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Community-led design capabilities during the COVID-19 pandemic and beyond.

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Abstract | COVID-19 threats have been impacting disadvantaged communities even harder. This paper looks into challenge areas and community responses to those in Brazilian informal settlements during the COVID-19 pandemic. These were identified through online roundtables with community members and representatives of NGOs in five Brazilian informal settlements. Our findings show how community members unconsciously design, deploying community-led (or diffuse) design capabilities to tackle COVID-19 challenges. These capabilities have been critical to coping with the immediate effects of the pandemic in communities. However, they are limited to short-term and reactive strategies. We argue that these natural problem-solving skills can be enhanced through a transition from diffuse to co-design capabilities to further harness community creativity towards better futures; extending community-led design capabilities into challenges and opportunity areas in a more strategic way for communities. This research contributes to filling the gap in design studies on how and to which extent communities unconsciously design.

KEYWORDS | COMMUNITY-LED DESIGN CAPABILITIES, CO-DESIGN, COVID-19 PANDEMIC, COMMUNITY RESILIENCE

1. Introduction

This paper looks into key challenge areas that the COVID-19 pandemic has created or exacerbated for informal-settlement communities in Rio de Janeiro and Belo Horizonte (Brazil) and identifies the design capabilities deployed by community members to tackle those. We call these as community-led or diffuse design capabilities (Manzini, 2015a, 2015b). Our analysis shows community-led design capabilities that sheds light on *how communities unconsciously design*. We discuss how these community-led design capabilities can be extended into co-design capabilities to build a resilient and better future for communities, harnessing their creativity and potential.

In the literature on resilience, community resilience is mostly related to natural disasters. Design skills, approaches, processes and methods are still under-researched in this context, although the COVID-19 pandemic has recently attracted attention in emergency and recovery contexts in design practices and research (e.g. BBC, 2020; Marchese, 2020; ED-UEMG, 2020; UFMG, 2020). Resilience of communities is related to building or enhancing community capabilities throughout *co-development processes* of self-organising, accessing resources, strengthening network, harnessing collaboration, and creating mechanisms that contribute to holding community-led plans and efforts accountable (Berke, et al, 2011). Recognised worldwide, guidance on hazards mitigation and recovery are approached from a risk management perspective (UNISDR, 2015; UNISDR, 2016) often neglecting sociocultural determinants and livelihoods' diversity.

This paper presents barriers, challenge areas, and adaptive strategies of communities during the COVID-19 pandemic. It analyses, frames and defines how community members have been deploying their natural design capabilities to tackle these challenges in Brazilian informal settlements.

1.1 Context and problem

Around six per cent of the Brazilian population lived in favelas in 2010 (IBGE, 2010). The largest population living in informal settlements is in Rio de Janeiro city with 1.4 million people in 763 agglomerates. In Belo Horizonte, 307,000 people lived in 169 agglomerates. Although the 2020 census was not concluded due to the pandemic, the figures for households in 2019 show that around eight per cent of Brazilian households were in informal settlements, Rio de Janeiro and Belo Horizonte had respectively over 19 and over 11 per cent of households placed in informal settlements (IBGE, 2020).

The characteristics of informal settlements vary across Brazil. However, there are similarities between these areas related to the historical migration from countryside to cities that unfolds the emergence of informal settlements, particularly favelas in the 1940s in Brazil. Informal-settlement conditions are generally related to the limitations of the physical infrastructure of cities (e.g. water and sanitation grids' extension), including geographic features that are not favourable to regular and safe urbanization, the lack of basic services

(such waste collection, sewage treatment, water and energy supply, etc.) and the absence of a formal address (IBGE, 2010). Populations are predominantly composed of black people with low levels of formal education (Musumeci, 2016). Income sources are usually based on informal or low-income activities (e.g. cleaning, construction work, and waste picking and collection), and families are often female headed (Musumeci, 2016).

On the 11th December 2020, there were 68,845,368 confirmed COVID-19 cases worldwide and around 10 per cent of these confirmed cases of COVID-19 (6,728,456) were in Brazil, with 178,995 deaths (WHO, 2020). In Minas Gerais, 453,364 cases were registered (with almost 10,499 deaths). In the State of Rio de Janeiro, there were 381,644 confirmed cases, with 23,546 deaths (Microsoft, 2020).

There is a significant underreporting of cases of COVID-19 infection (Monteiro, 2020; Prado, et al, 2020; Veiga e Silva, et al, 2020) in Brazil. The actual number of cases is estimated to be about 10 to 11 times higher than the ones shown in official figures (Monteiro, 2020; Prado, et al, 2020). Low testing rates and diagnostic difficulties have contributed to underreporting and to keeping the disease spread (França, et al, 2020; Oliveira & Araújo, 2020), leading (in Minas Gerais) to a projected sub-notification of around 42 % by the end of the year (Amaral, et al, 2020).

The Brazilian situation is also aggravated by the current government health policy which includes scientific denialism; ethical-political issues linked to human rights; and biopolitical strategies influenced by neoliberal reasoning (Caponi, 2020). Although the first COVID-19 cases in Brazil (as of February 2020) were related to white upper-, middle-class people returning from Europe, the virus was quickly transferred to the favelas. By the end of May 2020, there were a total of 260 deaths in the Rio de Janeiro's large favelas, while in São Conrado, an upper-class neighbourhood bordering the Rocinha favela, only three deaths were recorded by the middle of the same month (Oliveira, et al, 2020). Nevertheless, minority groups' disparities prevail not only in Brazil (see for instance Milam, et al, 2020). They are especially impacted by the COVID-19 pandemic.

In response to this, communities have deployed their strategies to mitigate COVID-19 immediate impacts. We analyse those in the context of 5 informal-settlement communities in Brazil. Although design capabilities have been explored to a certain extent in design domains and organisational studies, there is little empirical evidence of diffuse design capabilities deployment determining to which extent the lay public unconsciously design.

2. Capability, democracy and design

The term 'capability' relates to people's knowledge capital, skills, competencies and prior experiences. It is also seen as what someone or a group of people can do/make in order to achieve a (shared) aim. It refers to the ability to adapt prior knowledge to new purposes. For

this study, we adopt the Sen's capability approach as a starting point to discuss design capabilities for community resilience in this research context.

Sen (1999) defines capability as the potential of people to lead "the kind of lives they value - and have reason to value" (p. 18). He argues that the extent to which capabilities are deployed are influenced by interconnected factors such institutional arrangements (see also Acemoglu & Robinson, 2012) that determine economic opportunities, political liberties, social powers, enabling conditions of health, access to basic education, and by an environment that fosters initiatives.

Therefore, citizens ideally have the liberty to participate in social choice and public decision-making, being a fundamental agent of change through participation in economic, social and political public life. Sen highlights the need for the "effective use of participatory capabilities by the public" to influence "the direction of public policy" (p. 18) in a two-way relationship, pointing out participation as a key factor in democracies. Participatory design is the design field dedicated to the public participation. In this domain, Sanoff (2007) emphasises the importance to provide participants "with the information they need to (1) participate in a meaningful way and (2) be informed how their inputs affect the decision" for effective participation (p. 59). These aspects are also emphasised in post-disaster situations (Vahanvati & Rafliana, 2019).

Participation is a means to establish a dialogue between citizens and public officials (Sanoff, 2007). Active participation goes beyond voting and choosing amongst pre-set options, being related to citizens' critical role in creating and shaping the future of their environment and influencing public decision-making (Sanoff, 2007). Participatory design that aims to foster and deploy collective intelligence is a potential means to empower communities, citizens, and democracies, providing enabling structures for integrating communities into public decisions that affect their lives and contribute to shaping their future.

2.1 Design capabilities

> "Design is all around you, everything man-made has been designed, whether consciously or not" (Hunter, 2014)

Manzini (2015a, 2015 b) distinguishes between three typologies of design capabilities: expert design, co-design, and diffuse design. Expert design concerns the use of design by the design community who has specific design skills and culture. Co-design is the design process resulting from the transdisciplinary interaction between different stakeholder groups, including, for instance, expert designers and the lay public. Diffuse design concerns the natural human ability to design based on creativity, critical and practical sense. Although found in a fragmented literature, design capabilities can be identified in design research and organisational studies taking as a reference Manzini's framework: from expert to diffuse design capabilities.

Expert design is often approached in design management (Acklin, 2013; Borja de Mozota, 2011; Bruce, et al, 1999; Chiva & Alegre, 2009; Jevnaker, 2000; Mortati, et al, 2014) and policy (Maffei, et al, 2014), organisational studies (Boland and Collopy, 2004; Michlewski, 2008), product development and engineering (Baxter, 1998; Pugh, 1991; Ulrich & Eppinger, 1995), service design (Morelli, et al, 2021). Participatory design and co-design capabilities are found in participatory design (Huybrechts, et al, 2018; Sanoff, 2007), co-design (Sanders & Stappers, 2008), service design (Morelli, et al, 2021), social innovation (Murray, et al, 2010), design for policy (Bason, 2014; Julier, 2017; Junginger, 2014; Mortati, et al, 2016) and business fields (Brand, 2017; van der Pjil, et al, 2016). Diffuse design capabilities are discussed in social innovation (Manzini, 2015a, 2015b, 2019; Murray, et al, 2010), urban design (Dong, 2008), design management (particularly Gorb & Dumas' [1987] silent design). However, there is a lack of empirical evidence on diffuse design capabilities, specifically on how communities *unconsciously design* (strategise and act to solve their problems, envision opportunities and shape their future).

Design capabilities of the public (or diffuse) were discussed by Manzini and D'Elia (D'Elia, 2018; Manzini, 2015a, 2015b, 2018, 2019). They suggest that a design culture (*cultura del progetto*) will be the next basic competency of communities - as literacy was in the past, becoming a community patrimony. On the other hand, the need to bring design capabilities into policy-makers' skills set is also stressed (e.g. Bason, 2014; Julier, 2017; Junginger, 2014; Mortati, et al, 2016) to capture the needs of communities in policy-making processes (Junginger, 2014). Participatory design serves as a bridge in this context, building dialogues and actions through collaboration between citizens and stakeholder groups.

2.2 Who is willing to exploit creativity?

Community creativity plays a critical role in co-design processes. However, we cannot take for granted that communities are prepared to go through a collective creative process related to complex problem-solving or setting visions for the future. Although human beings are creative by nature, different levels of co-designers' involvement in creativity processes are identified ranging from 'doing' to 'creating' (Sanders & Stappers, 2008).

Furthermore, throughout life, the way we are educated and schooling tests are framed as "wrong-answer-right-answer" hinder our creativity or divergent thinking capacity, affecting our ability to solve complex problems that do not fit in the "right-wrong" answer framework and inhibiting us from taking the risks involved in innovation processes (Sternberg, 2006, 2012).

Hence, creativity is not seen as an inborn trait of human beings by some scholars in the psychology field. It relies on external environment and personal factors that contribute to the decision to hamper or to harness our creativity use (Sternberg, 2006, 2012). Creativity is at the core of design processes, involving exploration and deployment of divergent thinking to establish connections between ideas not related to one another before, so they are often controversial when innovative. Innovation is facilitated when people with diverse

backgrounds participate and also involves failures and the ability to timely learn from those and persist (Poirier, et al, 2017). Thus, there is a tendency to "follow the crowd" and not to step out a "comfort zone" rather than investing in the effort that creativity deployment requires (Sternberg, 2006, 2012).

3. Methodology

Our research reasoning is inductive, and the approach is qualitative and exploratory. We first listened to community members to understand how they unconsciously design. The case study was built upon triangulation of methods (Eisenhardt, 1989; Stake, 2000; Yin, 1994) and analysis of multiple data sources.

Primary data was collected through three online roundtables with community members from five informal-settlement communities, two in Belo Horizonte and three in Rio de Janeiro, and representatives of NGOs who have been engaged in solving COVID-19-related issues in these communities. The following tables describe the online roundtables composition:

Table 1. Belo Horizonte online roundtable.

Roundtable role	Gender	Related Community / Role
Participant 1	Male	Community A / NGO representative and community member
Participant 2	Male	Community A / NGO representative
Participant 3	Female	Community B / Kindergarten teacher, community member and volunteer
Participant 4	Male	Community B / NGO representative and community member
Mediator	Female	Lancaster University / Research Associate
Time moderator	Male	UFMG / Master student
Observer 1	Male	UFMG / Professor
Observer 2	Female	UEMG / Professor
Observer 3	Female	UEMG / PhD candidate

Table 2. Rio de Janeiro online roundtable.

Roundtable role	Gender	Related Community / Role
Participant 5	Female	Community C / Nurse, doula and community member
Participant 6	Female	Community D / Journalist and community member
Participant 7	Male	Community D / NGO representative and community member

Participant 8	Female	Community D / Educational project founder and community member
Participant 9	Female	Community E / Social movement representative and community member
Mediator	Female	Lancaster University / Research Associate
Time moderator	Male	UFMG / Master student
Observer 2	Female	UEMG / Professor
Observer 3	Female	UEMG / PhD candidate

Roundtables were run in the first language of participants. The talks of participants were transcribed and translated. Conversations were drawn around the following topics: sources of information, communication means and impacts on routine; prevention; diagnosis and treatment; support, and change. The researchers mapped speeches of participants using Affinity Mapping (Service Design Tools, n.d.) to identify problems, adaptive strategies, needs and the related areas of challenges regarding each topic through cross reference. The maps were validated by community members during a third roundtable, enabling reflection and further discussion in a participatory process.

Secondary data collection included public data (from NGOs' and community members' Instagram and Facebook posts, websites, press news) and literature review focused on: design capabilities; participatory approaches to community resilience-building in emergency and recovery contexts; COVID-19 in the world and in Brazil with focus on the disparities and demographics of favelas in Brazil.

The results clarify barriers, challenge areas and diffuse design capabilities which were identified and mapped according to each area of challenge. The next section describes those. Our discussion shows the community-led strategies underpinned by diffuse design capabilities in community practices.

4. Challenge areas and community-led design strategies

4.1 Communication

The language used in COVID-19 public messaging is misleading and confusing for community members. Hence, access to COVID-19 information occurs mainly through television and social media (e.g. Facebook and WhatsApp) although access to the Internet is still a barrier. Furthermore, who is communicating the message defines whether the information will be considered by communities. For instance, if a distrusted politician communicates the information, people will not listen to their message. Community members rely on messages from WhatsApp groups, local community leadership and personal relationships.

In response to these, communities have created rap lyrics that are disseminated by a car with a sound system; children created educational videos talking about prevention which are disseminated amongst communities through Facebook and WhatsApp.

4.2 Education

Brazilian public schools remain closed although an official national lockdown has not been declared and decisions regarding restrictions have been usually made at the local level by municipalities and state governments across the country. The lack of access of children, teenagers and other students to information technology resources (e.g. laptop, tablet, Internet) in informal settlements exacerbates the learning conditions, in the absence of the physical infrastructure, services and staff support from schools. Children at risk are also an important issue.

Two community strategies were adopted to cope with this situation: a project dedicated to improving home-schooling conditions, providing children with materials and activities, and the reformulation of the school planning.

4.3 Employment and income

Community members often work on elementary services or businesses, such as supermarkets, hospitals, pharmacies, healthcare centres as informed by participants. As such, they do not have options for remote work. Many others lost their jobs and those, who did not, needed to continue commuting and working to provide for their household. The lack of access to the Internet also hampers the possibility of remote work for community members. Besides, informal workers that offer, for instance, cleaning services and earn on a daily basis and local businesses in informal settlements, such as small grocery stores, have been suffering the effects of the crisis. This situation is aggravated by the businesses' practice of overpricing hygiene products and food.

Social Assistance Reference Centres (CRAS) provided benefits to residents such as voucher cards that enable them to buy food parcels in businesses close to the community, reducing the economic impact. However, these services were closed in Belo Horizonte when this study was conducted and the access to these were through Internet and telephone. This hindered community access to those.

As a response to these, local NGOs' representatives helped community members access benefits, for example, filling out electronic forms and providing food-kit donations and hygiene products as a result of partnerships with private companies and solidarity of citizens. Hand sanitizer and masks were distributed to workers at dawns. Grated soap and water mixture stored in reused oil cans was also a strategy, however, the effectiveness of the latter was not assured.

4.4 Culture, leisure and behaviour

Social distancing and other preventative measures are influenced by the street culture and games that prevail amongst children, young people who keep partying (especially the “Funk Parties”, typical of favelas), adults that often go to bars to have beers as usual, and older adults who want to keep their habits as before the pandemic and have difficulties in adopting preventive measures. The COVID-19 virus was seen as an invisible threat contributing to people’s disbelief in the disease.

In addition to communication strategies, handwashing and hand sanitizer check points were implemented at entrance and exit of community areas.

4.5 Public administration and politics

Public information systems which enable citizens to access benefits failed to reach everyone in need. Sometimes, citizens data that should be transferred from one Government department to another are not making some citizens invisible.

The access to some benefits depends on the access to the Internet. Otherwise, people should get these in person at banks. This potentially generates overcrowded banks and long lines. Besides, it is common amongst communities, people who have not a bank account and will need to handle values in cash and still use cash for transactions as well as others in need of Emergency aid (600.00 BRL) who have not it approved. The Social Assistance Reference Centres (CRAS) that could help citizens with these issues were closed in Belo Horizonte during this study and NGOs were replacing their roles and facilitating community members communication with CRAS and other public bodies.

Police officers are usually associated with violence against community members and vice-versa although their initiatives to encourage preventative measures were recognised at the beginning of the pandemic in one of the communities. Their absence in favelas is felt throughout the pandemic evolvement. For instance, warning and hindering parties as they usually did before the pandemic. Notwithstanding, community members wish to build dialogues and collaborations with them.

The lack of politicians’ initiatives against COVID-19 disease is noticed in communities as stated by a participant: “The State did not arrive to beat COVID-19”. Their presence in informal settlements is often directly related to poll objectives (e.g. bribing community members for votes). Disbelief in the COVID-19 virus is also motivated by political instability involving power disputes and corruption as mentioned by a community member: “Is the virus an invention motivated by political interests?”.

In some communities, there is also the lack of access to water and sanitation grids or the provision of those basic services does not work well.

Social organisation has underpinned most community strategies to cope with these challenges even though it is considered challenging amongst community members. These

strategies involve mutual help amongst households, design and manufacturing of masks which are made and distributed by community volunteers, the establishment of a community leadership unity known as collective mandate composed of community members actively engaged in solving community problems, the donations of food parcels and hygiene products by citizens and socially responsible organisations. The problem of lack of access to water is still being solved with the purchase from a water tank truck.

4.6 National Health System

There was the lack of protective gear for health professionals in the public sector and COVID-19 tests were not available for free at the time this study was conducted.

People did not trust the public health system's diagnosis in the absence of tests due to the confusion between COVID-19 and other diseases' symptoms, such as dengue and chikungunya. Also, the need amongst healthcare workers for access to reliable information and knowledge to provide diagnosis and treatment was mentioned. Additionally, there was the distrust in medical appointments made on the phone.

Recommendations are often not suitable for informal-settlement communities since measures such as to 'self-isolate' are not possible to be followed in overcrowded and intergenerational households and high-density areas.

In order to tackle these, some communities raised money from their own members to have a diagnosis, or to provide healthcare workers with protective equipment. Traditional knowledge was used to improve immunity, such as lemon, ginger and saffron teas and sunbathing to strengthen vitamin D. Other adopted strategies in the absence of access to proper healthcare include private medical appointments and harmful ones, such as self-medication based on media speculation and prescriptions' sharing.

These areas of challenges are often interwoven. For instance, employment and income problems aggravated by the COVID-19 pandemic also influence the ability to access hygiene products and food as those were overpriced and the government benefits did not reach everyone in need. Hence, affecting the ability to follow preventive measures globally recommended.

5. From diffuse to co-design capabilities

Community members unconsciously design when translating information, empathising, self-organising, developing and implementing strategies to tackle the pandemic issues. They create, plan and implement feasible and viable actions to deal with barriers related to infrastructural, political, public policy and/or service, behavioural, cultural and socio-economic determinants (Figure 1).

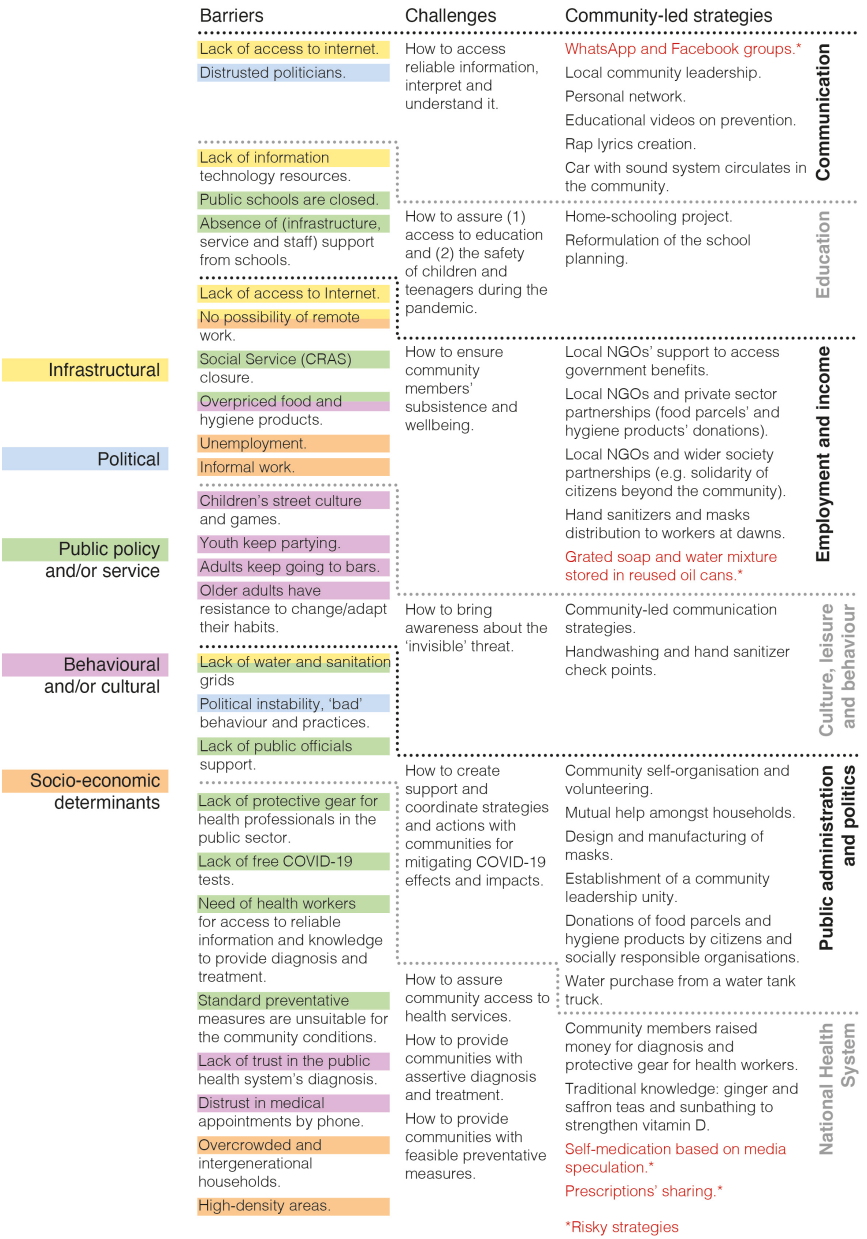

Figure 1. Barriers, challenges and community-led strategies for tackling the COVID-19 pandemic.

Many barriers and challenges are part of the lives of communities even before the pandemic. For example, communities have their socio-economic conditions aggravated by the COVID-19 threats, but these were already persistent problems in communities.

Most community-led strategies were critical to tackling the immediate impacts of the pandemic. However, as recognised by community members, there is the need to sustain and scale up those, making them sustainable. Furthermore, a few strategies mentioned are risky and can harm community members or may not be effective in preventing COVID-19 contamination.

These risky strategies can benefit from co-design. For instance, involving health experts to check information before disseminating it through WhatsApp and Facebook groups, and designers to 'translate' complicated messages into accessible communication. This can contribute to beating false information which leads to medicines' misuse, bringing awareness of potentially harmful practices (e.g. prescription sharing and self-medication) and of the prevention importance.

Also, there are problems that are beyond the current possibilities and control of communities (e.g. infrastructural, political, public policy's and service's access and quality), requiring (from short- to long-term change in) co-operation, collaboration, commitment and interest of public officials. Community members demonstrated the will to build dialogues with public officials despite the feelings of abandonment and disappointment which were exacerbated during the pandemic evolvement.

Co-design at the political and policy-making levels can contribute to putting scientific knowledge and community needs, voice and livelihood diversity in policy-making processes and in the political agenda. Designers are facilitators in these co-design processes, empathising with community members, understanding community needs, translating scientific knowledge into accessible messages and stimulating their creativity and potential. This contributes to building *bridges* (*dialogues*) between and *strategies* and *solutions* with communities and different stakeholder groups.

This is a mutual learning process. On the one hand, community-led strategies are reactive and can benefit from designers' forward thinking, extending community-led problem-solving skills into future-oriented strategies that can bring long-term benefits. Reflection and learnings from these co-design cycles can be better shared and discussed in communities, building a legacy of community-led design capabilities. On the other, designers and other stakeholders can learn from communities especially regarding their ability to establish partnerships, quickly finance and implement strategies in uncertain and complex environments.

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