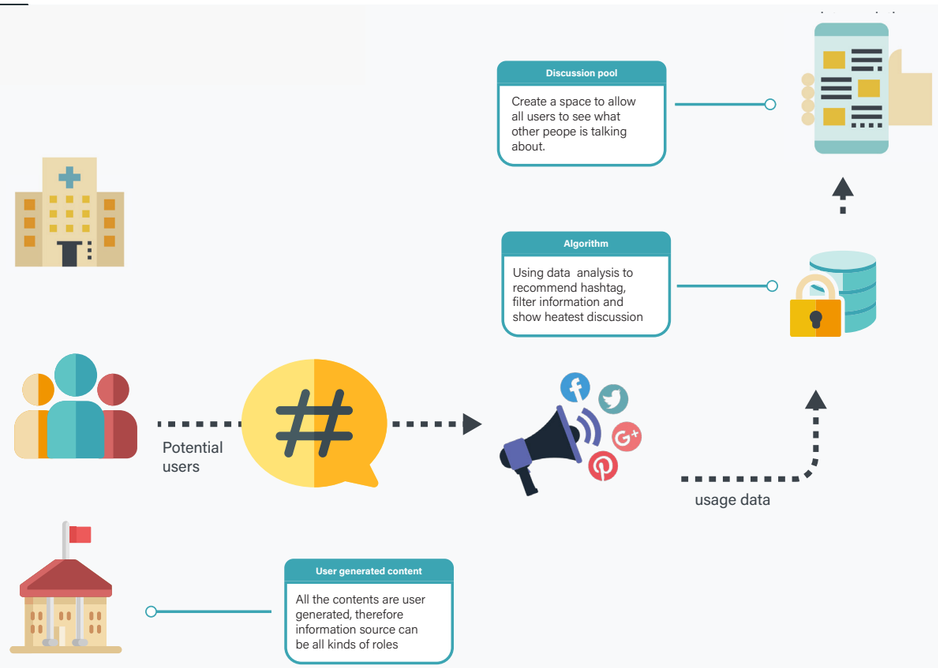
LIVE STREAM VIDEOS

Visitors who can not make it physically to the zoo location can see animals virtually through cloud-based live stream videos online.



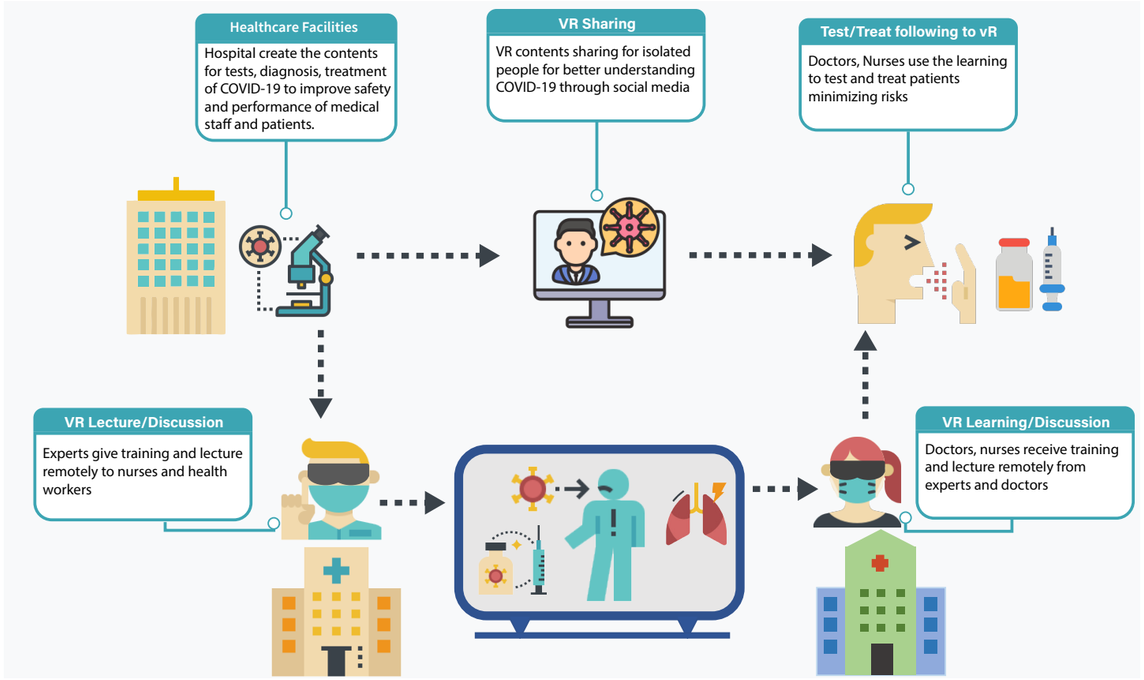
HASHTAG

Hashtag is a tool on social media to share their thoughts on certain issues, topics, and it is a very efficient way of spreading information.



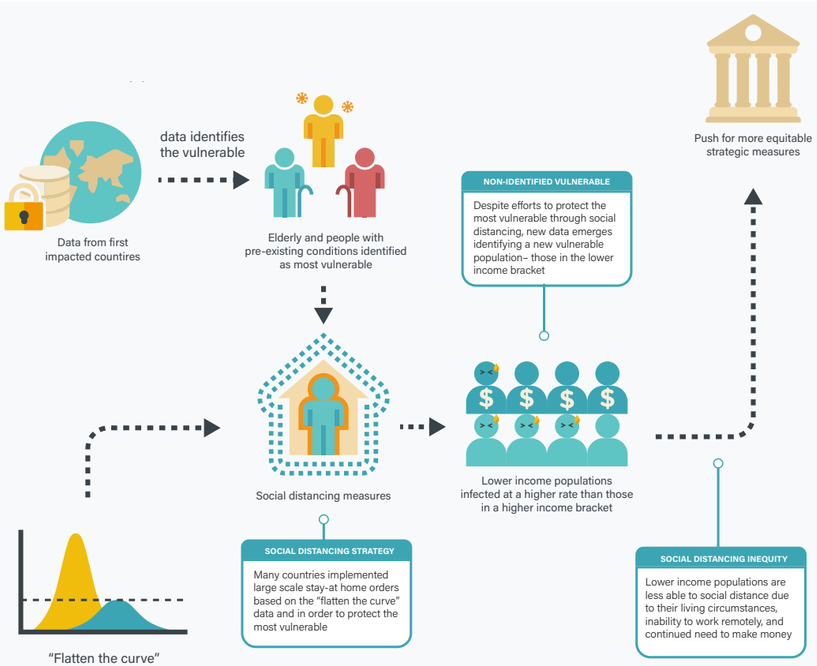
VIRTUAL REALITY COMMUNICATION

To share information and raise discussion remotely to keep safety of doctors, nurses and patients



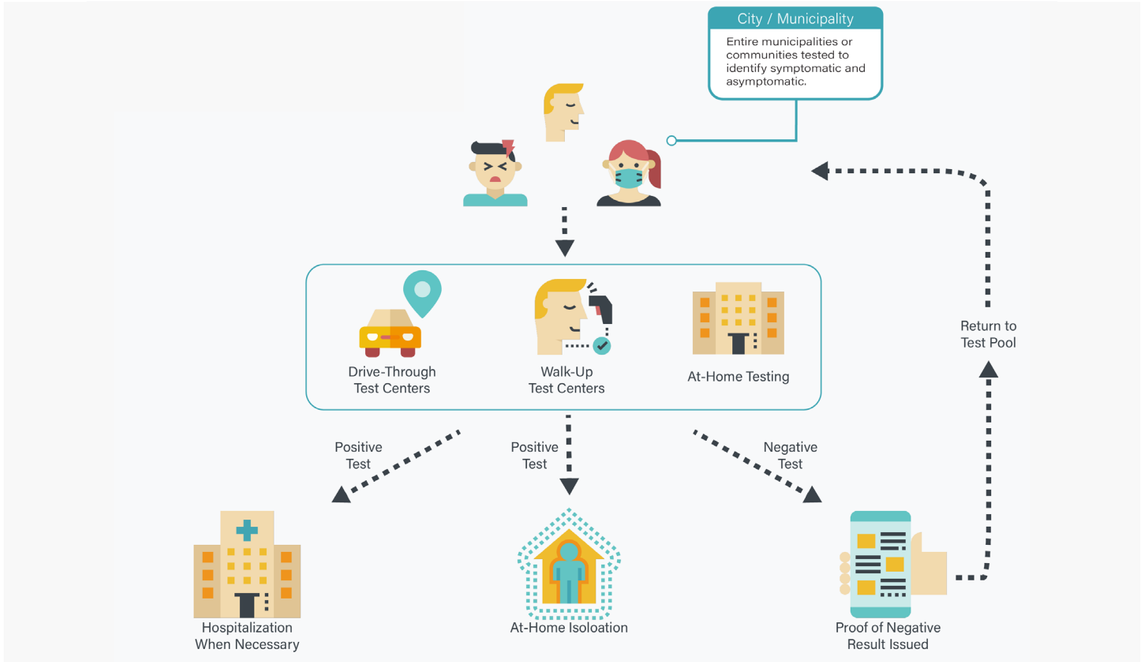
SOCIAL DISTANCING

A strategic measure across the world to protect the general public and has helped health leaders identify vulnerable populations.



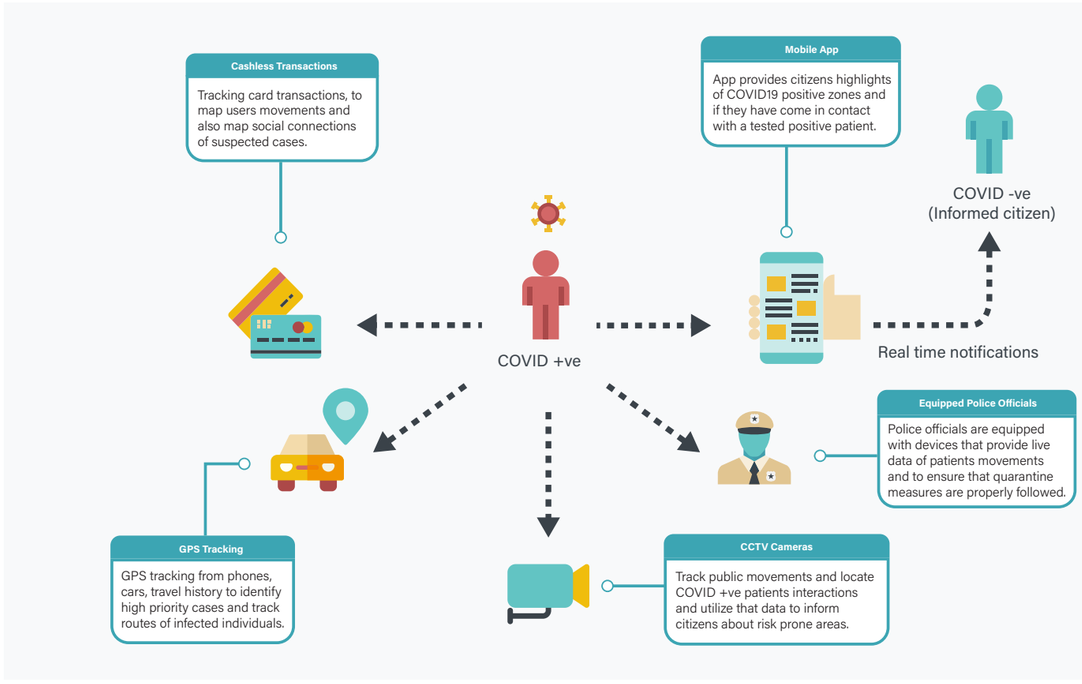
MASS TESTING

In an effort to reduce the reproduction number or “R Number” municipalities has adopted the strategy of testing mass populations, sometimes including the entire communities.



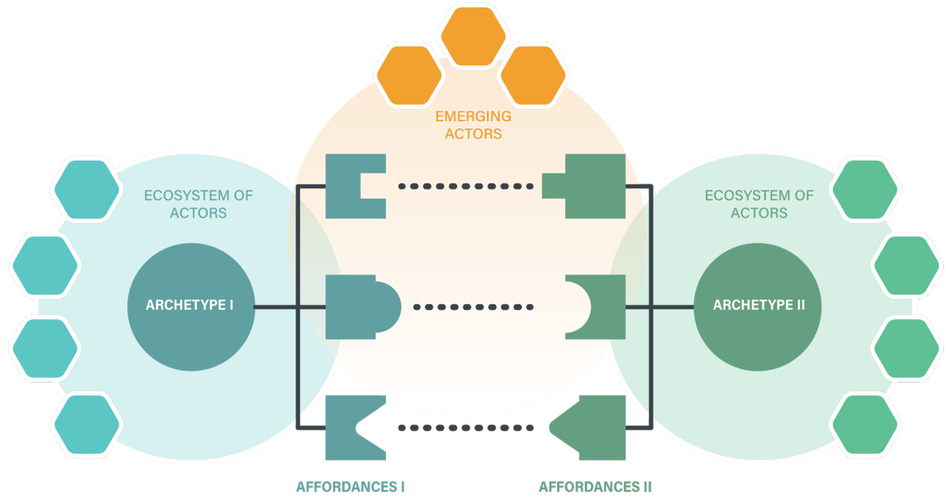
CONTACT TRACING

Tracking citizens data to identify and inform about COVID +ve cases and potential risks areas to refrain from.



COMBINATORIAL POSSIBILITIES

This study uncovered that infrastructural components being developed for public health are not limited to a single design intervention. Rather, they belong to a portfolio of solutions from which possible and complementary solutions can be combined and give shape to new infrastructures oriented towards improving the health of the public. The flexibility inherent in the various combinatorial possibilities can help individuals and organizations provide inclusive infrastructures capable of accounting for diversity of livelihoods.



4 STRATEGIES FOR OPENING UP

The unprecedented nature of this scenario presents an opportunity to form entrepreneurial ecosystems composed of different organizations and stakeholders working collaboratively to design a well-integrated system of interventions. In this context, the ingenuity of design is perceived as an advantage for seamlessly and successfully integrating existing and new infrastructural components that respond to contextual variations. The study identified five different plans of combinatorial possibilities to integrate products, services, communication, and data ecologies that can help influence new interactions and enable large scale behavior change.

CENTER FOR AMERICAN PROGRESS

Preventing the spread of disease and recovering the social system as soon as possible.

AMERICAN ENTERPRISE INSTITUTE

Gradual and selective lifting of stay-at-home orders.

HARVARD EDMOND J. SAFRA CENTER FOR ETHICS

Ensuring the safety of essential workers and providing access to essential services.

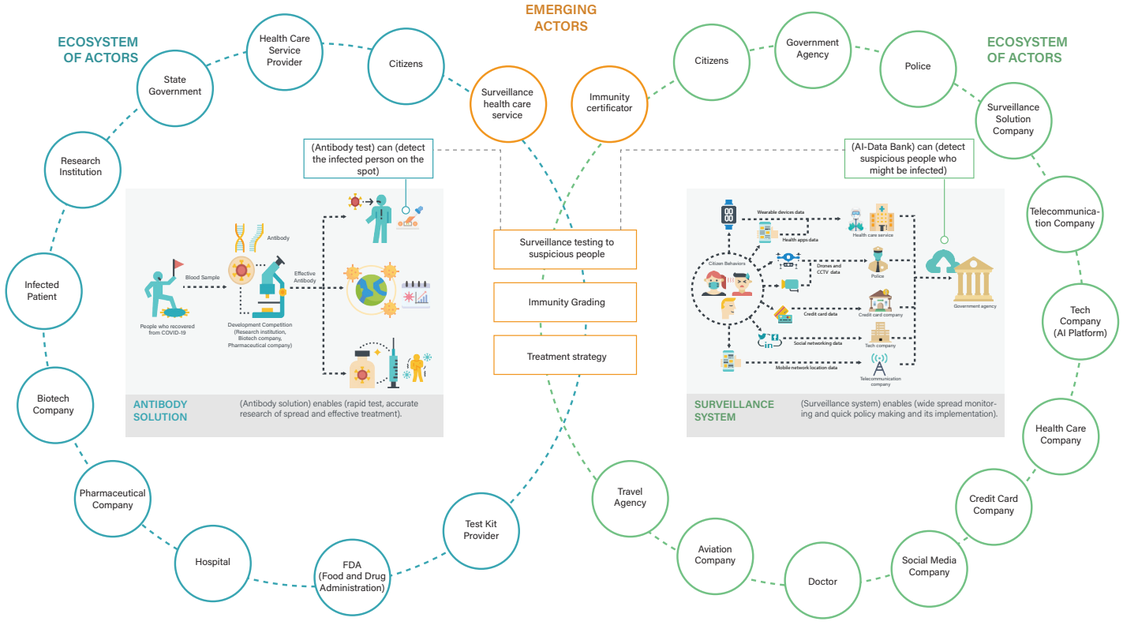
Massive condition tracking.

PAUL ROMER

Introducing a massive “test and isolate” policy, making it safe for Americans to return to work and keeping the infection rate below 5% of the population.

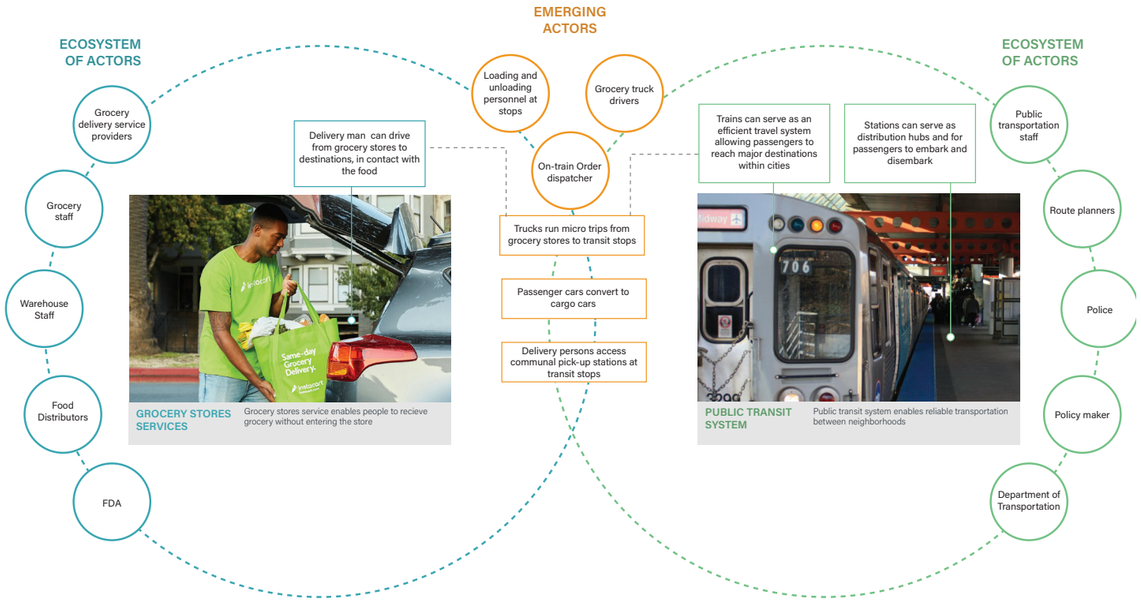
ANTIBODY SURVEILLANCE

Leveraging the antibody solution capabilities for surveillance purpose, proactively aims to recover from the pandemic situation.



MASS GROCERY DELIVERY

Utilizing local public transportation infrastructure to deliver groceries.



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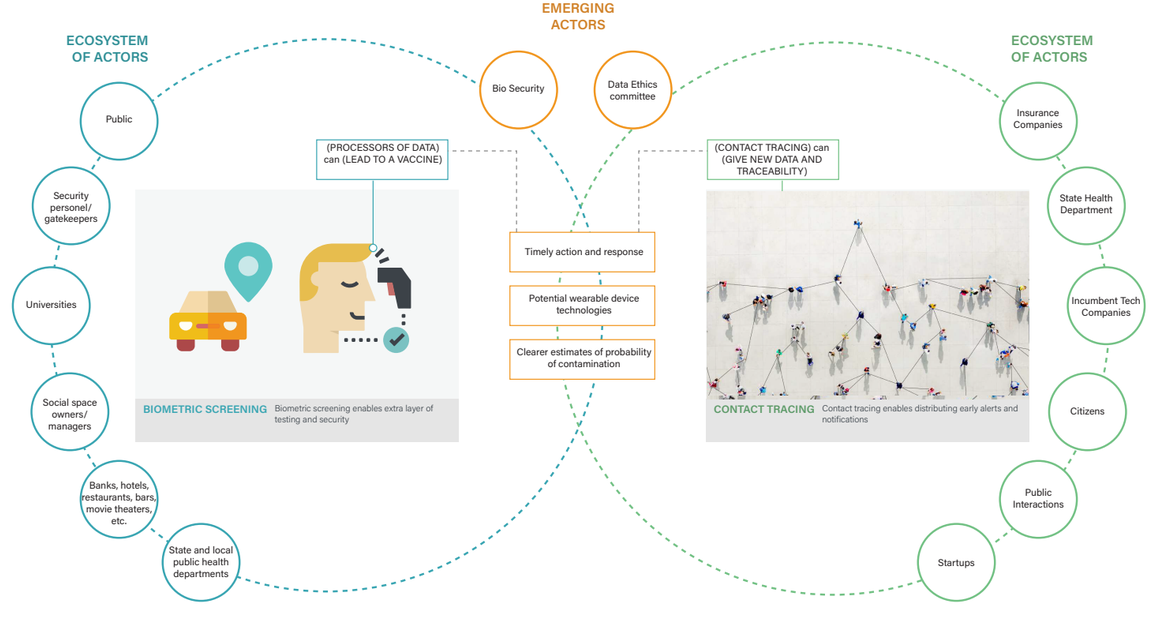
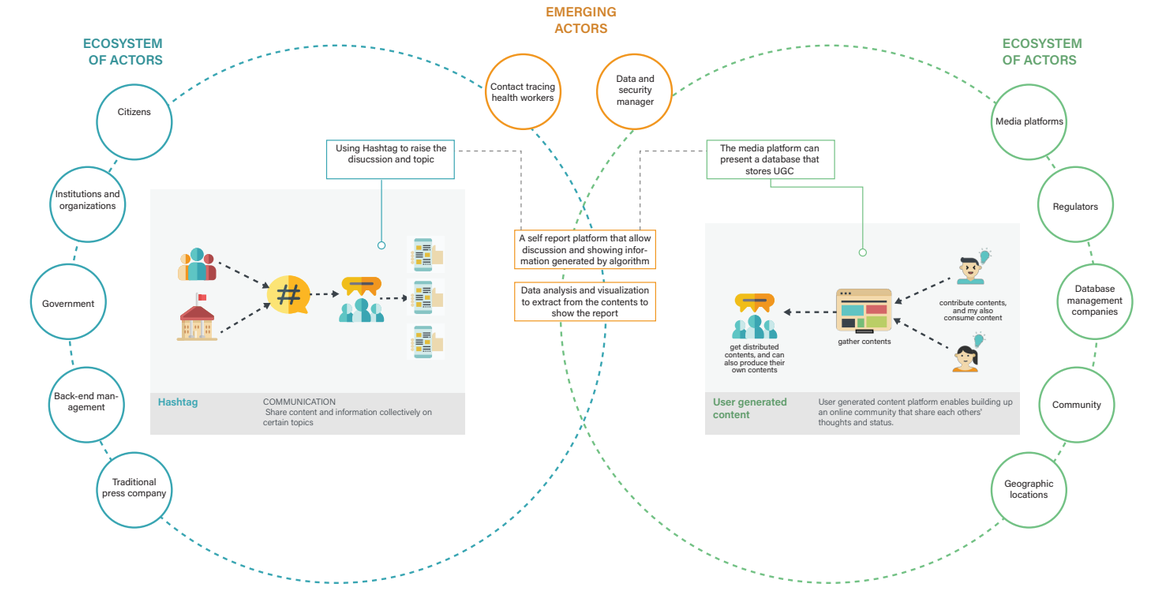


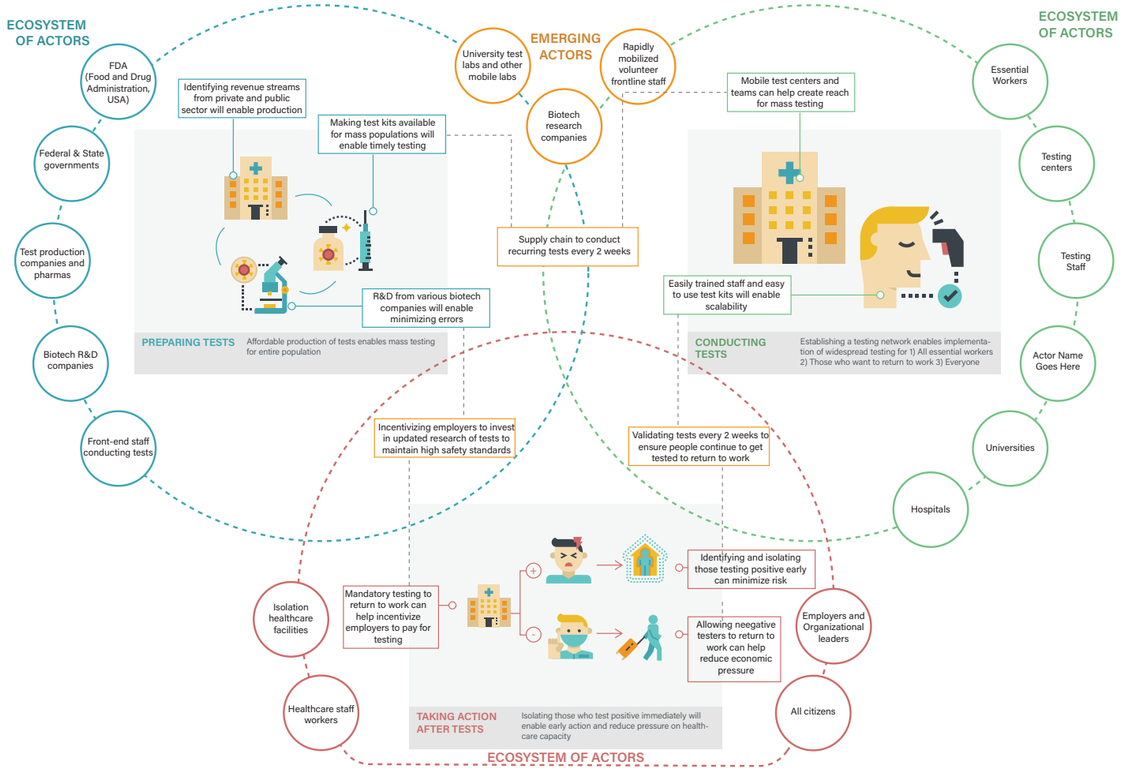
BIO SCREENING

Alert infected individuals and ensure health safety in public spaces.



TEST & ISOLATE

Supporting “test and isolate’ policy to make it safe to return to work and keeping the infection rate below 5% of the population.



What We Learned

The **uncertainty** facing us calls for a tactical integration of emerging solutions and their adaptation to different places.

Emerging strategies and imperatives will require:

- Identifying available infrastructures,
- Intelligent integration of infrastructures,
- Their adaptation and application to different contexts,
- Strategic application of design at multiple levels of systems.

We are dealing with unprecedented **diversity** and many archetypes fall short in addressing it. In tactical design:

- There is no silver bullet approach.
- Variations of a portfolio of archetypes can help address multiple variations of demands.
- The more diversity we face, more design we need.

RECOMMENDATIONS

Our analysis indicated critical approaches that can be adopted in tactical design for pandemics. Yet, when leveraging infrastructural archetypes as a tactical approach to create large scale interventions, it is critical to consider how the various infrastructural components are conditioning the flow and allocation of various resources in a given context, and how the access to these resources condition the livelihoods of diverse agents. Below we present our recommendations based on the 4I’s model (Nogueira, 2019)[1], suggesting that all tactical design for pandemics must consider the interconnectivity of organizational levels, integration of multiple systems, interactions of diverse sets of agents, and

[1] Nogueira, A. (2019). *Sustainable Solutions in Complex Spaces of Innovation*. (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global database. (UMI No. 27548171)

INTERCONNECTIVITY OF ORGANIZATIONAL LEVELS

- Recognizing that different types of knowledge shape dynamics at different system levels
- Incorporating considerations from the “tacit knowledge” that governs daily activities
- Aligning activities and expertise across levels to prevent unintended consequences

INTEGRATION OF MULTIPLE SYSTEMS

- Integrating siloed systems based on the purpose to avoid dispersed organizational efforts
- Uncovering opportunities in organizations across systems based on complementary functions
- Combining efforts based on functional gaps of seemingly separate systems

INTERACTIONS OF DIVERSE SETS OF AGENTS

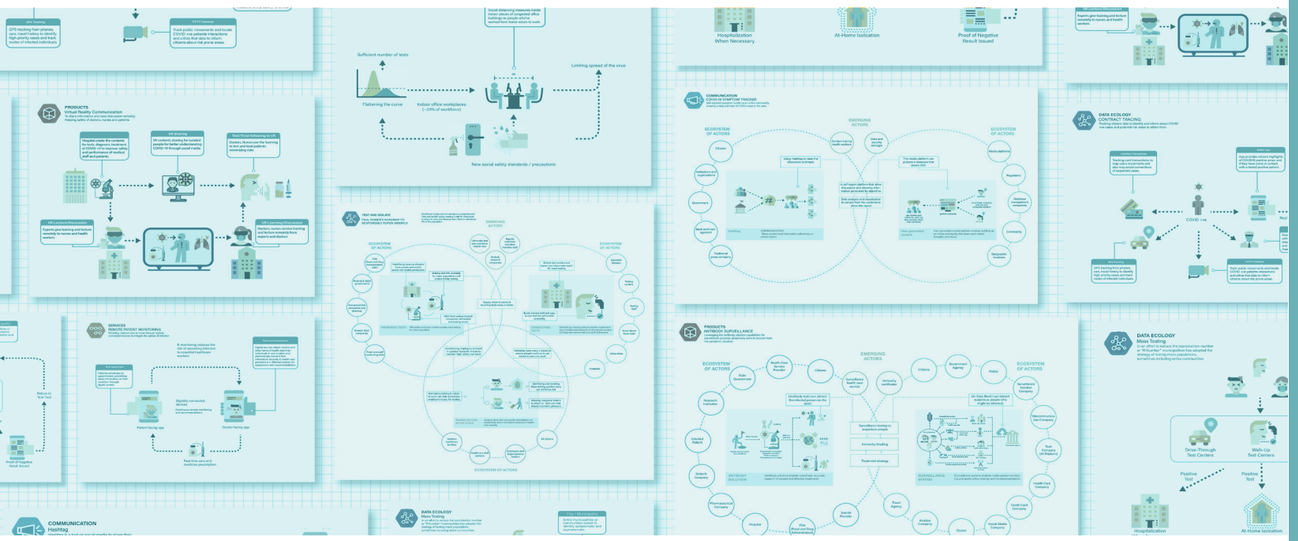
- Revealing unconsidered interactions to trigger new forms of resource exchange
- Enabling new interactions by reconfiguring how people, organizations and infrastructures act together
- Igniting new entrepreneurial ecosystems across sectors that respond to new combinatorial possibilities

ITERATION OVER TIME

- Designing infrastructures to be adaptable and responsive to changing dynamics
- Identifying the various temporalities that give shape to a global pandemic beyond national and organizational boundaries
- Understanding solutions as archetypes to foster adaptability to and adoption of new scenarios

FUTURE DIRECTIONS

This study indicated that the intelligent integration of infrastructures and the design of their components is critical to dealing with pandemics. Different strategies and emerging imperatives will require organizations and people to iteratively develop new ways of organizing daily activities, consequently creating new interventions. Due to the unprecedented uncertainty and diversity of the current circumstances, industries will have to tactically develop and adapt their responses by mobilizing entrepreneurial ecosystems.



We will keep studying and analyzing these archetypes on an industry by industry basis, with the involvement of experts from the fields of design and public health. During Summer 2020, we will investigate the new interventions and infrastructures that are being deployed to address the following questions:

- How can tactical design address emerging imperatives in a changing world?
- How can variations of archetypes support equitable and adaptable solutions?
- How can different industries combine and apply solution archetypes to adapt to the new conditions?

Acknowledgements

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Coordination of activities and report design were carried out by Azra Sungu, PhD student at IIT Institute of Design.

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