Shaping Crisis Information

An Approach to Designing Effective
Digital Information Dissemination Products (DIDPs)
in the Context of a Public Health Emergency

by Ignacio Gimenez Rebollo

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Abstract

In the context of a public health emergency such as the 2020 COVID-19 pandemic, Digital Information Dissemination Products (DIDPs) can have a significant impact on how people receive, process and assimilate information. Yet despite this potential, the many solutions that were put forward by organizations, governments and tech companies have not been able to properly counteract the alarming rates at which false or misleading information have been able to spread through online media (Tasnim et al, 2020; Wang et al, 2019).

In this study, we define Digital Information Dissemination Products (DIDPs) as any online tool, service, platform or software —with or without a physical tangible form— focused on informing, educating, influencing or modifying key social behaviours, in areas of significant public interest. This paper proposes a new approach —structured through a set of facilitation tools— to rapidly design DIDPs, maximizing their impact and effectiveness in the context of a public health emergency.

The proposed design methodology is based on a theoretical framework built around two information platform case studies built during the COVID-19 pandemic of 2020, a systemic analysis of the larger context of public health misinformation, and the principles of human-centered design. The case studies provide an understanding of the specific design requirements needed to develop DIDPs, while the systemic analysis provides a broader understanding of the larger information ecosystem and an overview of the dynamics affecting information flows in public health emergencies specifically.

Finally, a series of recommendations for additional research are presented, highlighting the shortcomings of the proposed tools, and opportunities for further development.

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Introduction

In mid-February of 2020, Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO), highlighted in an official statement how the world is not only fighting a pandemic, but also what he called an 'infodemic' (Zarocostas, 2020). This term was defined by the WHO as an overabundance of information —both online and offline— that includes deliberate attempts to disseminate wrong information, undermining the public health response (WHO, 2020). This aligns with the numerous cases of misinformation, disinformation and false rumours we have seen spreading around the World throughout 2020 (Tasnim, Hossain, & Mazumder, 2020). Ultimately, an infodemic —or public health misinformation in the context of a global pandemic— is understood as a phenomenon that will create confusion, generate distrust towards governments, international organizations and health institutions, and ultimately thwart the effectiveness of any public health response (Zarocostas, 2020).

Evidence of a widespread infodemic during the COVID-19 pandemic is abundant, with examples at almost every level of society and from many countries around the world. These range from the relatively harmless to the more consequential, such as the false rumours alerting of drastic lockdowns in the State of New York, which disrupted supply chains and exacerbated food insecurity amongst vulnerable populations (Tasnim et al., 2020). The misinformation related to both diagnosis and treatment of the disease is confusing not only for the general public, but also healthcare providers, who face an under-researched disease (Tasnim et al., 2020). This uncertainty has resulted in many deaths or seriously injured people, and public health organizations and NGOs alike have been actively fighting to discredit the false beliefs behind them (WHO, 2020).

Yet these are not the only dangers the WHO was referring to. The constant stream of public figures providing false or misleading advice —whether due to ignorance or with an ulterior motive— has been another key element associated with the global infodemic (Mian, & Khan, 2020). Ultimately, the key problem institutions and individuals alike have to face in a public health crisis such as the COVID-19 pandemic is the lack of information itself (Tasnim et al., 2020). Due to the novelty of the virus, there are no clear and definitive answers to most of our questions,

and experts struggle to find the right answers and solutions, particularly in the initial stages. Consequently, there have been conflicting views about the steps that must be taken between different levels of government and institutions, or even between different geographical regions in close proximity. Take for instance the case of Sweden, whose lax measures surprised a European Union moving in the opposite direction (Yan, Zhang, Wu, Zhu, & Chen, 2020); or in the dramatic first stages of the outbreak in Italy, where lack of cohesion between political, scientific and media levels caused multiple attempts to contain the virus to fail (Ruiu 2020).

Online content and social media play a particularly relevant role in the spread of misinformation. These platforms are increasingly becoming society's preferred medium for finding and reading news (Vorhaus 2020), and yet at their very core, they are designed to provide comfort to its users, rather than objectivity. The information presented by these platforms tends to confirm the views of its users to keep them connected, a pattern that many have identified as a threat to democracy itself (Allcott, Gentzkow, & Yu, 2019). This dynamic not only has the power to divide society, but it is also likely to exacerbate educational and socio-economic differences, relegating many to an ideological —and potentially involuntary— isolationism.

There is no question about the damage that unfounded rumours and misinformation campaigns can have. From providing a false sense of safety -and the resulting relaxation of preventive measures— to actively promoting distrust, anxiety and confrontation (Allcott et al., 2019). In the onset of a public health emergency or epidemic, particularly when no treatment or solution is available to fight the disease, only preparedness, some level of social cohesion and coordinated action can prevent unnecessary deaths from happening (Van de Walle, Van Den Eede, & Muhren, 2008; Summers et al., 2020), as we saw in cases such as the rapid —and effective— early responses of Taiwan or New Zealand (Summers et al., 2020). The availability of information and decisive use of it were key factors for their success. In the case of New Zealand in particular, part of the initial success was likely the result of having additional time to observe other countries and prepare accordingly, rather than a solid pre-existing infrastructure and response plan as it was the case in Taiwan (Summers et al., 2020). Regardless of this deficiency, it was ultimately early decisive actions from authorities, monitoring systems, and testing strategies that led the country to effectively controlling the situation within a month (Robert, 2020). Witnessing early examples of COVID outbreaks in places like China, Iran, Italy or Spain, meant access to more comprehensive information for better decision making, which in turn allowed all relevant stakeholders and decision makers to act in a more coordinated manner

and towards the same goals. Even more importantly, the clear results from that coordination and decisiveness —as well as the stark contrast with the situation in other countries— is likely to have encouraged even more public cooperation, and a willingness to prioritize official information over the immediacy and sensationalism of alternative sources.

Reliable, evidence based information, is ultimately the essential piece that many seem to be missing, often willingly, despite its absolute availability. Many digital solutions have tried to bridge this gap and provide reliable information or discredit false content online, and yet most —if not all— have failed to reach those who needed it most. Take for example the numerous platforms released by American companies and organizations, such as Apple's COVID assessment tool, the CDC online information platform or the John Hopkins Dashboard. While all these products were somewhat successful and had a good uptake, the United States remains the country with the highest case and death count worldwide, in part due to a divided response split by partisanship (Altman 2020). While many factors may have contributed to this, there is no evidence showing that these platforms had a significant impact in reducing this partisanship or the incidence of rumours.

How can these solutions improve their impact and effectiveness? What are the issues that are stopping them from succeeding? Can we leverage the way these social and technological systems work to our advantage?

Literature review

Information is an essential piece at every stage of a public health emergency. Whether for legislation, scientific research, public recommendations or personal protection, it is not possible to make decisions when there is no access to information. Similarly, too much information can be just as problematic. Optimal sensemaking, coordination and decision making are only possible when all actors involved share a common frame of reference (Muhren, Van de Walle, 2010).

Through a review of news articles of 2020, we can identify clear phases in how different countries respond to the spread of COVID-19. These phases also seem to align with those proposed by Wang et al. (2020), who propose 3 key stages: Early cases, virus identification, and institutional response.

In order to find ways to tackle the aforementioned infodemic, we need to understand the process, complexities and implications of the information life cycle —from its collection to its distribution. There are several aspects and phases in this process, each affecting different stakeholders and roles, from the moment the data is collected, to the actual communication of that information to the public. Multiple disciplines are directly or indirectly involved in this process, overlapping and interacting with each other at various stages. This review will attempt to provide an overview of the general perspectives and main concepts from each of the fields of study affecting information flow and our primary question. These are:

- Information management in Emergency Response
- Knowledge translation, dissemination and Social Behavioural Change (SBC)
- Online content, social media and digital technologies
- Design Thinking and Human-centered Design

Information management in Emergency Response

In the early stages of a public health emergency, local and national institutions, as well as some key international organizations of global presence, will try to make sense of the situation on the ground, understand the main drivers of the crisis, and project how the situation will evolve. Accurate and timely information is absolutely necessary for rapid coordination and an effective response, (Muhren et al., 2008) particularly in crisis of global concern. Literature on information management (IM) for emergency response provides us with a good framework to understand the nature of information collection and distribution (Van de Walle et al., 2008). The general process of IM is distributed in four phases: Collection, processing, analysis and dissemination.

Figure 1

Information Management Flow, United Nantions - OCHA

Collection

Data collection can take many forms, from needs assessments, to remote sensing, to a review of baseline data.

Processing

Sufficient time and skilled staff must be allocated for data to be processed. For example, before 200 assessment questionaires can be analysed and used for planning, they must be checked and entered into a database.

Analysis

In an emergency, analysis is usually limited to summarizing information, and prioritizing and testing assumptions. Decision makers require analysis that summarizes a large volume of information and points out key aspects of an emergency situation.

Dissemination

Information needs to be communicated clearly and effectively to a wide audience.

According to the Principles of Humanitarian Information Management and Exchange (UN-OCHA, 2002) there are 13 necessary conditions for an effective use of information in emergency response. These are accessibility, inclusiveness, interoperability, accountability,

verifiability, relevance, impartiality, humanity, timeliness, sustainability, reliability, reciprocity and confidentiality (Van de Walle et al., 2008). These principles highlight the essential role that information plays in supporting crisis preparedness, response and recovery.

The information that is collected, processed and analyzed by diverse organizations and institutions during a health emergency has the potential to save lives, but can also endanger people when it is inadequate, misleading or gets in the hands of malevolent groups (Van de Walle 2008). For this reason, it is essential that both individual countries and international organizations develop the necessary processes and systems to effectively collect, process, analyze and disseminate accurate and truthful information. Cooperation and international collaboration in particular, are essential tools to guarantee the effective flow of information in large scale global emergencies (Kokudo, & Sugiyama, 2020) such as the COVID-19 pandemic.

The United Nations (UN) Office for the Coordination of Humanitarian Affairs (UN-OCHA) is the humanitarian body in charge of inter agency coordination and, most importantly, management of information. Much of the material available regarding information management in an emergency context has been produced by this organization. While they do not always collect data directly, they ensure this data and information is accessible and usable by all other agencies. In cases of a public health emergency or global pandemic, however, the main body in charge of data collection, information management, and information distribution for all other agencies is the World Health Organization, also an UN body. Many other organizations and institutions perform these functions at the regional, national and local levels, yet few have the reach and global influence of the WHO. This places this organization in the best position to coordinate a global response, yet this capacity is always subject to the political decisions made by each independent member state. Ultimately, global coordination can be facilitated by these international institutions, particularly through diplomacy and information management and dissemination, but global coordination depends entirely on the political will of national states.

Knowledge translation and dissemination

Information management can indeed set the basis for an effective response, particularly informing decision makers and key actors with the ability to enact direct change. Yet the nature of information management tends to be internal to an organization or set of organizations, and the design of IM systems is generally oriented towards generating insight for those in leadership roles. Decisionmaker awareness is indeed a necessary step, and yet successful dissemination of that insight beyond the organization should not be taken for granted. When making information available to the public, a clear and tested dissemination strategy becomes necessary.

In the current context of digital information, where the sheer volume of content can easily overwhelm the capacity of professionals to keep up with the relevant material, knowledge translation methods can be an effective strategy (Pablos Mendez, & Shademani, 2006). In the case of public health information, where the scientific nature of medical research makes much of the information inaccessible to the average person —and thus, many decision makers— this approach may be essential for the effective communication of insights to the public.

Knowledge translation (KT) is usually defined as an iterative process involving the synthesis, dissemination, exchange and even application of knowledge to improve health, health related products, or the healthcare system (Straus, Tetroe, & Graham, 2009). Ultimately, KT aims to address the gaps between evidence based research and decision making, gaps that information management alone fails to bridge. This means knowledge translation goes beyond simple dissemination, and tries to understand and improve how this knowledge is used as well. It is for this reason that the process needs to be iterative, monitoring how knowledge is being received and used, and adjusting strategies accordingly (Straus et al. 2009).

Often, knowledge mapping (KM) can be an even more effective way of distilling key information, especially in projects where direct involvement from all stakeholders is important. KM makes tacit and explicit knowledge graphic and visual, which can facilitate the identification of important gaps and its causes throughout the knowledge translation process (Ebener et al., 2006). This also relates to systemic design and the production of synthesis maps, tools that integrate research evidence with design methodologies to generate visual narratives that support communication and decision making (Jones, 2014; Jones,

2017). Both of these approaches are collaborative, iterative and constructivist, prioritizing the participation of stakeholders in the process to generate further understanding (Bowes, Jones, 2016). Given the increasingly decisive role of social media and online content, visual knowledge translation might well become the most effective KT approach, as it adapts to the immediacy and accessibility requirements of these contexts.

Beyond the methods of knowledge translation, lessons from the discipline of Social Behavioural Change (SCB) might also be relevant to this study. As described by Schneider and Haider (2018): "SBC aims to identify, document, and implement the most effective means of influencing individual and community adoption of improved practices, whether these are technological or behavioral innovations, to improve health status". While the field relates to multiple disciplines such as psychology or behavioural economics, its overlap with human-centered design is particularly significant. Ultimately, both SBC and design focus on the understanding of human nature and the final beneficiaries in order to shape their products or strategies. This overlap allows us to identify an initial set of methodologies that can be used in the process of generating products and strategies that resonate with final users.

Unfortunately, the resources, time and funding required to design an effective SBC campaign (Schneider et al., 2018) are not always available, especially in the midst of a crisis. While there are valuable lessons to learn from its principles, an alternative approach might be required in the context of a public health emergency.

As it has become clear in the last decade, making information available is simply not enough. The digital era has brought a super-abundance of information (Tasnim et al., 2020), overwhelming amounts of content available at all times, often actively pushed onto us through a multitude of platforms, applications, newsletters and devices. Any solution aiming to combat the infodemic needs to actively compete with vast amounts of content from different sources, from unrelated topics to directly opposite views.

Online content, Social Media and digital technologies

Online content, social media and digital technologies (such as phones, tablets, etc.) are increasingly becoming the most important channels to access and/or disseminate information.

These platforms are predominantly designed to keep audiences engaged for as long as possible in order to collect enormous amounts of personal data. This invaluable data can then be sold to third parties —usually for personalized marketing of products—, allowing the platforms to profit while maintaining their services free. This is what has been referred to as the 'attention economy' (Ciampaglia, Flammini, & Menczer, 2015). While this business model may not always be obvious to their users, it forces these companies to prioritize engagement and to maximize the time spent in the platform. To this purpose, the look, feel and overall experience are carefully designed to be as addictive as possible, trying to 'hook' people for longer periods of time. One of the many ways in which social media does this is through their learning algorithms and artificial intelligence (A.I.), which are programmed to learn the preferences of visitors and customize the content presented to their taste and interests. Ultimately the goal is to provide comfort, so that users keep returning. This has the harmful side effect of facilitating —and actively enabling— 'echo chambers' and 'filter bubbles' (Bruns, 2019), the phenomenon of being exclusively exposed to information confirming one's beliefs and biases, eliminating any contact with opposing arguments or diverse content. Information from preferred sources is prioritized and pushed over 'external' sources that are not part of the interests defined in the profile, effectively shielding the user from external input.

Many argue that this dynamic is actually at the root of an increasingly divided society, contributing to a gradual polarization and the normalization of fringe ideologies (Bruns, 2019). More importantly for the topic at hand, this system makes it very difficult for key public health information to reach all audiences online equally. The design of these platforms is much better equipped to building a loyal audience than it is to reach those at the opposing side of the argument. Those who most need public health advice will rarely receive it, while those who are already likely to be informed will be exposed to the same information ad nauseam.

And yet, social media also has an immense capacity to do good, as many examples have shown. For instance, social media has allowed many crisis response organizations to quickly collect information directly from people affected by emergencies (Black, Dietz, Stirratt, & Coster, 2015). In some cases, online platforms have also shown a capacity to distribute information previously hidden from the public, by-passing a mainstream media that in some cases may have been state controlled. The easily accessible streaming of first hand information has allowed for many first hand accounts of abuses, discrimination or violence, which made possible to held the

responsible accountable (Purbrick, 2019). Moreover, these tools have also served to coordinate large groups of people effectively, often serving to coordinate political movements under the radar of repressive regimes. This was the case during the Arab Spring in 2011, or the Hong Kong protests of 2019 (Purbrick, 2019).

As much as these online services have a potential for good, however, their design and intrinsic business model make them rather problematic. As there is no clear frame of reference to determine the credibility of a source found online or in social media, all the responsibility is placed on the individual user. With an increasingly sophisticated number of technologies at our disposal to manipulate data, image and video, this responsibility becomes more unsustainable every day. Under these conditions, it becomes essential to develop digital tools that facilitate this task in the online space. Digital literacy is now increasingly necessary to maintain a free and informed society (Buckingham, 2010).

Design Thinking, Human-Centered Design and Systems

Design thinking is an emerging approach to problem solving that has been increasingly growing in popularity, particularly in business settings (Razzouk & Shute, 2012), where even some companies have become design leaders (Dunne & Martin, 2006). It is ultimately a generative process, one that focuses on creating opportunities to experiment, create and test options, gather feedback, and iterate designs (Razzouk et al., 2012). It is no surprise that it has been welcomed by business leaders, as it can facilitate a more agile and efficient process of idea generation.

If the ultimate goal of Design Thinking is to facilitate the generation and testing of ideas, human-centered design focuses on ensuring these ideas are adapted to the real needs of those that are meant to benefit from them, generally by including those beneficiaries in the generative process (Stone, Jarrett, Woodroffe, & Minocha, 2005). The concept of human-centered design is intimately related to the earlier user-centered design, a practice defined by Don Norman in the 1980s to emphasize the need to place the user at the center of interface design (Abras, Maloney-Krichmar, & Preece, 2004). According to him, the role of the designer is to facilitate the tasks required from the user, and ensure they can be performed with minimum effort (Norman, 2013). This approach was later expanded beyond the limits of interface design and

task completion, to understand it as a design approach that prioritizes adaptation to the user's needs, but also their skills and limitations; that engages users, can adapt to the context, and most importantly, can effectively work in real life (Kulyk, Kosara, Urquiza, & Wassink, 2007). This set of principles is commonly understood as human-centered design, and it is increasingly being applied to a varied number of fields, particularly those focused on problem solving and idea generation, such as commercial products, health care systems, etc.

The combination of design thinking and human-centered design can therefore yield solutions that are not only quickly and effectively generated, but also adapted to the needs and limitations of those meant to benefit from them.

In the context of crisis information dissemination, however, we cannot understand digital products as merely software or business design. Human-centered design and design thinking can produce innovative and effective products that adapt to a target audience, but will not necessarily be able to effectively manage the complexity of the context in which they are meant to operate. The success of products at this scale can depend on multiple social, organizational or political factors, not only on the usability of the solution at the individual level. These can be understood as socio-technological systems (Vicente, 2010), which highlight the need to design for multiple levels of human-technology interaction. In his book "The Human Factor" (2010), Kim Vicente proposes five levels in which technology will need to be designed paying particular attention to human factors: physical, psychological, team, organizational, and political. Any digital information dissemination product will need to consider these five factors in its design to successfully reach its expected impact.

This new level of complexity leads us to the discipline of systems thinking and systemic design. These methodologies focus specifically on addressing complexity using design thinking approaches, particularly by visualizing and understanding patterns and processes in the larger system affecting the problem (Sevaldson, 2011). A systemic approach will be necessary to analyse the multifaceted problem of infodemics and information dissemination, while systemic design methods such as the Systemic Design Toolkit (Jones et al., 2018) will allow us to properly address the five levels of a socio-technological system mentioned earlier.

Methodology

01 Approach

The aim of this study is to develop a series of techniques to improve the design —and with it the impact—, of information dissemination digital products in the onset of a public health emergency, or as a preparedness activity prior to any crisis. As such, it can be better understood as applied research —focused on solving a particular practical problem— through the design of processes and tools with an immediate application, rather than an exclusively theoretical and descriptive analysis.

In terms of data collection and analysis, this project uses a mixed-method approach, combining a series of qualitative methods with some quantitative analysis as needed. While most of the procedures focus on qualitative data, the use of some statistical data from automated analytics of selected platforms provided an additional layer of verification. In order to collect relevant data that was both immediately relevant to the particular problem at hand, and adaptable to the time constraints of the project, I used two key examples as case studies to draw insights from. These case studies allowed for a better understanding of the challenges and opportunities involved, effectively defining the needs assessment of a potential solution. Prior to this, an in-depth literature review on the subject matter and related fields was performed, which helped guide both the understanding of case studies and the later systemic analysis of the problem, while also completing any remaining gaps.

02 Data collection methods

Literature review

A thorough review of the literature available in the main subject matter, as well as related areas of study, was performed to create an initial theoretical framework. This framework was used to

contrast the findings and data gathered from the available case studies, and to better understand the larger context and ramifications of the research question. The literature also proved to be useful in the analysis stage of the study, filling important knowledge gaps that may otherwise have been left unexplored by the case studies alone.

Case studies

These cases provided concrete, contextual, in-depth knowledge about a specific practical challenge that the humanitarian, emergency response and public health communities face regularly: Designing a digital information platform that can effectively bring relevant, live-saving information to those who need it in an emergency, with minimal resources, and as rapidly as possible given the urgency of the context. This key problem encompases many other factors, questions and barriers that are explored later in our study.

The choice of case studies was no coincidence. Earlier in the initial months of the COVID-19 pandemic I had the privilege of collaborating with the Dahdaleh Institute for Global Health Research in the design and implementation of a COVID-19 information portal as an external consultant. This portal focused specifically in bridging the gap between academic and scientific research and practitioners and decision makers around the World. This experience allowed me to make observations and document the challenges, difficulties and opportunities we encountered throughout the process, providing much more thorough insight than a simple analysis of the final platform and its outcomes. Furthermore, through my involvement with UN-OCHA's Digital Services, I was able to participate indirectly in the implementation of a series of information pages for the humanitarian community on COVID-19, which allowed me to review relevant statistical analyses about its usage and general activity. Both of these experiences provided me with a wealth of applicable insights that shaped this research and defined an urgent need for more efficient and effective product ideation techniques.

These case studies were studied with a combination of qualitative and quantitative methods, with particular emphasis on the qualitative aspects to better understand behavioural, organizational and political complexities.

The main methods were:

- **Observation** of the main design and generative processes —as well as the organizational structures— that underpinned the final decisions and product.
- **Content analysis and usability review**. A thorough review of the sites to identify patterns, and categorize themes and concepts. This was also combined with a contrast with usability standards and user experience best practices.
- **Quantitative data analysis** through a review of the data available for these platforms and/or pages with Google Analytics.

03 Sensemaking & analysis methods

All the qualitative and quantitative data collected in the previous stage was analyzed and synthesized through a series of design research tools. These are based on the Research through Design (RtD) approach, which uses methods and processes from design as a method of inquiry (Zimmerman 2010). Given the numerous ramifications of the information dissemination problem, I applied the framework of Systems Oriented Design, a methodology focused on designing for complexity through the visualization and understanding of its patterns and processes (Sevaldson 2011). In particular, this study used the tools provided by the Systemic Design toolkit (Systemic Design Toolkit 2016). This methodology was particularly relevant at the sensemaking stage of the analysis, providing a framework to systematically organize the knowledge available, find relevant themes and form the basis of the later systemic analysis.

Using systems archetypes (Braun 2002) as a frame of reference, a series of system models were generated in an effort to understand key aspects in the early stages of a public health emergency. These models uncovered clear patterns of social behaviour and strong connections between the many different actors involved in an infodemic.

This analysis ultimately provided a much deeper understanding of the problem, forming the contextual needs assessment —complementing the particular needs assessment from the case studies—for the later design proposal.

Analysis

Drawing from the insights uncovered in the literature review, we can identify an very initial outline of the issues that any potential solution would need to consider and address:

- Information needs to be understood in all its stages, first and foremost in the context of emergency response, information management, and emergency data collection.

- The relationship between formal media, online media, and the broader public has immense ramifications and direct implications in the effectiveness of a response.

- Due to a number of factors, information about any problem affecting society has become increasingly politicized. Political narrative, framing and polarization have become the new reality.

- Design decisions at every level —or the lack of them— can have immense repercussions in the success of a DIDP. Any solution must be designed for the needs and nature of those who are meant to use it, but must also adapt to the necessities of the organization developing it, to ensure its sustainability.

Using this outline as the foundation of our study, a three tier analysis —Case studies, sensemaking analysis and systemic analysis— is developed to gain understanding of the practical, contextual and systemic issues affecting public health misinformation and infodemics.

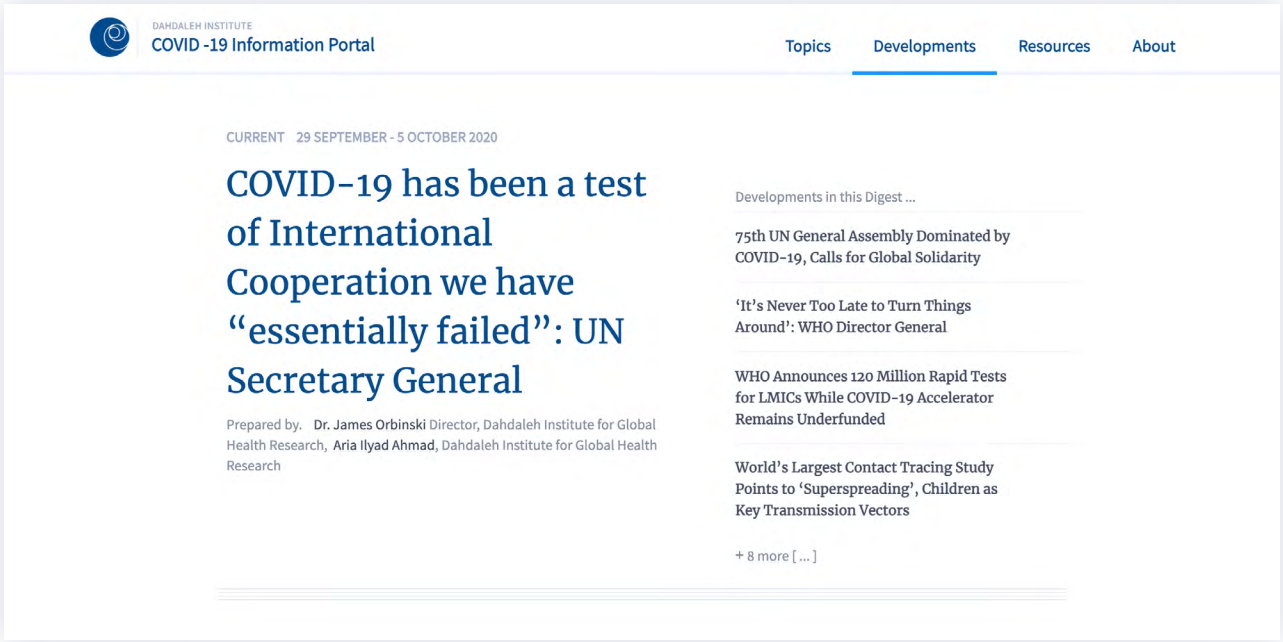
Case studies

The following analysis summarizes key insights and lessons learned from the two case studies that formed the core of our research, the **Dahdaleh COVID-19 Portal**, and **UN-OCHA COVID-19 global** pages.

Dahdaleh COVID-19 Information Portal

Figure 2

Dahdaleh COVID-19 Information Portal, screenshot taken on Nov 2020



Released by the Dahdaleh Institute in August 2020, the COVID19 Information portal was aimed at bridging the gap between academic research and practitioners or decision makers having to respond to the crisis of the novel coronavirus pandemic.

As part of this effort, I had the privilege of collaborating with the Dahdaleh Institute in the design and implementation of this portal. This experience provided me with a first hand overview of the barriers, difficulties and risks organizations can face in the development of these solutions, and a wealth of practical insights to draw from.

The project involved a wide range of academics and practitioners as part of the steering committee, and all of whom contributed with their diverse and extensive knowledge. This diversity and immense expertise in specific fields also required a significant amount of design facilitation. The project began in late April, and after numerous workshops and intense work sessions, the first version was released by mid August, in just over 3 months.

The project was a success initially, yet it had to be put into a hiatus due to personnel shortage. After the project ended, I was able to compile a series of notes on the opportunities and problems I found during the development of this platform.

Main opportunities and successes:

1. Clear vision from the onset of the project
2. Powerful value proposition that was backed by the community and real use cases
3. Great network and input from a variety of key stakeholders
4. Dedicated and passionate team
5. Supportive and open minded higher management
6. Clarity, consistency and ease of use in the final design of the platform

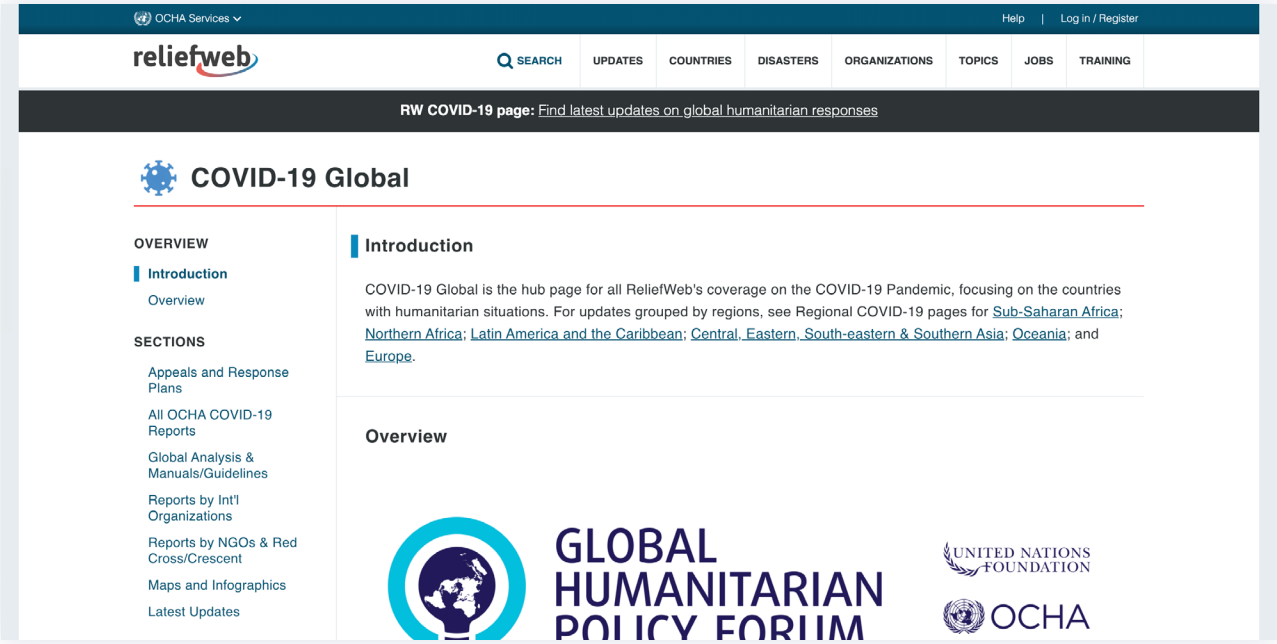
Main problems:

1. Very short timeframe and urgency to release. Danger of quickly becoming irrelevant.
2. Not enough technical capacity, which led to technical issues, bugs, etc. as a result of the pressure to release quickly.
3. Not enough medium to long term capacity. A very small team in charge of the platform, on top of their regular responsibilities. Maintenance required larger and more dedicated teams.
4. Key dependencies, over relying on key roles with no replacements or redundancies.
5. Minimum viable product (MVP) had to be much more modest than the original value proposition. There were not enough elements to easily transition from MVP into the larger goals.
6. Insufficient design facilitation and planning in early stages (ideation stage)

UN-OCHA COVID-19 global information pages

Figure 3

ReliefWeb's COVID-19 Global page, part of the UN-OCHA family of sites. Screenshot taken on Nov 2020



COVID-19 humanitarian information pages were published in ReliefWeb and other portals supported by the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) in April of 2020. I was able to witness indirectly their creation and development, and occasionally assist with minor aspects. As part of the team, I was also able to access data analytics on these platforms, obtaining further insight regarding their performance.

Data analytics show a surge of visitors in the early stages, but the platform was not able to sustain this flow of visitors. Most visits are a few seconds long, and they quickly go to specific country pages or reports. Products offering general information, such as the global map, are unlikely to be explored for long, as average visit time to the main page is around 6 seconds. All evidence indicates that users were not interested in any type of overview, but only specific products affecting their field or region of interest. Once they learned of faster ways to access those reports, assessments or infographics, they stopped visiting these information pages.

In summary, the main strengths and weaknesses of these information pages were the following.

Main opportunities and successes:

1. Provide access to strong products that are needed by the humanitarian community (i.e. reports, assessments, etc.)
2. Clear focus: Central point to redirect to other sites
3. Consistent with OCHA digital products
4. Usable and adapted to needs. These pages prioritized lightness to load faster and easier with slow connections. A recurrent problem in 'field' locations.

Main issues:

1. The timing of release was later than expected by the community, which found alternative sources of information
2. They had a weak user need. Most of the users they were able to reach were not interested in global overviews, but country-specific information.
3. Though the priority was fast loading, the user experience was unengaging and the information was not thoughtfully presented, which may have led many to avoid the site altogether.

Key findings

In summary, these two examples offer a series of strengths and challenges they struggled to overcome. Both cases present a series of individual complications and specific circumstances, however certain aspects of their successes and failures are still generalizable to both studies. Below, we list the key findings emerging from the overlap of the two cases.

- **Challenging timeframes**. The urgency of the situation makes it difficult to plan, and orgs may always feel one step behind.
- **There is immense competition in this sector**, and no time to refine the value proposition.
- **Capacity requirements can be prohibitive** (not enough technical or organizational capacity, not enough resources…)
- **Adaptability and coordination in the short and long term** become essential. The crisis may demand shifting priorities initially, how to maintain a product in the long term after it's over?
- **Understanding user needs and behaviour** key to success, but is time consuming and requires resources
- **External support and partners are a fundamental resource**. Opportunities for funding or partnerships can be abundant, but so is competition.

Sensemaking & preliminary analysis

With all the information, data and insights compiled from the case studies and the analysis of the literature in all the related fields, we begin the process of 'sense making'. Using the tools from the Systemic Design Toolkit (Systemic Design Toolkit, 2016) —a series of tools and methodologies specifically created to tackle complex problems— we can begin to understand what the core problem might be, its ramifications, and where potential solutions may lay.

The initial stages involve the identification of key stakeholders and a deep dive into the roots and underlying structures feeding the problem at hand. After this, I begin to categorize the information by themes and distribute these in a timeline, mapping each of these themes in the standard timeline of a crisis (Wang et al., 2020). After several iterations, the themes have been contrasted with relevant information from the literature and juxtaposed with common patterns and system archetypes found in the work of (Braun, 2002). The comparison with standard archetypes of behaviour in complex systems proved to be useful in guiding the understanding of certain aspects of the pandemic response, particularly in the relationships between key stakeholders, influence and power dynamics, and the risks associated with certain imbalances.

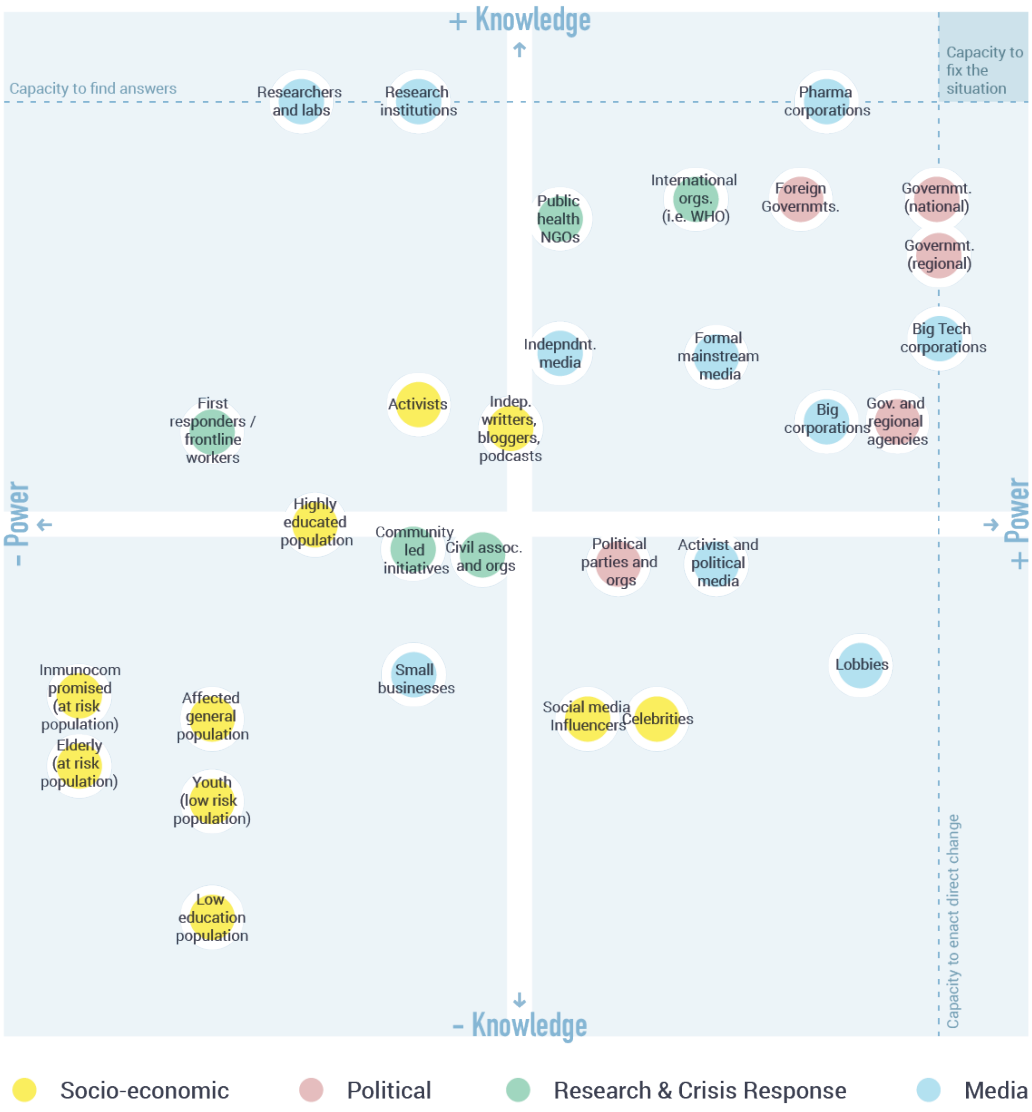
The resulting analysis and key insights was summarized into a synthesis map to provide an overview of the challenges associated with information distribution during a global pandemic —or infodemic— and ultimately situate our research question in the larger context. This synthesis, in addition to the findings in our case studies, resulted in a richer definition of our problem and a clearer vision of the needs, barriers and opportunities any potential solution would have to address.

Main actors and impact: Stakeholder analysis

When mapping the key stakeholders by the level of knowledge and power, we find the overall tendency to be that more power generally involves more knowledge. There are some notable exceptions, as is the case of researchers and labs, with very high knowledge and relatively low power; and lobbies, influencers and celebrities, with very high 'power' or influence, and yet a relatively low level of institutional or individual knowledge.

Figure 4

Stakeholder analysis on a knowledge and power matrix



Another important insight is that only a few organizations reach the 'capacity to find answers' spectrum, and similarly, another handful have the capacity to enact direct change. None have the ability to fix the situation, symbolized in the diagram by the overlap of both previous spectrums. This means that because no specific actor can solve the crisis by itself, any viable solution must come from the collaboration and cooperation between different stakeholders at the political, scientific, economic, social and non-for-profit levels.

The roots of the problem: Causal Layered Analysis (CLA)

Figure 5

Causal Layered Analysis (CLA) of the infodemics

In order to understand the underlying issues resulting in the Novel Coronavirus infodemic of 2020, I worked on a Causal Layered Analysis (CLA). This tool can facilitate the identification of different levels of causality, eventually leading to the underlying social narratives and beliefs that enable the visible outcomes.

Many interesting aspects came out of this exercise, but maybe the most important are the effects of online media, and the massive transformation that modern societies are experiencing in how information is consumed and processed. The need for immediacy, the comfort of only being exposed to information we agree with —the so called 'echo chambers— and the higher levels of distrust, arise as the main threats to fair and objective information dissemination.

Ultimately the culture supporting these realities (either the cause or a result of them) is one of relativism, individualism, comfort and yet a need for a strong sense of belonging. These are narratives that are increasingly entrenched in our societies, and will be incredibly hard to overcome.

Systemic analysis

After an iterative process using systems theory —and particularly the system archetypes proposed by Braun (2002)— I modelled 4 variations of some of these archetypes that represent essential aspects, dynamics and social behaviours contributing to the infodemic. These models can be plotted along the general timeline of an emergency, as they emerge at different times and can span multiple stages (see Appendix A).

The four models are:

- **Identification of the threat and initial guidance**, a variation of the 'Limits to growth' archetype.
- **Media ecosystem response to the crisis**, a variation of 'Accidental Adversaries' archetype.
- **The socio-political framing** of the situation, a variation of the 'Escalation' archetype.
- **The evolution of the institutional management** of the situation, a variation of the 'Eroding Goals' archetype.

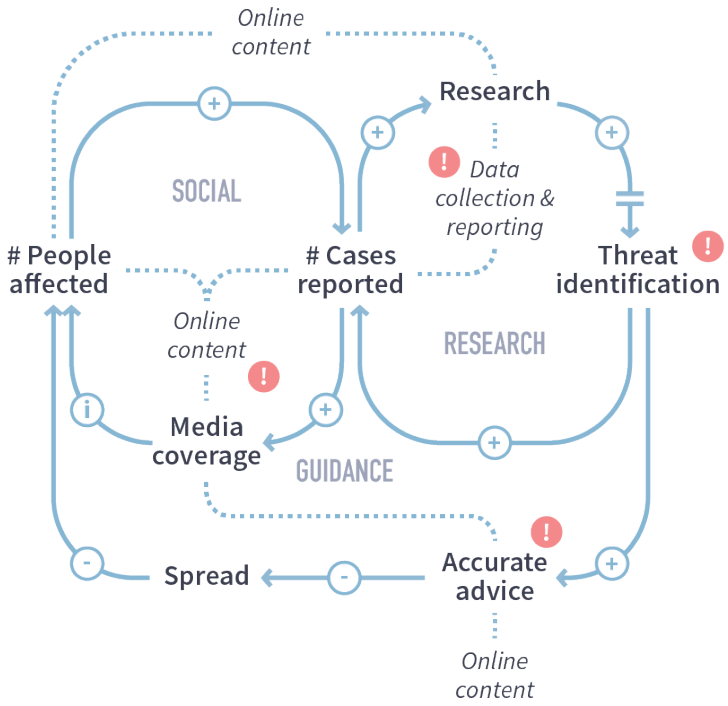
We can use these 'system maps' to understand the direction the crisis response may take, and how to prepare accordingly.

Identification of the virus and initial guidance

This model (see Figure 6) is based on the archetype of limits to growth (Braun 2002).

Figure 6

Identification of the virus and initial guidance model



The model illustrates the main dynamics of the early stages of the pandemic. The number of people affected increases the number of cases reported, which in turn will incentivize media coverage of the issue. At the same time, media coverage itself can influence the number of people affected depending on the narratives and information presented. Similarly, the number of cases reported would incentivize research on the subject, which in turn —after a considerable delay— could help identify and understand what the threat is and how it operates. This will facilitate the identification of cases and therefore contribute to the number of cases reported, completing a reinforcing loop. It would also improve the accuracy of the advice, which could theoretically reduce the spread and therefore the number of people affected. This last piece, however, may not be as straightforward, as the COVID-19 pandemic has extensively proven. Part of the reason for this is the heavy reliance on both formal and online media to distribute this advice to the broader population.

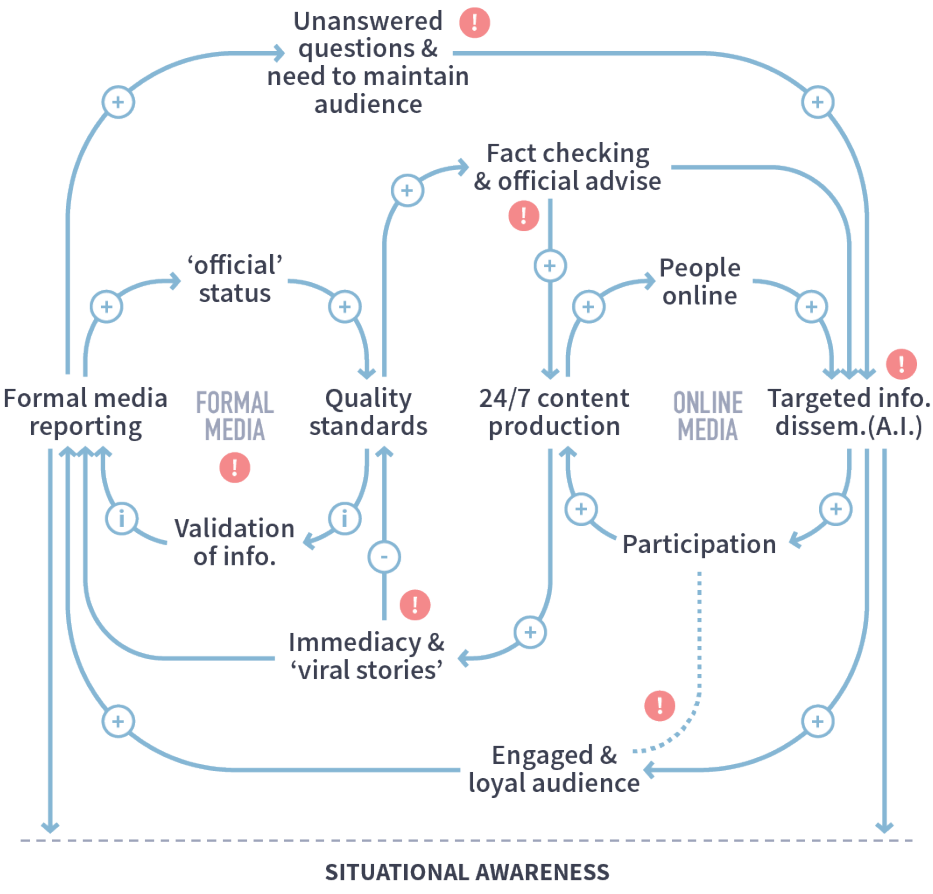
A key aspect in this system is the quality of the data collection and reporting mechanisms. These will directly influence the quality and potential of the research, while also affecting the number of cases identified, and obviously reported. Without proper data collection and reporting mechanisms, the entire system will fail to balance. Online media can also be used as an effective tool for direct data collection and first hand reporting from the affected population, as seen in the literature.

Main challenges

- Heavy dependency on data collection and reporting mechanisms (+preparedness)
- Iterative nature of the threat identification process and its consequences
- Changing and/or inconsistent advice as a result
- Heavy influence of online media (for bad and good)

Figure 7

New Media ecosystem response model



New Media ecosystem response

The relationship between formal media and new media (see Figure 7) can be understood as a slightly modified version of the 'Accidental Adversaries' system archetype (Braun 2002).

The Media ecosystem response models depicts the dynamics between formal and online media. This relationship is extremely uneven, and can easily result in the degradation of formal media quality standards in favour of the immediacy of online media. Over time, this imbalance will drive people to social and online media, gradually increasing the dependency of the whole system from it.

Initially, this may appear to have some positive aspects, making information more accessible, engaging and immediate, yet this cycle can become very problematic in the long term, as its very design will foment misinformation, confrontation and polarization.

Main challenges

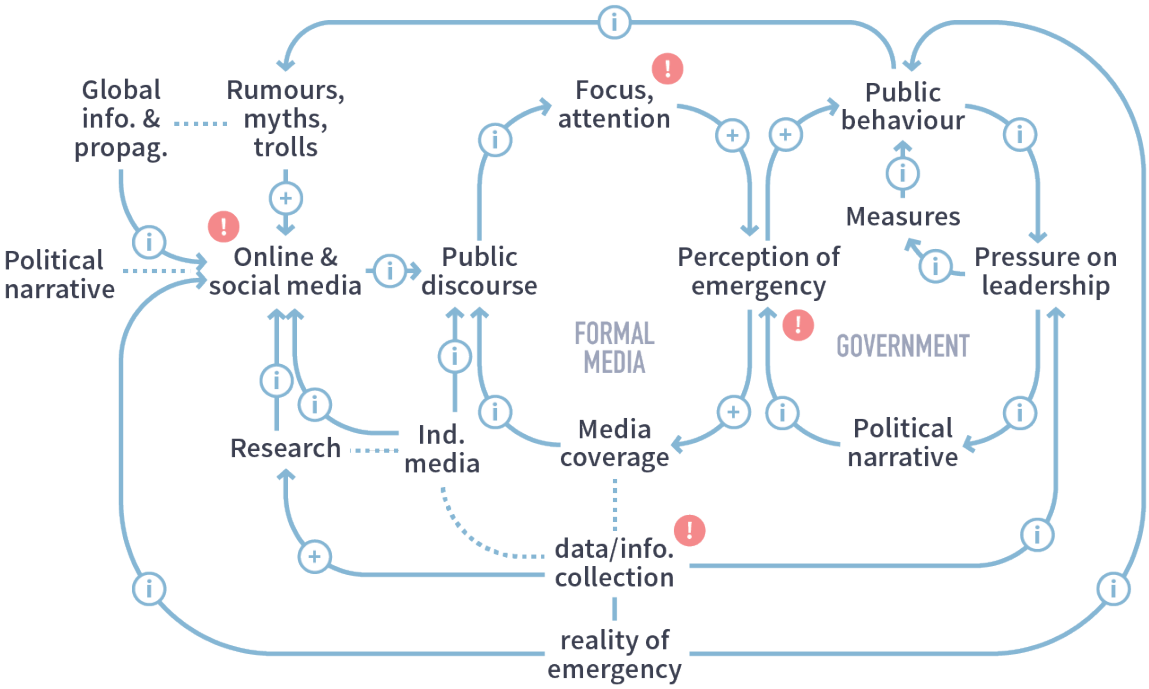
- Formal media cannot compete without sacrificing integrity in this uneven dynamic
- Fact-checking from social media will ultimately serve to generate more engagement in social media, solidifying audiences and bases but hardly reaching those in the opposing sides of the issues.
- 'Viral stories' put pressure on media to be reported, but often give credibility to fringe ideas
- A.I. creates echo chambers, shielding groups from relevant information
- Formal media solidifies audiences in social media, increasingly depending on it to stay relevant, which erodes its independence in the long term.
- Any gap in formal media's reporting drives audiences to online content in the search of answers, incentivizing even more the reporting of online content and reduction of standards.

Socio-political framing

The modeling of the socio-political framing of the situation (see Figure 8) was based on the 'Escalation' system archetype (Braun 2002).

Figure 8

Socio-political framing model



In this model we can identify the dynamics affecting the public perception of the emergency. The most relevant aspect of this system is the tension between public discourse and political narrative. Whichever narrative is stronger will end up overpowering and shaping the other. Totalitarian regimes with control over the main media channels will be able to craft public discourse with relative ease, while in more open and free societies, governments will likely have to adapt to the narrative imposed by the key media players and increasingly, by public discourse in social media.

Ultimately, we can identify again in this system the increasingly dominant influence of social media in key levels of society.

Main challenges

- Focus and attention of the public can have immense consequences, shaping response, available funding, collection of data...
- Perception of the emergency can be shaped predominantly by political narrative or public discourse. Often will influence the other, depending on which one is stronger or faster to mobilize. When both have strong drivers and yet remain divergent, conflict, social tensions and public discord might unfold.
- Social media can increasingly overpower social media in shaping the discourse. Its influence can be positive or negative, depending on many factors, often unpredictable.
- Data collection can shape media, but media can also shape how or what information gets collected.

Institutional Management Evolution

The modeling of the institutional management evolution (see Figure 9) was based on the 'Eroding Goals' system archetype (Braun 2002).

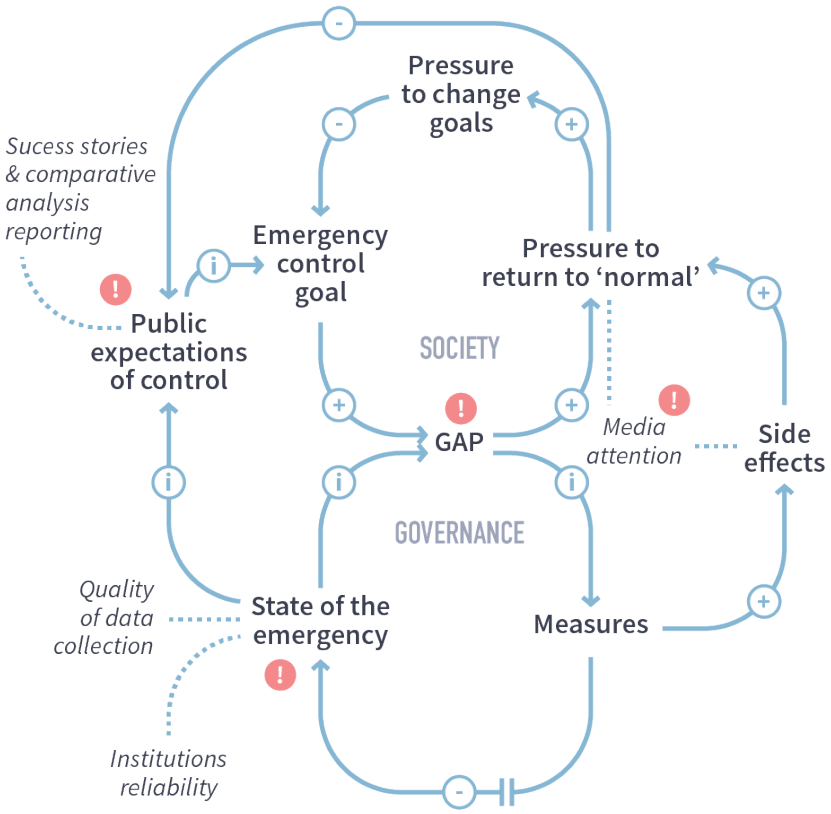
The model maps the tension between the reality of the emergency on the ground, and the goals and expectations of pandemic containment that a given society sets. Here as well media and public opinion play a fundamental role, and can contribute to either keep or slowly erode the original goals. A key aspect shaping public opinion is how the situation in other countries or regions is perceived. Of course, this comparative analysis can easily be -as it often is— biased in favour of the dominant public discourse shaped in the socio-political framing of the situation.

Main challenges

- A persistent goal between the goal and reality will gradually lead to the surrender of the original in favour of more attainable ones.
- Media attention can heavily affect the overall direction of the system
- Public expectations are predominantly shaped by media (online and formal)
- State of the emergency can be highly subjective, and therefore also reliant on many factors including media, institutions reliability, quality of the data collected, etc.

Figure 9

Institutional Management Evolution model



Findings and needs analysis

At this point, we have a richer understanding of the larger context and dynamics affecting information flows, but also the more specific requirements we identified in our case studies.

Bringing all of this together —and considering the key lessons from the literature on design methodologies— we can define a clear set of needs and specific requirements for any potential solution to thrive.

Design proposal

The complexity and difficulty of developing successful Digital Information Dissemination Products that can actually have a significant impact in the larger context becomes clear after reviewing the evidence from our systemic analysis. The likelihood of these new platforms or apps becoming established and visited enough by the demographics they aim to help is generally fairly low. Becoming successful enough to significantly change behaviour in a given demographic and the larger society is an even more ambitious —and unlikely— goal.

As we have seen, a large number of factors —psychological, technical, organizational, and contextual— directly influence the success or failure of these products. Some of them, such are the technical and organizational barriers, may be more visible and relatively easier to plan for. Others, such as the psychology of our target audience, the larger context of the crisis or the countless socio-political and economic factors, might be harder to identify and predict.

In the midst of a crisis or a public health emergency, time is of the essence. As we have seen, more often than not teams and organizations tend to consider planning and design as a luxury reserved for calmer times. The pressure to respond immediately and release a product is immense —particularly in the last decade, where the dominance of social media in the information landscape demands immediate action to remain relevant. Under these circumstances, organizations are forced to quickly pull resources together and release whatever product they are able to generate in the shortest amount of time, rather than the most strategically relevant product or the most impactful solution. In other words, time to think is a luxury they do not feel they have.

These circumstances and needs align well with the principles of rapid prototyping and design thinking. However, in the particular context of emergency response —where lack of design capacity, or even knowledge of it, is usually the norm— these methodologies require not only excessive time and effort, but also the input of external professionals, often at a high cost, and with no guarantee of success. In this context, a more structured set of guidelines and well documented methodologies, made publicly available, would allow these organizations to apply design thinking to

their ideas independently. By doing so, they may be able to benefit greatly from its most relevant strategic advantages, without any significant sacrifices in terms of resources, time or capacity.

With this in mind, an initial solution was proposed: a design toolkit developed to facilitate the rapid brainstorming, prototyping and planning of effective products in the context of an emergency. This proposal consists of a number of quick team ideation tools —a series of structured and collaborative activities to facilitate the process of defining an idea, testing it, planning its development and envisioning its future evolution. These activities can be organized in a short workshop of one to three days, and have the potential to provide teams with a much more strategic direction, increase the chances of success, the impact of the product, and avoid unnecessary expenses or delays in the short and long term. Essentially, a very small investment in the early stages of the process can yield a faster, more efficient, more effective and more impactful DIDPs.

This toolkit (see Appendix A) has been developed using a combination of multiple Design Thinking activities. Each exercise has been selected and adapted to fit the specific requirements and particularities of the emergency response context, and the process itself is tailored to the time constraints and organizational dynamics described earlier in this study. Yet it is important to remember that these collaborative tools are only a proposal in its initial untested form. Though undoubtedly a useful facilitation asset, additional research and testing with multiple organizations will be required to objectively confirm its effectiveness and increase that effectiveness over time through multiple iterations.

Table 1

Structure of the DIDP design workshop based on the number of days available

workshop type	1st day	2nd day	3rd day	4th day
1 day workshop	*Stage 1 (full)* *Stage 2 (step 1; step 3, only 2 stages)* *Stage 3 (main feature)*			
2 day workshop	*Stage 1 (full)* *Stage 2 (step 1)*	*Stage 2 (step 2, only trends; step 3)* *Stage 3 (2 features)*		
3 day workshop	*Stage 1 (full)*	*Stage 2 (minus scenarios)*	*Stage 2 (review)* *Stage 3 (5 features)*	
4 day workshop	*Stage 1 (full)*	*Stage 2 (steps 1 to 2-3)*	*Stage 2 (step 3 and step 4)*	*Stage 3 (no limit)*

Before you begin

The proposed design tools can be structured, as mentioned earlier, in a workshop spanning one to three days, depending on the urgency of the project, the resources available and the size of the group participating.

To guarantee the success of the event, there are a series of preliminary conditions that organizations will need to consider and plan for.

General structure and time allocation

The workshop will be structured through the activities proposed in our design toolkit. This toolkit is divided in three stages (or design tools): 'Ecosystem Placement & Impact', 'User Needs and Product Adaptability' and 'Organizational Design & Planning'. Each of these stages is composed of multiple steps and activities, and may involve a day's worth of collaborative work. All team members —as well as external partners and target users, depending on the activity— will actively participate in all or most of these activities. The tools allow for certain flexibility, and depending on the needs and circumstances of a given project, specific activities can be either omitted, shortened or merged with others. This allows teams to build a more contained and focused workshop spanning two days, or even a single intensive day of work. For additional information on how to structure the event depending on the number of days available, see Table 1.

Facilitation

The toolkit has been specifically created to guide organizations through the design process even if they don't have any dedicated design capacity or may not be familiar with design thinking concepts. Ultimately, the intention behind this proposal is to bring design methods to those organizations that need them most, and would otherwise not have the resources or capacity to benefit from them.

Nevertheless, as accessible as these tools aim to be, it is highly encouraged to bring in a trained facilitator to guide participants through the workshop. Even though the toolkit can provide a

roadmap and the activities, an experienced facilitator will be able to truly bring out the creativity and hidden knowledge in the team. This is particularly important for bigger organizations where roles, hierarchies or rivalries might be an important barrier to collaboration. Designer or not, the role of the facilitator is fundamental, as it can help break the ice, foment active participation and ensure the group maintains an open, inclusive and collaborative mindset.

The four pillars

In addition to a good facilitation, the success of the toolkit relies on four key elements. These are referred to as 'the four pillars', since they are the foundation upon which the rest of the workshop will be built. If these four aspects are not given the proper attention, the activities in our toolkit will not yield meaningful results.

01. Concept

First of all, there must be an idea. These tools are not meant to be used as a brainstorming or idea generation tool. Rather, they are meant to help teams shape, maximize and test the impact of an idea, pre existing concept or organizational goal.

02. Participants

Selecting the right participants is the single most important thing for the success of a workshop. Failing to bring in a given group will radically bias the result in favour of those who are present. Deciding who to bring is the first step towards determining what kind of solution you seek. To ensure a group of participants as balanced as possible, consider the T.E.S.T. approach: Team, Expertise, Stakeholders and Target audience.

All the team must be present, this means everybody who will be participating in the project, regardless of their role. Managers, developers, financial officers, marketing, public relations, editors, even interns. The goal is to address the project from all perspectives and points of view. As unsettling as it might be for managers in the beginning, it will have the very desirable effect of reducing the number of blindspots that may otherwise go unnoticed.

Bringing experts on the key subjects affecting the idea or product can also be essential. They will be able to provide more objective insight, and help the team move forward when it hits a knowledge barrier. These 'experts' may be internal or external to the organization, or even a combination of both. It is advisable however to avoid conflicts of interest. Experts involved in a given project for too long might be unable to judge it objectively. In this case, external support from partners might be advisable.

The group should also aim to include any relevant stakeholders. Funders, partners from other organizations or advocates of your product or work are a key asset. Ultimately the product will rely on them for funding, advocacy or collaborations, and incorporating their views will set the project one step closer to a successful relationship.

Finally, try to include some of your target audience. This may be challenging in some cases, especially in the middle of a crisis, when time is of the essence. Often, the target audience may also be part of the previous groups. Stakeholders may also be your future users, and your group of experts may end up becoming the biggest fans of your product if it solves a problem they have been struggling with for long. You may also find other ways to reach your target audience during and after the fact through digital means, gathering their feedback and opinions through surveys, participatory forums or social media.

03. Gaps

Not everything is possible, especially in the limiting circumstances of a health emergency. Participants representing the target audience might not be available, funders and stakeholders might not be willing to spend valuable time helping you refine your project and simply expect an already defined idea. In the worst case, maybe even bringing the entire team together is unrealistic. These might be significant barriers to the success of the exercise, but it does not mean it can't or shouldn't be done. As long as the group is able to identify and acknowledge their biases and shortcomings, these tools will still be able to provide useful and actionable insights. It will be important to discuss these gaps as a group, and document areas where the team of participants to your workshop will be lacking expertise, where they might be excessively knowledgeable and potentially biased, or the absence of any relevant groups that should be represented and aren't. This will provide the team with a list of items pending further research, as well as important aspects that may require additional feedback from key groups after the

workshop. It is also recommended to use this document as a reference throughout the event, ensuring participants understand at all times when a given solution will need to be tested and reviewed externally after the fact.

04. Openness

Finally, it is essential that participants come with an open mind and engage in the process equally, regardless of roles or seniority. As mentioned earlier, for these activities to truly shed light on the complexities and challenges of creating an impactful product, it is crucial to leave hierarchies behind. Only by ensuring everyone is heard equally, without fear of retribution, can we address the problem from every point of view. This in turn will allow the group to uncover and address as many barriers, challenges and difficulties as possible. Ultimately, at this early stage ideas are extremely malleable and adaptable. The more problems the workshop can bring to the surface, the more we can design for them, and the smoother the process will be later on.

Once these four pillars have been addressed and a clear plan has been defined —ideally in collaboration with the person that will be taking on the facilitator role— we are ready to begin the workshop. The toolkit consists of three steps or tools, as we mentioned earlier, yet multiple combinations are available, as we saw in table 1. For the purpose of clarity, in the following sections we will consider each of these stages will span one day of collaborative work, though this may not necessarily be the case.

Figure 10

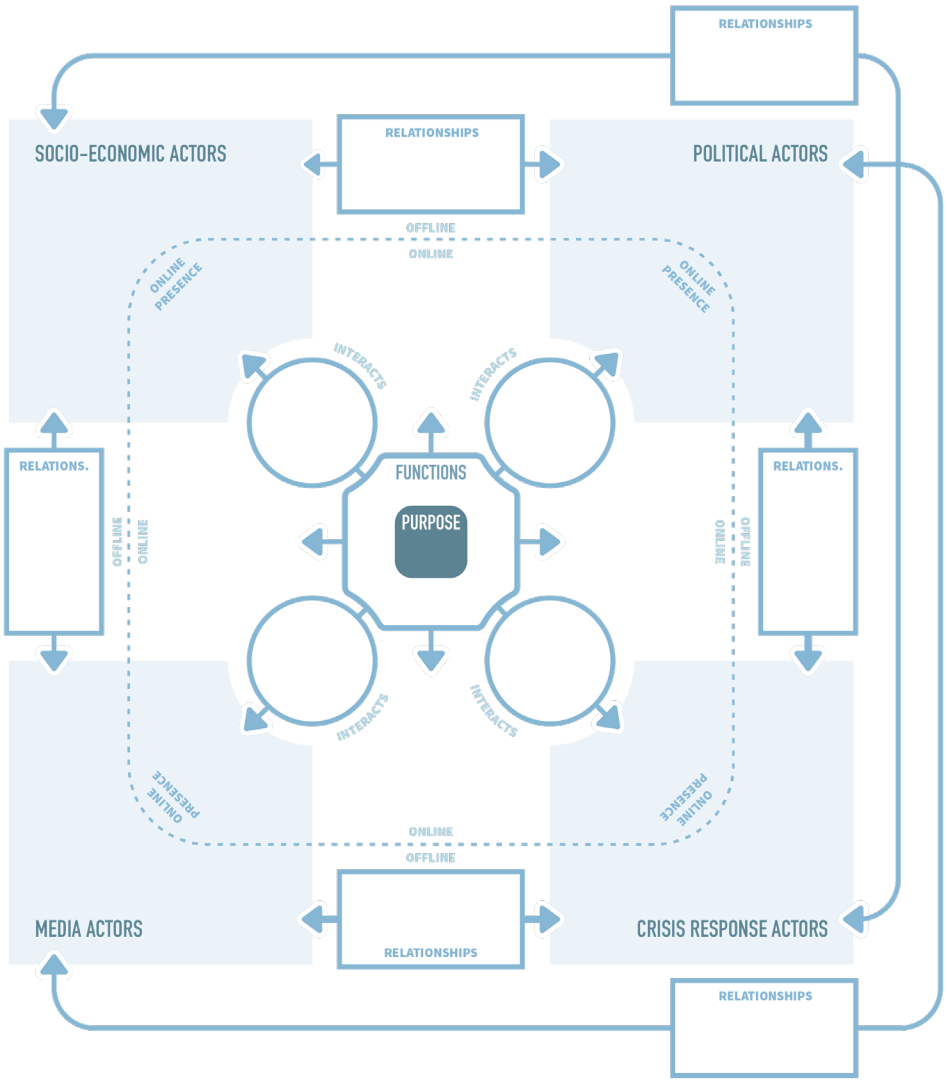
The DIDP Design Toolkit

Stage 1: Ecosystem Placement & Impact

The first tool in the design toolkit (Figure 11) focuses on product placement. It aims to guide the group through the process of thinking collaboratively about the larger ecosystem in which the platform is meant to operate. Each section of this diagram shows the space in which each stakeholder will be operating, the relationships generated between them or our organization, and other relevant products related to our idea or operating in the same field. Once this map is

Figure 11

'Ecosystem Placement & Impact' design tool.



completed, it should give the group a big picture perspective of the environment they will be operating on and the challenges associated. This activity is best structured in the following 6 steps, which are meant to facilitate a more organized and productive collective reflection.

Step 1: Determine your Stakeholders

What are the main actors in the ecosystem the product or idea will be operating in? The group should be as specific and detailed as possible in trying to identify the key players and/or beneficiaries that will affect your environment and product. Actors such as 'the government', 'the United Nations' or 'business owners' are too complex and large in scale to have a clearly defined behaviour beyond a very high level agenda. The group should brainstorm, either in turns or in smaller groups, much more specific actors. Take the government for example, usually one of the first stakeholders to come up in a group, who are they really referring to? Which department, which roles? In all likelihood, many actors are relevant within the government, and they may have different goals and behave in different ways. Some might be supporters, while others may be detractors. All within the same institution. Similarly, the beneficiaries of your idea should be clearly defined and categorized. For instance, 'vulnerable population' is not a demographic with a defined identity, needs or goals, and it will not yield useful information. Breaking down that group into more specific and better defined demographics will provide more insight, and will force participants to start thinking which profiles must be prioritized.

Open and constructive discussion should be encouraged until the group is satisfied with the actors found. Throughout the process, these actors should be placed in one of the spaces allocated to the four key categories in an emergency: Socio-economic, political, media and emergency response. . The same 'stakeholder' may be perceived as 'political' by your organization, yet the How are actors in the same category working with each other? The relevant stakeholders, divided in our 4 key groups: Socio-economic, political, media and emergency response. These actors may be socio-economic, political, related to the crisis response, and the media.

Step 2: Find the Relationships

What are the relationships between the different groups? How are the political actors interacting with responders or the media players? Discuss as a group the existing relationships between the different stakeholders and stakeholder groups. Be as precise as possible, and try to identify as many connections as the team can come up with. Place these connections in the appropriate box, depending on what groups are involved. If a given relationship involves three or more groups, try to break it down in bilateral links. What do each of them need from each other?

Step 3: Identify their Online Presence

Ultimately, this exercise is meant to help us develop an idea for a digital product. The surrounding ecosystem of online tools, platforms and services in which we operate —and our ability to adapt to it— will have a direct impact in the success of our product. This step will focus on mapping the online presence of all the relevant actors and groups we identified earlier. What websites or apps are your key stakeholders maintaining, promoting or using? Do they have relevant social media accounts? Did they release a new diagnostic app? Discuss and describe these products, and place them in the right spaces. If there are relevant online products that don't belong to any particular group, place them in the spaces in between. Lastly, try to rate them by their relevance and impact on your idea or audience.

Step 4: Discuss your Product

After identifying all the relevant online products in our ecosystem, the following step will focus on defining the product we aim to release. Discuss as a group your core mission and the underlying values of your organization. Place this information in the 'Purpose' box. Ensure all the participants align in their vision for the idea and the organization itself. Use this step as an opportunity for organizational self discovery. How do participants, team members, partners or management perceive the organization and its goals? This will ultimately form the 'core' of your product.

Once this 'core' level has been discussed, move to the more specific and technical solutions. This will be the 'superficial' level of your product, what your beneficiaries can see and use. Include

features, functionalities and services your product will be providing in the 'Function' box, and ensure both levels align and reinforce each other.

Step 5: Discover the Interactions

Finally, in the last step of the process, the group will discuss how the product —both at its core and superficial level— interacts with the online presence identified in the step 3.

What platforms will be directly competing against your product for attention, funding or influence? What platforms share your goals and values? What services is your target audience already using? This will determine the requirements, needs and limitations of the environment you will operate in, and the expectations and preconceptions your audience will have.

Step 6: Iterate

Are your product functionalities serving each group appropriately? Are they contributing in a way that serves and aligns with your mission? Revisit any steps as needed and iterate new versions. Do as many rounds and revisions as necessary until the group is satisfied with the resulting ecosystem, the most relevant stakeholders (by impact or need) will be determined.

Stage 2: Audience Needs & Product Adaptability

The second design tool will be the Audience Needs and product adaptability, which can be divided in 3 main parts (or steps), plus 1 additional — yet optional— component to define a more adaptable and durable product.

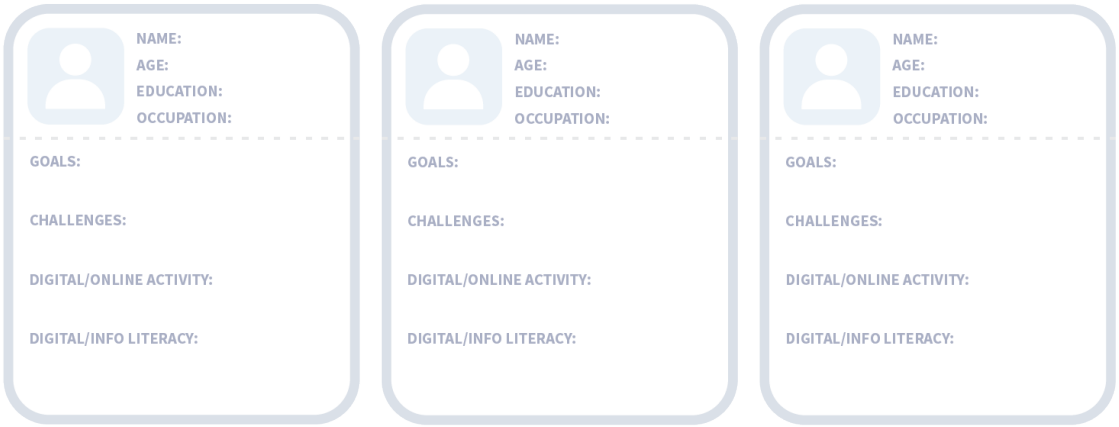
The first step focuses primarily on audience definition, identifying key profiles. In the second step, the group will explore trends and future scenarios. In the third step, the group will bring together all the previous information into a timeline, and delve deeper in how the crisis might evolve and how the product will adapt to it. Additionally, projects with a long term vision —

beyond the immediate response to the emergency— will be able to expand the third part using the future scenarios, testing the adaptability of the product to more unforeseen events.

Step 1: Target audience

Figure 12

'Defining Target Audience' activity



Participants will dig deeper into the beneficiaries, potential users, and other stakeholders identified during the stage 1 of the project (ecosystem placement and impact). The group will brainstorm and refine more concrete user profiles to focus on. Using the template, create as many distinct profiles as possible, identifying their goals, the challenges they face, what type of online platforms, services or websites they could be visiting, and their level of digital literacy. Once the group is satisfied with the user profiles and their definition, try to evaluate their relevance to the project and prioritize up to five, when possible.

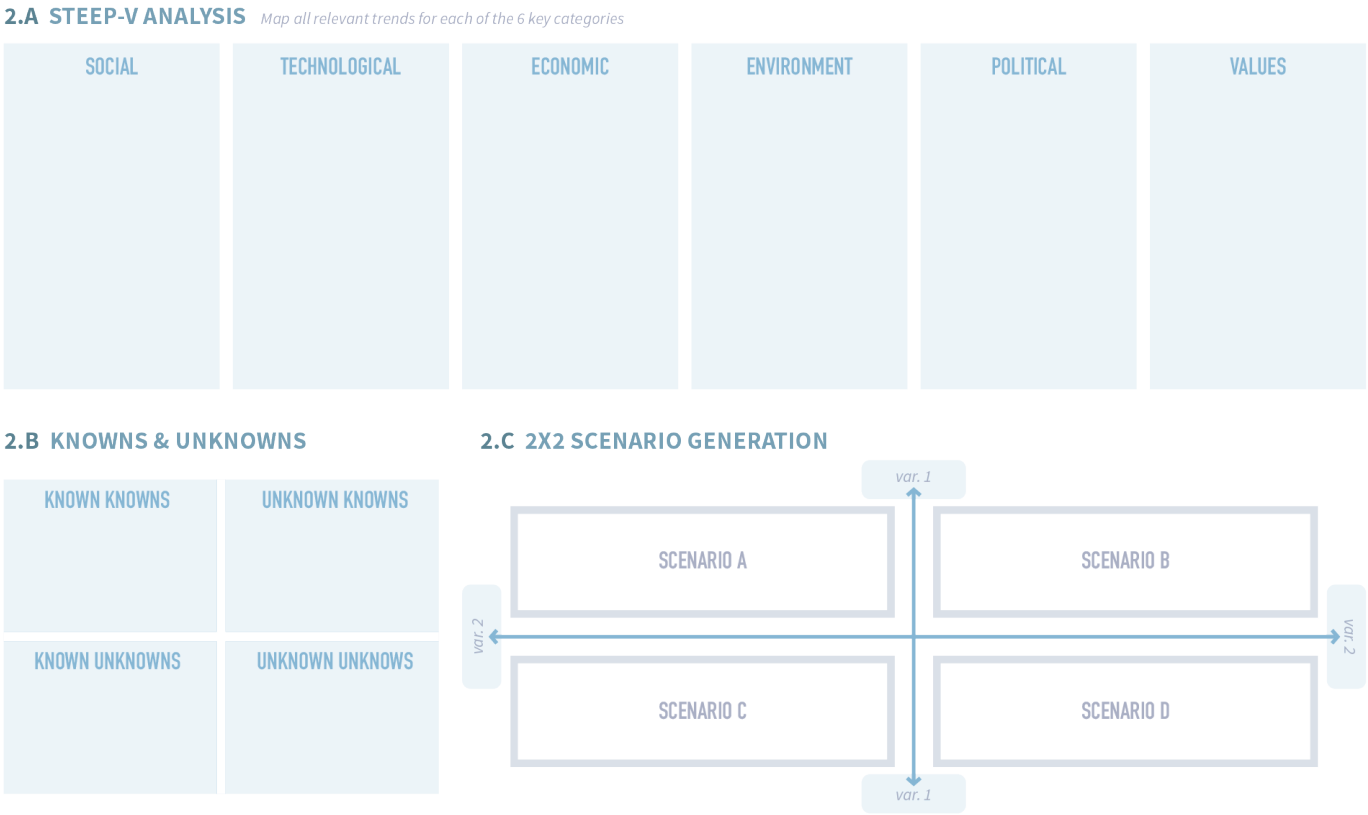
Step 2: Trends and scenarios

Step 2 will begin with an analysis of the relevant trends affecting the area of work you will be operating in (Figure 13). This analysis will use the STEEP approach (Szigeti, Messaadia, Majumdar, & Eynard, 2011), which structures these trends into social, technological, economic, environment, and political categories, plus the addition of values (V), incorporating the cultural

element. In a collaborative effort —yet working individually, for instance, adding sticky notes to a board— identify as many relevant trends as possible, and then discuss as a group. Select the most important trends to monitor for the success of your project.

Figure 13

'Analysis of Trends and Definition of Key Scenarios' activity



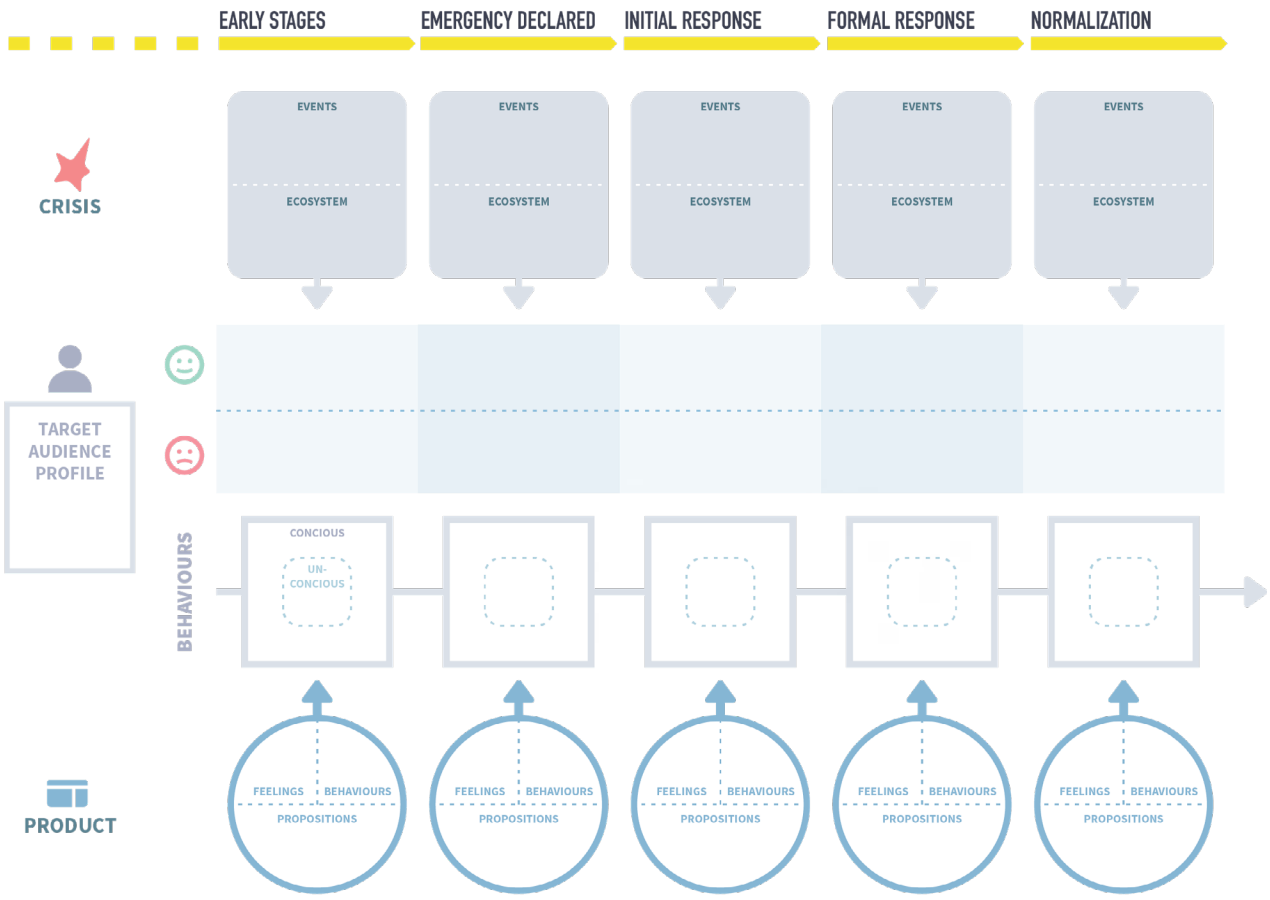
Once these trends have been settled, the group will tackle activity 2.B, the knowns and unknowns. Here, participants will try to brainstorm and push the limits of what they know about the emergency. Begin with information about the emergency that is known and the group is comfortable with (the known knowns). For instance, in the case of the 2020 COVID-19 pandemic, a known known would have been that the virus could be asymptomatic, and therefore anybody could be highly infectious without being aware of it. From there, move into the known unknowns —the information we know we are missing. Finally, discuss the potential unknown knowns, and the unknown unknowns. What information might we be missing? What are we not aware of?

Finally, we move into the scenario generation activity. Participants will come up with four future scenarios using the two by two method (Rhydderch, 2017). The group will determine, using the information from the two previous activities, the 2 variables with the highest impact and highest unpredictability. For instance, in the case of the COVID-19 emergency, two good variables would have been the level of international cooperation (from isolationism to a global effort) and the development of effective treatments or vaccines (from untreatable to fully treatable). Place the selected variables in the axis, and discuss the resulting future scenarios of each combination of the extremes.

Step 3: Timeline analysis

Figure 14

'Test and iterate' activity



With all the previous information, the group will be ready to move into the final part, where all the previous insights will be mapped on a timeline of the emergency (Figure 14). This activity is divided into three levels: Crisis, users and product. Begin from top to bottom, understanding first how the crisis evolves, how this affects the target audience, and finally determine how your product will address these factors.

On the crisis level, discuss as a group what events are likely to happen —based on the trends and known knowns— at each of the main stages of the crisis. Then, consider how these events may affect the ecosystem from stage 1 (ecosystem placement and impact). Will relationships change, will some stakeholders become more relevant than others?

Moving on to the audience level, place one of the user profiles identified earlier to the left of the timeline. Using one profile at a time as a reference, determine how this person will feel (negative, positive or neutral feelings) at each stage and with each event. Then, determine how this person is likely to behave, based on the information you have. Note that behaviour can be conscious or unconscious. More often than not, your audience will behave in ways that are not necessarily logical. Delve into their personalities and try to fully understand how they might think. User input and research will be particularly helpful at this stage of the process.

Finally, discuss how the product will be adapting to these events and addressing the feelings and behaviour of the key audience. What emotions and behaviours can it leverage? What strategies, functionalities or services can effectively provide users with what they need, at each stage of the crisis?

Step 4: Testing future stages

Finally, part 4 is meant to address products that are designed with a long term vision, with the aim to remain useful after the crisis ends —or normalizes. This exercise is simply a continuation of part 3, but with no predetermined stages of the crisis. Instead, each column will represent one of the scenarios created in part 2, ranked from the most likely to the most unlikely.

The activity will develop as before, allowing the group to test the product against more extreme events and variable conditions. The exercise also aims to provide a bigger picture perspective by removing immediate needs and issues to tackle, focusing on a more abstract and uncertain future.

Figure 15

'Test future states' activity, spaces to define scenarios

Stage 3: Organizational Design & Planning

Finally, the last tool is meant to help organizations prioritize functionalities and services, outline internal and external coordination, and plan the overall development of the IDDP (Figure 16).

Each of the functionalities and services identified in the previous tools will be assessed by its impact and implications for the organization. This will allow the group to prioritize and create an action plan accordingly.

Begin by creating a detailed list of all the functionalities that came up during the workshop, and discuss their impact and relevance. Select those with the highest impact and viability, and place them in the left column. Write down their impact, and why they have been prioritized. Then, discuss with each of the team members and partners involved what are the implications of developing each specific functionality. How does it affect other aspects of the product? What are the technical implications? What would it require from the organization? What effect could it have for the community in your field of work?

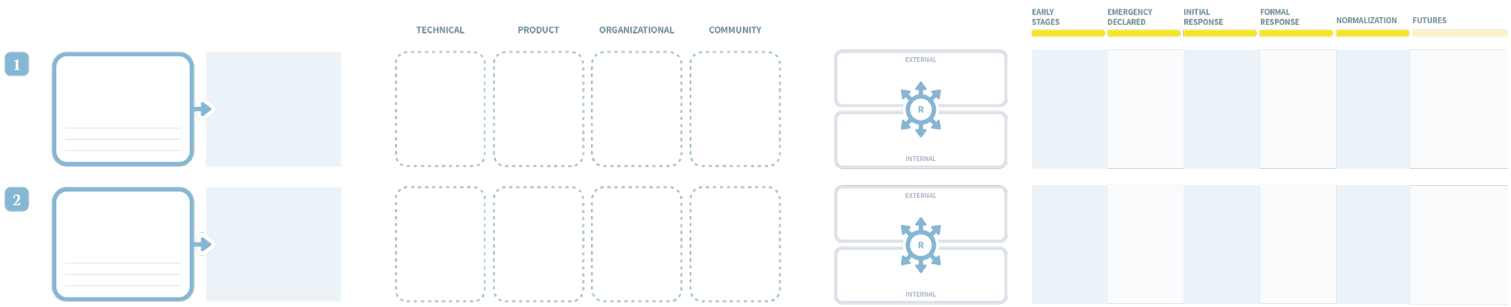
Lastly, the tool leads the group into planning the implementation of the feature. First, discuss who will take the lead in developing a given service or functionality. Then, determine who will be the key partners (those external to the organization that will also collaborate in the project) and the internal team (members of the organization that will be involved in the project). Once the 'implementing' team has been defined, identify in the timeline of the crisis when the functionality or service will be the

most impactful. This should be the 'release' date. Work backwards and distribute responsibilities to develop a schedule of tasks that ensure the service will be ready by that date.

Additional spaces are allocated to write down discarded ideas that might be useful in the future, and to allocate responsibilities to team members. At the end of this collaborative process, teams should have a defined shared vision for their product, including a set of solid partners and beneficiaries, competitors and barriers to overcome, and scheduled tasks with performance indicators. Ultimately, the result is a clear plan for the short, medium and long term, and a refined product idea that can adapt to —and leverage— almost every eventuality.

Figure 16

'Organizational design and planning' tool



Recommendations & conclusion

This research project and proposal is only a first step towards refining an accessible and easy to use methodology for public health and emergency response organizations. While based on both empirical experience (case studies) and solid design disciplines such as design thinking and systemic design, the toolkit remains untested by external organizations in a real emergency context. To ensure this methodology can truly make a difference for the organizations that it is meant to help, additional research and other supporting activities would need to be conducted.

The following 5 recommendations outline a roadmap to further develop and strengthen this research and design proposal:

- **Additional primary research on information consumption**. Surveys, one on one interviews and other data collection mechanisms would help us better understand how a given society finds, consumes and processes information. Comparative studies could be developed to find differences between countries, regions and cultures.

- **Broader study of additional DIDP examples**. Though the case studies described earlier are a solid foundation for the development of this proposal, additional cases at different scales, contexts and times will allow us to distinguish between individual issues and truly generalizable problems affecting multiple disciplines and contexts.

- **Partnerships with organizations to test the methodology**. Additional partnerships, especially with external organizations with no association with this project, will allow for an unbiased test of the methods proposed.

- **Publication of the methodology**. Making this project and proposal publicly available may allow for an even more extensive and independent testing of the tools. Any feedback received from teams testing the toolkit will be an invaluable resource to develop future iterations.

- **Adaptation of the toolkit to remote teams**. Particularly in the context of the COVID-19 pandemic, it became evident that in-person collaboration is not always viable. The workshop, activities, and generally the design thinking approach, rely fairly heavily on physical interaction. Sketches, games, brainstorming sessions, etc. are usually key facilitation resources. Further research will be necessary to properly adapt these tools to the online collaboration space.

Information dissemination in the context of a public health emergency is an incredibly complex issue. This research project, its proposal, and the aforementioned recommendations, are an initial step towards addressing the problem. Even when no digital product can aspire to change entirely how a society behaves or how a crisis might evolve, improving its effectiveness can have a very real impact on both. To date, businesses, corporations and private interests have had the tools to create digital products that can effectively shape the way we think and behave. It is to be hoped that this proposal, and any future versions that might emerge through contributions from the crisis response and design communities, may serve to put these tools in the hands of those that want —and can— change society for better.

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Appendix A:

Accompanying digital files

File 1: Infodemics_SynthesisMap_IGR_2020.pdf

Public health emergency 'Infodemics'

Systhesis map depicting both the contextual analysis of the concept of 'Infodemics' and the systemic models representing the patterns and dynamics affecting key stages of an infodemic.

Dec 2020

File 2: DIDP_DesignTools_IGR_2020.pdf

Public Health Emergency Digital Information Dissemination Products Design Tools

Proposed methodology to help teams design more impactful DIDPs in the context of public health emergency misinformation. This design toolkit was developed to facilitate the rapid brainstorming, prototyping and planning of effective products in the context of an emergency. This proposal consists of a number of quick team ideation tools —a series of structured and collaborative activities to facilitate the process of defining an idea, testing it, planning its development and envisioning its future evolution.

Dec 2020