Better Together – Empowering citizen collectives with community learning

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Abstract. Citizen collectives have the potential to contribute significantly to various societal transitions. Rather than focusing on the individual, collective action improves empowerment and agency, and can contribute to effective collaboration between citizens, policy makers and other institutes. This can be facilitated by enabling efficient monitoring, reflection, and multi-level learning, but an infrastructure is missing to scale bottom-up approaches and bridge the gap with the systems world of government policy makers. We discuss four open problems that need to be addressed in order to create this comprehensive data and learning infrastructure for empowering citizen collectives: 1. providing value and accessibility for all; 2. handling privacy, providing trust and autonomy; 3. enable community learning from observational data; 4. enabling scaling in order to accelerate and link to the 'systems world'. We conclude with sketching the research methodology that we plan to use to address these challenges.

Keywords: community learning, data sovereignty, positive reinforcement, data governance, multi-level learning, citizen science.

1   Introduction

The societal challenges with regard to climate, energy and health/well-being are huge, inter-related and require changes and collaborative action at all levels. Sustainable transitions are currently hampered by increased polarization and low trust in government among citizens. While the digitalisation of government services such as requesting a new ID, a permit or following the city council sessions online has resulted in more efficiency, government is now criticized for missing the human dimension. Still, many citizens are willing to contribute to societal challenges by making lifestyle changes, or by improving their living environment. However, they often do not have sufficient agency since other challenges – such as the harsh reality of dealing with poverty – prevail. Studies have shown that behavioural change interventions directed at individuals are hardly effect, and therefore the focus needs to

be redirected to the (social) system[1].In this multi-crisis, the potential of citizens collectives to help achieving local transitions is under-explored. Many initiatives exist, but these often miss longevity and organizing power.

Our research programme 'Better Together' aims at rebuilding trust and collaboration between citizens and government by i) improving the agency, value and representativeness of place-based citizen collectives leading to better social cohesion and ii) structurally stimulating engagement of citizen collectives for participatory community-up local policy making, thereby increasing trust, mutual understanding and support.

In this paper, we describe our approach to address these challenges, with a focus on the data and learning infrastructure that supports the learning and collaboration process. We first elaborate on the complex multi-level stakeholder setting that provides the context for our research (section 2). Next, we present an overview of various (social) mechanisms for learning and developing local transformative solutions to transitions (section 3). The main contribution of our paper is the description of four (socio-)technical open problems that currently prevent scaling up a community approach to societal challenges (section 4). The paper concludes with some reflections on how we can apply co-creation as a means to engage citizen collectives in our research and vice versa. We include a list of terminology definitions to guide the reader below.

Important concepts:

Agency: the capacity, condition, or state of acting or of exerting power

Citizen Science describes participatory research practices and knowledge co-production with citizens and societal actors.

Coalition an organization of individuals representing diverse organizations, factions or constituencies who agree to work together in order to achieve a common goal. The advantage to work together is to bring about a specific change that can only be achieved collectively[2]

Collectives are groups of people and/or entities that share or are motivated by at least one common issue or interest or work together to achieve a common objective. A particular legal embodiment of a collective is a cooperative. In our research, we are mainly focused on citizen collectives.

Communities are groups of individuals that share one or more characteristics. Each individual is a part of a community. A community can be characterized by the following elements: (1) membership - a sense of identity and belonging; (2) common symbol systems

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including similar language, rituals, and ceremonies; (3) shared values and norms; (4) mutual influence between community members; (5) shared needs and commitment to meeting them (this is in fact a property of a coalition); and (6) shared emotional connection including common history, experiences, and mutual support [3].Communities differ from coalitions, the former are focused on relations between group members, the latter on achieving a joint goal.

Community learning is a generic term for a learning process at the group level. Various instantiations are possible, depending on the context, with different learning mechanisms, different outcomes (individual/group) and different group compositions (communities, collectives, coalitions, networks of collectives). Rather than a focus on participation and information exchange, the focus is on community engagement, with a dialogue and interaction between different (local) players. [4]

Data hub a repository for collecting and analysing aggregated household data at the level of a collective, controlled by the collective

Personal data locker an individual repository for collecting and analysing data of one household/family., controlled by the individual household.

Disadvantaged refers to marginalised, socially vulnerable groups.

Living Labs are user-centred and co-created open innovation ecosystems integrating research, experimentation and innovation processes in real life communities and settings.

Multi-level learning concerns learning at local level from experiments changes are (not) successful, learning across different local activities to grow, replicate. and accumulate activities, and finally (at macro-) system level learning to link transition to global KPI.

Monitoring Evaluation Learning (MEL) refers to routine monitoring of project activities and results, evaluate to a periodic assessment of goal progress and to reflect on the outcomes and processes in order to learn how outcomes could be improved.

Place based collective: related to a certain neighbourhood, which defines the challenges and assets of a collective.

Transformative governance: transformative governance concerns the formal and informal (public and private) rules, rulemaking systems and actor networks at all levels of human society that enable transformative change. Transformative governance addresses power asymmetries, stimulates dialogue, learning and reflections, acknowledging diverse values, perspectives and knowledge systems [5]

2   Problem analysis: social and technical barriers preventing progress on transitions

Citizen collectives addressing local societal challenges such as the energy transition and neighbourhood security are gaining traction. There is solid evidence that citizen neighbourhood engagement interventions can have positive impact on community outcomes[6, 7]. Several fundamental issues need to be addressed to increase value and scale, valorise such an approach and make it accessible for all citizens, no matter their financial or housing situation. We suggest that multi-level monitoring and learning of actions and outcomes within and across communities is the enabler to achieve create systemic changes needed to establish social transitions. This paper articulates several of the technical challenges that need to be addressed before further scaling can be done. The technical challenges are tightly related to the social mechanisms that we intend to support (Section 3). In the rest of this section, we motivate our research challenges, linking to the state-of-the-art, and sketch some of our ideas how to solve the challenges. Further details on the technical challenges will be provided in section 4.

Point of departure for understanding critical success factors of citizen communities is the 'asset-based community development'(ABCD) approach, which is a methodology based on strengths and potentials from within a collective (so-called assets). Assets involve individual assets, physical environmental assets and collective assets, such as the resources, skills, connections. Key functions are 1) to understand existing assets (i.e. asset mapping), 2) build connections between community members and between communities and agencies, 3) share knowledge and resources and identify common interests, 4) create a vision and activity plan [8].

Although citizen collectives are not new, the mechanisms of informal learning and scalable, inclusive and durable collaboration by citizen collectives have hardly been conceptualized and are not well understood in the context of achieving societal transitions[9]. We will address the complexity of transitions by focusing on building trust and relational quality and success experiences, analysing and dividing the work to leverage a diversity of engaged citizens in different fitting roles[10], section 3.

Several stakeholders (cooperatives, NGOs, municipalities), and scholars[11] mention the absence of a trusted and up to date Monitoring & Evaluation infrastructure as a real bottleneck, hampering progress. Such an infrastructure would enable understanding which interventions effectively result in meaningful changes in relation to the social transitions and helps communities to speed up and scale activities. In order to create trust, it is important that local data and findings will be

fully owned, controlled and trusted by the citizen collectives. The local information can serve as input for community-up exchange on policy tailoring; mutually, democratic decision making between citizens and policy makers, which will contribute to place-based, locally tailored planning[12].

It will be conditional for the success, financial sustainability, and transferability of citizen collectives to have a reliable link with the 'systems world'. Collaboration, communication, and interaction with stakeholders requires some standardization of procedures, agreement on outcome indicators and a capability to report on impact. Collectives need be able to relate to scaled national level challenges and local government for setting up financial and regulatory conditions to make their initiatives durable and thriving. Transformative governance [13] has been recognized as a means to change socio-ecological systems (e.g. the health deals or green deal), and focusses on self-organization and decentralized decision-making, including citizens. However, the understanding and evaluation of transformative governance is in its infancy. Evidence based policy making is seen as a promising instrument for transformative governance[14] and for monitoring and steering systems changes. However, the required dense, timely, high quality local data is often not available and hard to obtain since citizens are tired of surveys and distrust government/commercial data collection efforts (cf. section 4.1).

In the following sections in this paper, we will provide a sketch of how we aim to overcome these challenges by building an infrastructure that enables collective collaboration and learning.

3   Multi-level approach to community learning and transitions

We propose a multi-level learning approach, to tackle the societal wicked problems and initiate and accelerate transformations. We start from the viewpoint, that collectives and coalitions are generally action-oriented and focus on reducing or preventing a common problem, identifying and implementing solutions and creating social change[2]. Collaboration, collective action, and agency can be stimulated by having a shared vision (including organisation model and funding), setting collective goals, by monitoring progress and providing feedback during the activity and by reflective evaluation on the collaboration process and outcome.

We distinguish multiple levels of learning (cf. Table 1), each with its own feedback loop, starting from learning at the micro-level (household level), learning at the meso level (within and between local collectives) and macro level (society). In our conceptual analysis of learning strategies we align and combine various disciplines

related to: behaviour change (e.g., [15]), community and coalition processes (e.g., [2]), system innovation and transition management[9, 16] , and transformative innovation policy[17].

Level	Type	Subjects/Actors	Objectives/Outcomes	Strategies	Inputs
1	Mastery learning	Citizens (households)	Self-/collectively set goals (eat more vegetarian, reduce fossil fuel use, be 30 min active)	Reflection, improve self-efficacy	KPI measurements, (household indicators), process step measurements
2	Social learning	Citizen collective members, and other stakeholders	Shared goals	Dialogue, joint action, monitoring, aggregated KPIs	Data at household level (level 1), goal setting related to national objectives.
3	Best practices	Between collectives	Tailor-made best practices (FAIR)	Exchange success and failures. Predictive modelling	FAIR experiment descriptions, input based on level 2.
4	Systemic change	Stakeholders, local and national (global)	Systems change	Reflexive monitoring, multi-level learning	System analysis, and actively feeding back learning experiences (based on best practices and inventory of barriers, level 3)

Table 1: Levels of learning

First, people may engage in *mastery learning* [15]. This can be at the level of households or collective. Mastery learning is the process of learning from self-set or mutual goals, and to evaluate whether the behaviours or actions initiated, result in the desired outcomes. Reflecting on goal achievement is important for two reasons. First, achieving the desired outcomes could enhance positive reinforcement. This can foster intrinsic motivation, i.e. satisfaction and enjoyment to proceed an activity. Reaching a goal can also contribute to feelings of collective or self-competence. Reaching a particular outcome in itself is not sufficient for sustaining collective actions. Collaboration should also promote collaborative synergy, which could foster citizen engagement and sense of collective identity (i.e., a sense of belonging to a group), social cohesion and social capital (e.g., the resources obtained through social connections such as norms of reciprocity, trust, [18]. Importantly, collective actions could contribute to basic human psychological needs of autonomy, relatedness and competence[19]. Second, in case of not reaching the planned goals or activities, the evaluation enables re-evaluation and adaptation of the originally set goals and activities, i.e. so-called iterative plan-do-check-act cycles.

A second way of learning is based on *social learning within a collective*. Social learning occurs through the observation, imitation and modelling of other people[15].

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Hence, community members may learn from the actions of other citizens or households. For instance, understanding how to maintain a healthy lifestyle or understanding how to lower energy consumption can be achieved by understanding what a neighbour is doing, why and how. Social learning in transition research can be defined as a process in which people align, share, and discuss their ideas together. As a result they develop new shared mental models, form new relationships, and develop the capacity to take collective action and manage their environment [20]. At this level, social learning is limited to the learning that occurs within a single project or situation. It, however, is not limited to learning amongst citizens, but focusses on community engagement in broader sense, where also other stakeholders (policy makers, NGOs, and private companies) collaborate on mutual goals. Key element in this context is to move beyond participation and information exchange, but to focus on dialogue and interaction between the different (local) players [4] which fosters also trust, empowerment and agency.

A third level of learning can occur across collective actions and local experiments (e.g.,[21]). This type of learning could be defined as transition learning. Learning across different collective actions enables deepening, broadening, and scaling up. Deepening can be the result of monitoring and evaluating single collective actions which helps to understand barriers and facilitators, and to learn what works, which facilitates social learning and leads to growth of activities. Broadening can be the result of learning across collectives, leading to opportunities for replication.

Finally, a significant scale up of collective actions via replication and extension is likely to induce a system change and hence transformation. Replication enables other collectives to make use of best practices and to understand barriers and facilitators. Extension could mean making connections between initiatives. In our vision, an independent national network organization needs to be set-up to act as a knowledge broker. This organization will aggregate, and curate lessons learned by the associated local collectives. The learning experiences and best practices can be made available to new collectives to have a warm start, e.g. using a predictive model that selects the best practice given local contextual parameters, and also to build new networks, including non-usual (disadvantaged) citizen members.

We acknowledge that learning at different levels as we have discussed so far is often not effective since transitions face systemic barriers. The existing situation often is linked to vested interests of stakeholders. This complex challenge therefore calls for system level learning, which can be viewed as an integrated multi-level learning approach, where coordination is established between the micro, meso and macro levels as discussed above.

The discipline of transition studies proposes various conceptual frameworks. One of the frameworks is the multi-level perspective (MLP) on (e.g. sustainability) transitions [22]. The MLP conceptualization is slightly different from the learning levels we discussed so far. Starting point is the so-called 'regime' the current practices, institutes that make up our societal and economic processes. A possible approach to address transitions in a complex context is to start parallel social experiments [23] in 'niches' (a practice referred to as 'probe-sense-respond' in the Cynefin decision-making framework [24]). When one or more niches become successful, they can be further scaled up when the contextual conditions (e.g. financial/ legal) defined by the so-called 'landscape' are favourable. In the complex transition field, monitoring, data and structured observations are conditional for fruitful reflection, collaboration and successful innovation / systemic change by involved stakeholders.

4 Open challenges for data and learning infrastructure

Our multi-level approach to community learning consists of various social and behavioural processes, at individual, community, network and system level. These stakeholder groups and processes can come into full swing when multi-level monitoring and learning is facilitated. Curated information is a catalyst and can either be qualitative or quantitative. Curated information is the result of planning, monitoring, and evaluation data, which enables reflective learning at the different layers (from household level to systems level). Hence our slogan 'data as a vehicle'. Raw monitoring data and qualitative data are important ingredients for assessing the current situation, setting the agenda and measuring progress in a learning setting and the ability to re-adapt (via plan-do-check-act cycles). Although experimental design, data collection, cleaning and analysis are commonplace in research and industry, this practice is less common for citizens and government, perhaps with the exception of various citizen science collectives. Various obstacles exist for a reflective learning practice. We now describe four important open challenges.

4.1 Providing value and accessible for all

A significant challenge that we face is to engage citizens beyond a small group of innovators or early adopters (the usual suspects). The reality of many neighbourhoods is that they are heterogeneous. That means not all solutions, services appeal to everybody. Not every person has the same amount of time, each age segment comes with its own challenges and social networks may not be connected. We advocate a research approach that is not 'extractive', but where the direct value ('what is in it for

me ') is clear to the participants. Several disadvantaged areas and some citizen collectives already suffer from 'overload by research attention', sometimes called 'extractive research'. Often citizens are discouraged because they do not see what is done with the data gathered, how it is of value for them, and participation generally is not facilitated. Key Enabling Methodologies such as co-design and co-creation are suitable instruments for keeping 'direct value' in focus, and so is agile project execution. In the end, neighbourhood communities/coalitions should become more self-guiding in their goal setting and monitoring, so it is important to leave the initiative with the citizen initiatives. A second aspect of heterogeneity that is possibly more important is communication. Differences in socio-economic position and migration background shape communication, interpretation and cultural elements that determine the success of reaching citizens and interventions. It is important to keep these factors in mind when designing our methods and evaluate accessibility. The move to inclusion and diversity in citizen science and action, requires the need to engage all members of society regardless of their background. This also necessitates making connections between social networks, such as via gatekeepers, key community members/opinion leaders or via place-based approaches connecting issues, networks and relationships[25]. In this way it is possible to create spill-over effects connecting members across neighbourhoods or social networks. Lastly, a related but important factor is 'literacy' and language fluency. This also requires a multi-channel, including offline and online but uniform communication that is understandable by most citizens. We may be able to benefit from insights concerning diffusion of innovations [26]. Specifically, how can we identify 'positive deviants', opinion leaders or change makers in subcommunities that are able to inspire and guide social innovations. There is some evidence that important changes can be achieved in relatively short time, taking advantage of the network effect in complex systems, achieving social tipping points [27].

Challenge 1: Co-design reciprocal value exchange archetypes, that can serve as starting point for a network of local learning communities. Co-design local missions where all citizens, existing institutions, government and other private and public partners can join and feel represented. Design methods for quantifying / qualifying inclusivity and representativeness.

4.2   Handling privacy, providing trust and autonomy

Since we intend to collect data at individual household level in data lockers and aggregate at the level of collectives in data hubs, data privacy is of prime importance. Analysis of personal data has become a very sensitive topics, given the recent misconduct by the Dutch Tax Office. Handling and processing personal data is governed by the Dutch instantiation of the EU General Data Protection Regulation. We choose 'consent' as the legal basis for processing data to compute aggregate

KPIs, correlations and other analytics that are a central element in our learning framework. Nonetheless, we think it is important to safeguard privacy at the design level, by employing privacy enhancing technologies such as secure multi-party computation. Citizens must always be able to revoke their consent. We conjecture that privacy safeguards at the deep technical level will help to build the trust level that is an important factor determining the adoption of new technologies involving 'big data'. Such an approach (hiding the data points of individual households) may help to prevent unethical social stigmatizing mechanisms [28] such as 'neighbour shaming' a practice to put the blame om delaying progress on individuals that lag behind. This would also mean that analytics can only be presented for a group with a sufficient number of individuals.

A recent study on trust in data processing systems[29] pointed out that transparency is not a sufficient remedy to rebuild trust in big data processing systems. A more important factor is trust in the organization in charge of and controlling the data processing infrastructure. Recently, some incidents in automatic fraud detection by Dutch tax authorities have significantly diminished trust in the government as an independent organization that acts in the interests of all its citizens. Several alternative data collection, processing and governance infrastructures are in the making (public spaces etc), stimulated by the EU Data Governance Act. What these initiatives have in common is that they enhance the autonomy of citizens, since they fully control data collection and processing (data sovereignty), that is without waiving permission to commercial entities (data storage often outside EU legislation) that offer 'free' services but in reality, trade aggregated personal data. Autonomy and working together as a group may help to rebalance the existing power inequalities between citizens and governments/corporations. A detailed example of how this could work is provided in [30, 31]. We need data pods, pod providers, data intermediaries that implement the data strategy as laid out by the DGA. The EU will introduce a special register for so-called data altruism organisations, with the aim to increase trust. If privacy and data sovereignty are correctly implemented and the value of participating in the community learning hub outweighs the cost and effort, it will be easy to grow a data backbone for a network of citizen collectives working on joint missions. If such a learning network gets sufficient traction and is a true representation of a certain neighbourhood, we conjecture that it is a good starting position to build sufficient authority and visibility to provide a counterfactor for the current destabilizing effects of personalized social media that are gradually getting more attention of our population. Here individuals are subjected to targeted advertising, influencers, hate speech, conspiracy theories and misinformation.

Challenge 2*: Design and build a (federated) data processing infrastructure which handles consent, is compliant with GDPR, DGA and provides the technical basis for trust and autonomy.*

4.3 Enable systematic community learning from observational data using open science principles

A possible means for community learning is to record repeated measurements of quantitative or qualitative data for analysis. We aim to empower and motivate citizen collectives to contribute to a data panel (longitudinal dataset) for their own collective, making it possible to have a better understanding of needs, interactions, inequalities, impact of interventions and promising solutions. In statistical terms, each citizen collective will control a data hub with so-called panel data, that is a longitudinal data collection linked to the households that are linked to the collective. The panel data will include qualitative and quantitative data, which are the basis for further analysis. We envisage various ways to learn from the household level panel data (these ideas are not limitative).

1. Peer group levelling by comparing the KPI score on a certain outcome (e.g. energy use per month) to the average score of similar households in the collective, citizens get feedback on their relative performance.
2. KPI stratification per household attribute: using the KPI scores in combination with e.g. house insulation data, it will be possible to provide recommendations on potential energy use reduction measures based on actual data in the neighbourhood.
3. Citizen collective level feedback and inspiration: The panel data can be used for monitoring progress on a collective mission, problem solving, or celebrate achievements.

Section 3 provides a brief overview of various levels of learning, where learning from observational data and experiences play a role. An extensive discussion of the interaction between different levels of learning is beyond the scope of this paper. Effective learning obviously involves social, cognitive and governance methodologies. Data and infrastructure are primarily supportive tools, not a means in itself.

Challenge 3: Design a generic systematic impact measurement methodology that is applicable to citizen collectives, supporting citizen science, which can be instantiated by different collectives whilst keeping interoperability of impact measurements and methodology descriptions. Of particular importance is a FAIR process ontology and data schema [32–34].

4.4 Enabling scaling in order to accelerate and link to the 'systems world'

So far, we have discussed requirements at the level of citizen collectives. Yet, to make real impact, it is critical that a promising approach can be scaled up (just like a start-up needs to transition into scale up phase to remain in business). There are several aspects that we want to mention here. First, we intend to work with network

organisations that link citizen collectives at a regional or national level. These network organisations are value driven and not for (shareholder) profit. We envisage that research organisations support accelerated scale up of best practices, using a mix of methods, fit for purpose.

1. Scale up can be accelerated if we can predict which mix of building blocks will be the most appropriate for a new neighbourhood to achieve their goals e.g. the heat transition. We intend to create predictions based on the experiments documented in the citizen collective data panels.

2. Scale up can be even further accelerated when interventions can be based on a causal analysis of the success of interventions. Such an approach may be feasible as soon as some standard approaches have matured and have been tested in similar neighbourhoods. Where data points are either matched on collective or household level using propensity scores. If matching is impossible we could also compare policy actions and resolve this issue using mixed analysis such as Qualitative Comparative Analysis (QCA) which is a useful method to study causal complexity. [35].

A second important condition for scaling is linking to the 'system world'. International regulation, national legislation, local policy making, all these contexts require a precise measurement of impact. This is important because government policy regarding e.g. climate change, quality of living environment, health is costly, and evidence-based interventions are becoming the norm. If a certain intervention does not deliver on its intended effect or that the impact cannot be measured on the scale accepted in the 'systems world', it risks not be financially supported by government or investors. Still, an unsuccessful experiment can be a stepping stone to an improved intervention or improve social cohesion. It is therefore important to manage expectations and take sufficient time for learning to collaborate.

Challenge 4: Scaling i) predict the success of interventions given a small set of neighbourhood parameters; ii) design a method to identify the main success factors of interventions, preferably by causal inference; iii) provide guidance towards (networks of) citizen collectives as to how to measure impact (in a co-creation approach).

5   Discussion and Future work

Societal transitions are urgent, but highly complex because all stakeholders need to agree on the way forward and there are so many dependencies and value chains affected by proposed systemic changes. In the research programme 'Better Together; empowering citizen collectives', we focus on supporting citizen collectives to become players with sufficient agency at the transition planning table while keeping a keen

interest to influence the transitions in such a way that they serve the interests of their member citizens (transitions are achievable) and are sustainable (do not postpone the burden/negative impact of current policy and lifestyles on future generations). Collaboration with other stakeholders on an equal level is key.

In this paper we have focused on the technical challenges that need to be addressed to build the approach that we envisage. We do not need to explain that the challenges are primarily social. Transitions ask for changes in behaviour and lifestyle, call on solidarity to align with equity goals, since the level of social inequalities inversely determines social stability. Technology cannot provide a solution alone but can support and facilitate the necessary changes. Since digital technology is now distrusted by many people, a careful step-by-step interdisciplinary co-creation process is needed to make sure that the proposed infrastructure will be adopted by everyone.

We have started to set-up living labs in several neighbourhoods in the Netherlands. The idea is that citizens themselves formulate their objectives and obstacles. By performing Participatory Action Research (PAR), researchers become part of the community teams. In this way, trust can be established leading to deeper insights. On the other hand, PAR has potential drawbacks since it is more difficult to keep an objective distance from the research context. We intend to remedy this potential bias, by structurally involving internal and external reviewers. If we manage to build a successful learning infrastructure, we may be able to build momentum for transitions and reach social tipping points that are instrumental for systemic change.

At the same time, we need to follow, and where possible influence, relevant developments regarding data sharing that are currently being shaped by the EU. Especially in the health domain. Relevant legislation is in the making, that may impact the viability of the transition approach that we envision. Harmonizing data is a good thing, but the value and impact for population and individuals should be balanced . [36]

The coalition website https:/better-together.dev/ provides more information on our associated partners.

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