Socio-Ecological Practice Research
https://doi.org/10.1007/s42532-024-00197-7

PERSPECTIVE ESSAY

What roles can democracy labs play in co-creating democratic innovations for sustainability?

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Received: 2 May 2024 / Revised: 14 August 2024 / Accepted: 20 August 2024

Abstract
This perspective essay proposes Democracy Labs as new processes for developing democratic innovations that help tackle complex socio-ecological challenges within an increasingly unequal and polarised society, against the backdrop of democratic backsliding. Next to the current socio-ecological crisis, rapid technological innovations present both opportunities and challenges for democracy and call for democratic innovations. These innovations (e.g., mini-publics, collaborative governance and e-participation) offer alternative mechanisms for democratic participation and new forms of active citizenship, as well as new feedback mechanisms between citizens and traditional institutions of representative democracy. This essay thus introduces Democracy Labs, as citizen-centred processes for co-creating democratic innovations to inspire future transdisciplinary research and practice for a more inclusive and sustainable democracy. The approach is illustrated with examples from a Democracy Lab in Lisbon, reflecting on requirements for recruiting participants, the relevance of combining sensitising, reflection and ideation stages, and the importance of careful communication and facilitation processes guiding participants through co-creation activities.

Keywords Sustainability transformations · Democratic innovations · Co-creation · Lisbon democracy lab

1 Democracy crisis, backsliding and innovations

Scholarly and political debate warns of a crisis of democracy mirrored in declining democratic participation, which affects societal sectors and segments differently, leading to escalating conflicts (Schäfer 2022). The issue of democratic backsliding is increasingly recognised as characteristic of this century (Druckman 2024; Xiang 2024, p. 107). Democracies are observed to be regressing, with democratic practices, such as freedom of speech, expression and association eroding in large countries with democratically elected governments, such as Brazil, Hungary and Turkey (Mechkova et al. 2017, p. 165–166). This democratic backsliding threatens to undermine any social, economic and sustainability gains from global targets, such as the Sustainable Development Goals and the Paris Agreement (Xiang 2024, p. 107).

This essay posits the hypothesis that a lack of innovation in democracy exacerbates these challenges and proposes Democracy Labs as a new approach to address a gap in research, policy, and practice concerning the role of co-created democratic innovations for addressing sustainability challenges. Democracy Labs are citizen-centred processes, that engage diverse participants in co-producing procedures, including those that ensure the policy legitimacy of participation, outcomes, and in creating new public spaces guided by principles of inclusivity, transparency, and dialogue.

While co-creation and participatory practices are increasingly embedded in socio-ecological research, through methods like living labs (Baran and Berkowicz 2020, p. 5 of 16), policy labs (Olejniczak et al. 2020, p. 96–100), and citizen science (Ottinger 2017, p. 42), these practices typically emerge within the academic community, among researchers and specialists, who engage experts and stakeholders. Despite their merit, such practices may exclude ordinary citizens from the process and be perceived as elitist and intimidating, potentially propelling societal divides rather than bridging them (Banerjee 2008, p. 70).

In this context, the usefulness of the Democracy Labs approach relates to its ability to meet the needs of

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social-ecological research practitioners for new tools that enable citizens to collaboratively determine how best to address complex socio-ecological problems (Xiang 2023). Rather than imposing engagement methods from the top-down, this approach involves citizens in co-creating innovative processes for their own participation. Democracy Labs, thus, go further by engaging citizens in co-creating the very methodology for democratic participation.

These co-created processes are framed as democratic innovations (Smith 2005), increasingly studied as new mechanisms for democratic participation and forms of active citizenship (Asenbaum 2022, p. 683; Smith 2019). Democratic innovations are considered important to address socio-ecological problems, as well as challenges related to digitalisation, artificial intelligence (Elstub and Escobar 2019, p. 105), and the risks of polarisation and extremism (Lub 2013, p. 165; Mcneil-Willson et al. 2019, p. 22). This need becomes particularly evident when established democratic tools can no longer engage citizens effectively in solving the complex societal problems of our time.

Citizens are here understood as members of the public who are affected by the policy or issue under discussion, in contrast to stakeholders who have formal associations with specific interests or perspectives, thus holding a 'stake' in the outcome of the discussions (Kahane et al. 2013, p. 5). Policymakers are those engaged in political parties who develop concrete policy proposals to be implemented, depending on their election. They may also be elected leaders and officials responsible for formulating and maintaining practical regulations. Dialogue between these actors within a democracy must ensure effective feedback mechanisms to build trust and translate diverse perspectives and bodies of knowledge (Dryzek and Niemeyer 2019, p. 412).

The emerging field of democratic innovations has highlighted new possibilities for citizen participation in democratic life beyond the electoral process, involving a wide citizen engagement (Elstub and Escobar 2019). Examples like collaborative governance, participatory budgeting, and mini-publics share the goal of shifting agency from policymakers and experts to citizens (Curato and Böker 2016, p. 175; Gash 2022, p. 497). The following sections briefly outline significant sustainability challenges to democracy, before discussing how democratic innovations can address these challenges and the practical role of Democracy Labs.

2 Democratic practices and sustainability

Democracy is critical for sustainability. The analysis of Pickering et al. (2022, p. 5) on the role of democratic practices in either hindering or enabling sustainability transformations provides a useful typology along institutional, social, economic, technological, and epistemic dimensions. They conclude that democratic practices foster sustainability transformations across all these dimensions. This positive effect of democracies is attributed to factors like participatory environmental governance and civil society participation, although participation may falter if existing inequalities are perpetuated (Pickering et al. 2022, p. 5). Additionally, democratic innovations such as deliberative forums and participatory governance contribute to this effect, though they may also reflect the biases of dominant stakeholder interests. Less positive effects of democracies relate to the creation of 'echo-chambers' in social media, which can exacerbate polarisation (Pickering et al. 2022, p. 5).

Despite the proven importance of democratic practices for sustainability transformations, there is widespread consensus that new societal divisions, and extreme polarisations within society are emerging around complex issues related to sustainability and digitalisation (Boehme-Neßler 2020). A core issue for democracies today is the conflict between the limits of planetary resources and sinks and the continuing need for significant portions of the global population to achieve a better quality of life (O'Neill et al. 2018; Steffen and Stafford Smith 2013, p. 403). Climate change, biodiversity loss and soil degradation are socio-ecological challenges that societies will have to deal with for a foreseeable future.

Furthermore, the complexity of the required transformations makes societies vulnerable to the polarisation of socio-economic conditions and opinions, creating a fertile ground for the rise of authoritarian populism and democratic backsliding (Barandiaran et al. 2024, p. 9; Xiang 2024, p. 107). Additionally, dangerous and highly destructive wars threaten the fabric of democratic life, undermining any sustainability gains and further depleting critical environmental resources with likely long-lasting cascading effects (Pereira et al. 2022, p. 2).

Alongside these socio-ecological challenges, technological innovations present both opportunities and challenges for democracies. In public life, digitalisation implies increasing coordination and articulation of public services via digital channels, as digital information systems become a new foundation for governance and public administrations, transforming public spaces. While these transformations introduce new feedback and tracking mechanisms, they may also contribute to digital divides and lead to greater disengagement and citizen protest (Buhmann and Fieseler 2021, p. 2). Moreover, rapid technological innovations in artificial intelligence (AI) bring both opportunities and challenges for the future of democracy (Leslie et al. 2021, p. 14). Developments in AI raise concerns for inclusivity and transparency in the context of public engagement (Buhmann and Fieseler 2021, p. 2). Jungherr, for example, highlights how algorithms, largely dependent on training sets that carry information about the past, may reinforce pre-existing exclusionary practices (Jungherr 2023, p. 4).

This combination of socio-ecological crises and rapid technological transformations challenges democracies in terms of participation, political trust, societal cohesion, and conflict mitigation. In response to these challenges, scholars argue that citizen participation and co-creation processes are essential to support representative democracy processes and improve the quality of political decisions (Hinrichs-Krapels et al. 2020, p. 2).

2.1 Democratic innovations

Recent years have seen a surge in the development of innovative citizen-centric mechanisms for democratic participation, such as e-democracy, participatory budgeting, mini-publics and collaborative governance models (Barandiaran et al. 2024; Curato and Böker 2016). These are examples of democratic innovations (Jäske and Setälä 2020, p. 2), which are considered fundamental for addressing complex socio-ecological problems. According to Elstub and Escobar (2019), democratic innovations are defined "as processes or institutions that are new to a policy issue, policy role, or level of governance, developed to reimagine and deepen the role of citizens in governance processes by increasing opportunities for participation, deliberation and influence" (Elstub and Escobar 2019, p. 14). Such innovations necessitate a renegotiation of relations between decision-makers and citizens and the creation of new feedback mechanisms. Importantly, as noted by Woo and Kübler, the novelty of democratic innovations is interrelated to the political and governance context in which they emerge (Woo and Kübler 2020, p. 338). Democratic innovations have also developed in authoritarian states, with examples such as online platforms calling for citizens' participation in specific policies in Singapore, and the institution of a "grassroots village election" in China (Woo and Kübler 2020, p. 337–347).

Sustainable, digital-era democracies must ensure that a wide variety of voices are heard and that citizens and communities can effectively decide about their shared futures (Macnamara 2020). If disenfranchised and disengaged citizens and communities are not able to, nor empowered to participate in innovative democratic practices, new structural forms of (digital) inequality and societal conflict are likely to emerge (Woo and Kübler 2020, p. 338). Impactful democratic innovations must, therefore, enable meaningful participation for citizens of all ages, faiths, ethnicities, gender, and educational and socio-economic backgrounds. They must also ensure transparency in both process and substance, as true inclusivity and accountability are only possible under such conditions (Roberts and Escobar 2015, p. 6 of 7). Finally, they must ensure that participatory experiences are valued and provide concrete inputs to sustainability policy, thus carrying processual as well as input values (Caluwaerts and Reuchamps 2015, p. 2; Stephenson 2023). In sum, while democratic innovations are urgently needed, they are also demanding in their characteristics, requiring fundamentally new ideas for relevant procedures and institutions.

3 Citizen-centred meta-democracy processes

Democracy Labs are defined here as citizen-centred meta-democracy activities and processes that rely on co-creation to develop inclusive democratic innovations. Democracy Labs do not directly address societal challenges, but instead focus on developing innovative procedures to tackle such challenges. Hence, the term "meta", referring to a process that employs co-creation for the purpose of developing co-creation activities.

Co-creation itself is taken as a "problem-focused process aiming to craft new and innovative public value outcomes", and is therefore useful as a "tool for public governance" (Ansell and Torfing 2021, p. 217). Most democratic innovations such as mini-publics and collaborative governance (Curato and Böker 2016; Flanigan et al. 2021, p. 549) also engage in co-creation. A key difference between these innovations and Democracy Labs is that the latter are not centred on deliberating on a specific policy proposal or issue. Rather, Democracy Labs serve as instruments for developing new and/or adapting pre-existing democratic innovations, against a background of rapidly changing contexts (e.g., technological innovations such as artificial intelligence; socio-ecological crises; polarisation).

Democracy Labs are inspired by two approaches, namely the 'living labs' approach (Campos and Marín-González 2023, p. 3–4) and the 'policy labs' approach (Hinrichs-Krapels et al. 2020, p. 3), with which they share some commonalities, but also differ.

First, both approaches are framed as a processes rather than specific physical spaces (Baran and Berkowicz 2020, p. 5). Participants interact with each other and have moments for individual reflection, which together contribute to collective findings and ideas. Nevertheless, Democracy Labs must equally include a space for their activities, and meet specific conditions related to logistical, technical, and procedural aspects. For instance, the two Democracy Labs already implemented by the authors (in Portugal and Italy), benefited from carefully chosen locations, with specific requirements (e.g. large open space, with natural light and a pleasant setting, yet easily accessible through public transports).

Secondly, a critical difference is that Democracy Labs are not focussed on co-creating solutions to address sustainability challenges, as in the living labs (Baran and Berkowicz 2020; Campos and Marín-González 2023), nor aim at co-creating policy, as in the policy labs (Olejniczak et al. 2020, p. 90). Instead, Democracy Labs work to develop new

principles, procedures, and public spaces—both digital and non-digital—to support inclusive dialogue between citizens, stakeholders, and policymakers on complex problems, while ensuring as much as possible the legitimacy of the democratic involvement.

Thirdly, Democracy Labs are citizen-centred rather than stakeholder-centred, seeking to encourage a dialogue from a citizenship perspective. They seek to engage a diverse group of citizens and aim to bridge the boundaries between citizens and other stakeholders, such as policymakers, by establishing effective feedback mechanisms between these actors.

Ideally, Democracy Lab participants are recruited with a focus on ensuring representativeness and diversity. In this sense, Democracy Labs are inspired by the practice of mini-publics, which are characterised mainly by a random selection model of recruitment, with roots in the model of the Athenian polis, guaranteeing that all citizens have an equal chance of being selected (Baran and Berkowicz 2020, p. 5). In addition, some stakeholders and policymakers may be invited to encourage a fruitful dialogue and trust. Democracy Labs thus establish a meta-space for co-creating democratic innovations guided by key principles, strengthening feedback mechanisms between citizens and representatives of democratic institutions.

4 Democracy Labs as a practice

Democracy Labs are proposed as a four-stage approach, represented in Fig. 1. The approach begins with the recruitment stage, where participants are selected and recruited. Next, is the sensitising stage, during which participants are familiarised with key concepts to prepare them for subsequent discussions. Following this, the critical reflection stage involves participants in collaboratively reflecting on their ideas and understanding of the topic. The final stage is ideation, where participants generate and develop new ideas for inclusive democratic innovations. Throughout the process, both ongoing and final evaluation moments are incorporated as a best practice in participatory research.

However, the first Democracy Labs' experiences, in Lisbon and Rome, have shown that the approach operates in a cyclical manner, with the stages interrelated through feedback loops, as illustrated by the dotted arrows in Fig. 1. For example, after the individual sensitising stage, where participants develop their own ideas about the topic, they engage in joint critical reflection. This collaborative process then leads to the co-creation of ideas, further deepening their understanding of key concepts, effectively revisiting the sensitising stage. Additionally, as lessons are learned from implementing the approach, future iterations may refine recruitment strategies and introduce new guidelines for this stage.

The four-stage approach combines several methods from the social science and humanities, including computational social sciences and generative design. Computational social sciences represent an interdisciplinary field that employs computational simulation methods and techniques to replicate and analyse social phenomena and human behaviour. The field combines computer science, statistics, and social science disciplines to offer a perspective on complex social dynamics; for instance, by modelling the dynamics of political polarisation (Garcia et al. 2012; Li and Jager 2023).

Generative design research emerged from participatory design methodologies (Sanders and Stappers 2012). It is focussed on exploring, ideating, and generating innovative solutions or products, while involving stakeholders at the early stages of the design process. It has gained recognition as an effective approach to foster democratic innovation and engagement (Pérez-Martínez et al. 2023, p. 3). The different stages of the Democracy Labs are described in the following

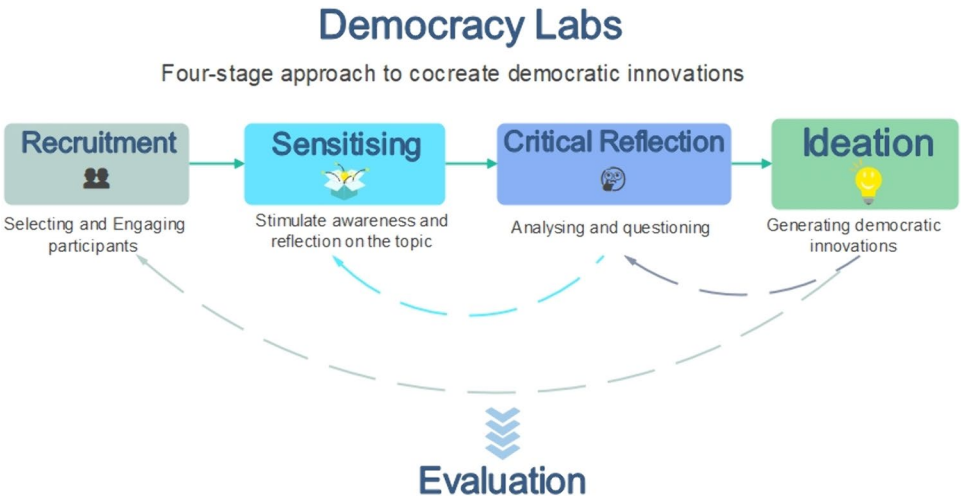

Fig. 1 Representation of the four-stage Democracy Labs process

subsections, and exemplified with the Lisbon experience, which took place between March and May 2024.

4.1 Recruitment

For a successful implementation of the approach, representativeness, diversity, and inclusivity in recruitment are essential. Participation bias due to self-selection and recruitment is a well-known issue (Gąsiorowska 2023, p. 2), and a core concern of the Democracy Labs. Several recruitment challenges must be carefully addressed, considering ethical procedures and practical factors like location, accessibility, and event timing. The development of carefully crafted materials that explain to participants in an accessible language what the process is and what its objectives are, is equally crucial.

Different countries are experimenting with various recruitment methods, tailored to the available resources and to cultural specificities. The two experiences so far (i.e., Lisbon and Rome) focussed on ensuring gender balance and broad representativeness across age, education, and geographical origin, with particular attention to vulnerable groups (e.g., economically disadvantaged, ethnic, and religious minorities) (Ansell et al. 2024, p. 150). The two cities equally sought to involve between 25 and 30 participants. Nevertheless, Democracy Labs can be scaled down or up in varying ways and include several rounds of participation, as a strategy to increase representativeness.

The Lisbon Democracy Lab involved 27 recruited citizens (of which three dropped out), along with three invited stakeholders and four elected policymakers. These seven extra participants were briefed on the process and encouraged to engage in productive dialogue without imposing their expertise, which they adhered to.

The recruitment process followed strict ethical guidelines, using a hybrid method through a recruitment company, which implied some degree of self-selection. The selection aimed for stratification by age, education, socio-economic status, and cultural background to represent the Lisbon Metropolitan Area (NUTS II: Greater Lisbon and Setúbal Peninsula). The aim was to mirror the population's distribution based on the Portuguese Census 2021 data, while remaining flexible due to limitations in the recruitment company's list, such as shortages of participants over 65 and those with low education levels.

The goal was to achieve gender parity; around 24% of participants over 65, 8–12% under 25, and 64–68% aged 25–64; 16–20% with 3rd cycle education, 24–28% with secondary education, and 20% with higher education. Additionally, 8% of participants were to be non-Portuguese nationals, and at least 4% unemployed. Efforts were made to ensure diversity across age groups, gender, and professional backgrounds, with participants from various municipalities, particularly those with larger populations like Lisbon, Sintra, and Amadora.

However, the recruitment company's list required adjustments to maintain balance, particularly due to the shortage of participants over 65, men, and non-Portuguese registrants. Despite these challenges, a diverse group in terms of age, gender, and profession was achieved. Selected participants had little or no knowledge of democratic innovations, nor significant experience in participatory processes, thus preventing biases of perspectives that may emerge in traditional stakeholder-centric participatory activities (Alberts 2007, p. 2337). A reward for participation—shopping vouchers in Lisbon—was introduced to level the playing field across economic groups and to better engage disadvantaged populations.

Nevertheless, there were substantial challenges in engaging disenfranchised participants. Among the more vulnerable groups, three citizens dropped out after completing the sensitising and preparatory activities. Although the reasons were not always clear, the organisers perceived that these citizens could have been intimidated by the process, despite the efforts in ensuring a smooth communication, and explaining the process throughout the sensitising stage. However, they also may have given up only for personal reasons due to their vulnerable situation (health, family care, jobs with strict working hours). Future experiments of the Democracy Labs will serve to clarify some of these difficulties.

4.2 Sensitising

The sensitising process occurs individually before participants meet in person. "Sensitising" means to gradually raise participants' awareness of the topic (Krüger et al. 2017, p. 1). This stage utilises diverse sensitising materials, and toolkits designed to support participants' insight and creativity in collaborative activities. Participants are encouraged to recall previous experiences where they participated in collective decision-making processes (e.g., a town hall meeting, a parent's association meeting), thus, encouraging them to draw on the experiences, world-views, and knowledge they hold (Longhurst and Chilvers 2019, p. 974). Individual sensitising activities also highlight different perspectives on the world, such as how people may be differently affected by socio-ecological problems such as heat waves or heavy rains. To facilitate these activities, a booklet containing diverse materials (i.e., cards, drawings, games, etc.) was prepared and distributed at the beginning of the sensitising process.

The distribution of these 'sensitising materials' may be done via postal mail, however, in the Portuguese case, the materials were directly handed to participants. This first personal contact was important to establish a relationship between the facilitation team and the participants and

ensure greater proximity and receptivity in the exchange of messages.

Participants engaged with the materials for two weeks before attending the subsequent two full-day workshops. Figure 2 shows an example of one original page from the sensitising booklet, filled out in Portuguese by one of the participants. During these weeks, participants were kept engaged through a planned communication process, which included regular explanatory emails, and the availability to clarify doubts and questions, keeping active communication channels, specifically set up for this purpose. All communications were personalised, informing participants of the various stages of the process and answering any questions they might have. By aiming to make participants feel valued, through tailored-made and individualised communications, facilitators hoped this would reduce the risk of dropout (Manetti 2011, p. 112).

Another element of this stage is the optional use of an agent-based modelling tool for participants interested in experimenting with it. The tool aims to offer insight into the complex dynamics of communication and opinion formation in pluralistic societies, and to foster mutual understanding. The tool generates simple and intuitive output graphs that offer an overview of the simulated group dynamics, showing how opinions changed over time, including dynamics of convergence/polarisation (Janssen and Ostrom 2006, p. 6 of 13; Le Pira et al. 2017, p. 405–406). Participants were invited through individual communications to experiment with the tool, as one of the suggested sensitising exercises.

4.3 Critical reflection

The following two stages of the Democracy Labs were conducted over two one-day workshops, thus keeping participants engaged and focussed, while not compromising the recruitment process (as it could be challenging to regroup the participants for a later workshop).

During the critical reflection stage (first workshop day), participants came together for the first time to collectively take stock of their individual work and engage in a reflective dialogue (Lundgren and Poell 2016, p. 5–7). They were invited to make sense of the commonalities and differences of their individual experiences (which were explored during the sensitising period) and discuss the key principles that they valued.

In the Lisbon Democracy Lab, participants identified inclusivity, freedom, respect, equality, accountability, and transparency as the most valued principles. These principles were first classified according to the degree to which they had been present in participants' previous experiences of participation and engagement. They were then compared to how participants wished these principles had been observed. Additionally, "dialogue" and "legitimacy" of (new) participatory processes were highly valued by some participant groups. This 'mapping' of principles was supported by printed materials, such as cards, games, and graph templates, which participants used to annotate their ideas about the relevant principles, as illustrated in Fig. 3.

The "provocative prototype" design approach was also used during this stage (Boer and Donovan 2012). The

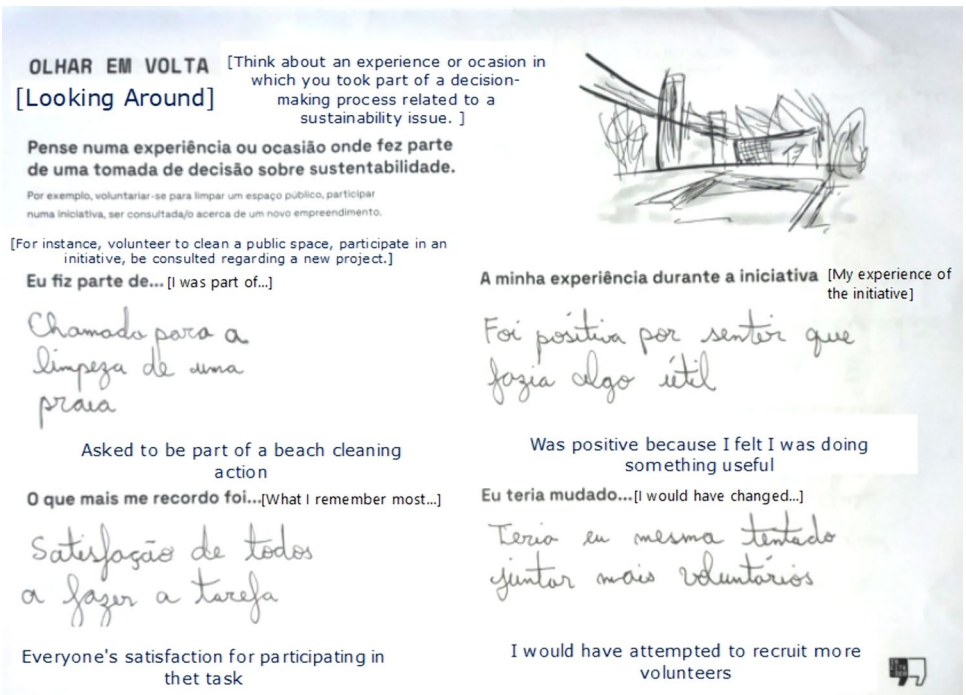

Fig. 2 Example of a completed page from the sensitising booklet, including both the original photographed page and the translated text

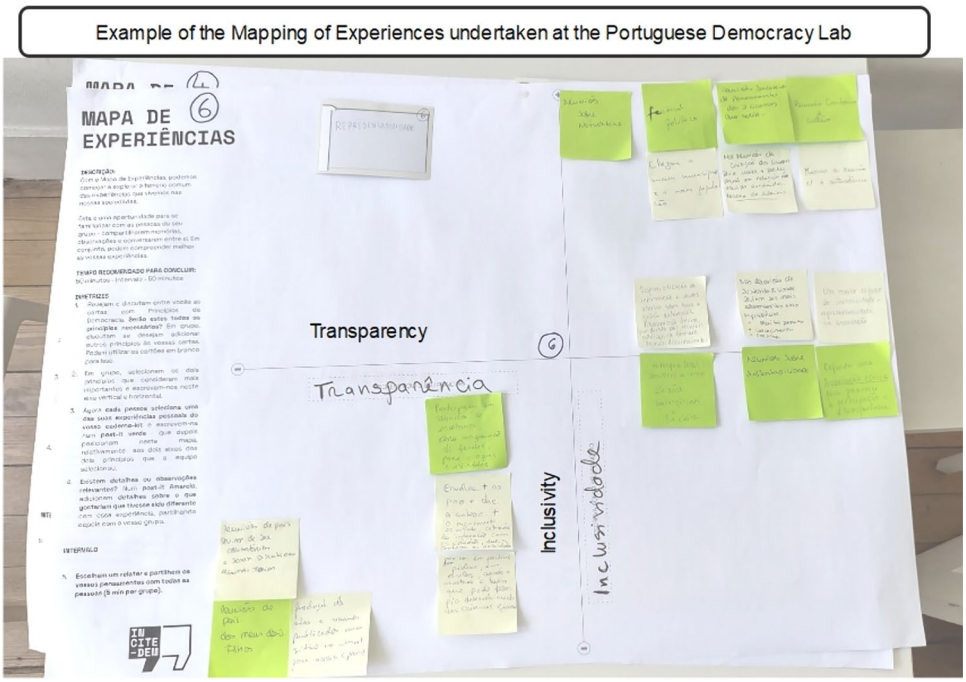

Fig. 3 Example of mapping principles and their interrelationships with citizens' past experiences (original text in Portuguese from the Lisbon Democracy Lab)

approach aims at inducing the development of a novel mindset and to create space for imagination by presenting citizens and stakeholders with provocative prototypes. These provocative prototypes offer original and alternative visions of forms of participation and engagement related to sustainability and socio-ecological transformations.

In the Lisbon case, an imaginary case study was presented to participants, recounting a process of a public environmental impact assessment hearing. The intent was to spark creativity, stimulating critical thinking and the questioning of existing norms and practices. Participants were provided with materials, including cards with specific questions (e.g., How would they prefer to be involved? Who should be involved and at which stage of the process? How should contributions from citizens be dealt with? Who should be consulted?). Working in groups, participants addressed these questions and developed clear final proposals for innovative public hearing processes. For instance, five groups agreed that civic participation in these processes should start early on, even at the ideation and planning stages of new projects with expected social and ecological impacts for local communities. Conversely, one group reached a consensus that they would prefer "to receive all the information and voice their opinions but would like to be involved later in the process," after experts had conducted studies on alternative project options.

4.4 Ideation

Lastly, the ideation stage (second workshop day) builds on the previous stages to engage participants in the development of democratic innovations based on the prioritised principles. This stage involves challenging participants to identify the building blocks of democratic innovations. For instance, when participatory budgeting was introduced, it involved establishing new principles (i.e., new approaches to deciding who can propose how the budget is spent), new procedures (i.e., participants proposing projects for funding and then voting on them), and new physical and/or digital spaces where community members could discuss and vote on proposals.

Ideation activities are supported by exercises based on storytelling, with storyboard templates and character cards. These materials assist participants in imagining new methods of civic participation and engagement, allowing them to consider how these would function in practice by developing a character (a family, a person) and creating a story to characterise their overall idea.

One example from the Lisbon experience tells the story of a mother of a child with disabilities who required free daily transport to school. To achieve this, she engaged with a new local community service, which participants named the "Citizenship House". These new spaces were established in municipalities across the country, enabling connections between municipal authorities, civil society organisations and news media (as local news media agents were perceived to exert political pressure) to solve problems for which no local solutions were available. By presenting the idea as a story, participants captured different principles of the envisioned democratic innovation (i.e., inclusivity, accessibility, equality), procedures (a new community service, supported by a national interconnected network, with its own internal

regulation), and new physical spaces (i.e. the "Citizenship House") dedicated to processing new requests and to manage community resources.

Other co-created ideas had a technological focus, such as a proposal to develop a new "digital key" and platform structure to interlink citizens' needs in more vulnerable neighbourhoods with new available services. Another idea advocated for citizen participation in political life, encouraging voter turnout in elections through a new platform called "We Participate!".

Overall, considering the principles and ideas most valued by participants in the Lisbon Democracy Lab, there was a significant concern with social justice issues, including the potential of digitalisation to further exclude some people from participatory processes. Other emerging concerns included the lack of citizen engagement in political life, and a sense of increasing disrespect and lack of dialogue in political discussions. These findings also highlight the context-specific nature of the envisioned democratic innovations, reflecting key issues with Portuguese participation, such as low voter turnout and increasing societal polarisation (Manoel et al. 2022; Torcal et al. 2023).

Lastly, a final evaluation questionnaire was sent out to participants one week after the workshops to gain insight into how the participatory dynamics were perceived. The evaluation also included follow-up interviews with six volunteering participants at the end of the two full-day workshops. Reflections from participants included one participant stating that the most interesting result for him had been the co-creation method itself. One elderly citizen mentioned she "realised that people in my table were listening to my ideas and that my ideas were adopted by the group, so at the end of the first day I was home thinking—oh, your life experience is worthy, you also have value." A younger participant stated that she felt empowered by the process: "I learned a lot but was also able to show what I knew, (…) I could hear myself and could hear the others as well".

5 Democracy Labs for the future

Democracy Labs are proposed as tools for future research, policy and practice, enabling open and inclusive co-creation. The approach allows participants to develop new ideas for democratic principles and processes to address socio-ecological issues. Initial experiments in Lisbon and Rome revealed a circularity in the approach, with iterative cycles of ideation and reflection, and lessons learned from the recruitment process. This interactivity equally mirrors the ongoing cycles of sustainability research and practice. Future applications should, thus, focus on refining the co-creation of democratic innovations and exploring their feasibility and replicability across diverse policy environments, leading to their institutionalisation.

Democracy Labs require well-crafted supporting materials and expert facilitation to create a safe and inclusive discussion space. While the preparatory stages are decisive for the success of the process, experienced facilitation also plays a critical role in ensuring all participants are equally able to voice their opinions and ideas. Thus, including the training of facilitators is important for improving future Democracy Lab experiences. It is equally crucial to share the results with participants, thus recognising their efforts and contributions.

Compared with pre-existing co-production methods, Democracy Labs offer a useful and much-needed space for a discussion on democratic innovations that can effectively contribute to address complex socio-ecological challenges through an inclusive and interactive dialogue. They require engaging a representative and diverse group of citizen innovators who embody inclusivity, transparency, and fair dialogue. In the Lisbon experiment, participant feedback confirmed these principles were upheld.

Lastly, Democracy Labs must produce innovations that can be translated into legitimate political practice, accepted by citizens, stakeholders, and policymakers. Nevertheless, their outcomes are likely context specific. Future research and practice need thus to encourage experimentation and the implementation of Democracy Labs in varied contexts, supported by the development of new tools for inclusive dialogue.

Author contributions The corresponding author, Inês Campos, was responsible for conceptualization, for the development of the methodology (working together with other co-authors), for the writing of the original draft and data visualisations, and for the review and editing of all article versions, including revisions following the article's peer-review. The second author, Doris Fuchs, was equally responsible for validation, conceptualization of the article, and methodology, as well as for reviewing and editing the original draft. Petteri Repo was responsible for validation and conceptualization of the article and for the review and editing of the original version of the article. Wander Jager and Christian Klöckner both collaborated in the conceptualization of the article and in the review and editing of both original and revised versions of the draft. David Lamas was responsible for the conceptualization and development of methodology. João Limão collaborated in reviewing and editing revised versions of the draft. All other co-authors collaborated in the conceptualisation and implementation of the methodology as well as in data collection activities leading to the article.

Funding Open access funding provided by FCT|FCCN (b-on). Funding for the research was primarily provided by the European Research Executive Agency (i.e., REA) through the Horizon European Programme (project INCITE-DEM, grant agreement 101094258). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or of the European Research Executive Agency (REA). Neither the European Union nor the granting authority (REA) can be held responsible for them. In addition, funding was also provided by the Fundação para a Ciência e Tecnologia (FCT) through the first author's post-doc contract 2020.01663.CEECIND/CP1605/CT0005 (https://doi.org/10.54499/2020.01663.CEECIND/CP1605/CT0005).

Data availability Data is available upon request to the authors.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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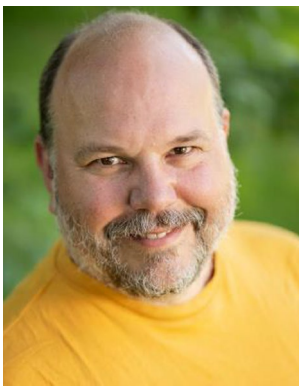
Inês Campos Inês Campos holds a doctorate in Climate Change Adaptation and Sustainable Development Policies/Sociology, from the University of Lisbon. Her research integrates interdisciplinary social sciences, sustainability, energy research, and data analytics, focusing on the societal aspects of sustainability transition challenges including social innovation, democratic innovations, and the active role of citizens in the energy transition. She has coordinated the H2020 project PROSEU (Mainstreaming prosumers in the energy union) and is presently coordinating the Horizon Europe project INCITE-DEM (Inclusive Citizenship in a World in Transformation: Co-Designing for Democracy). Her main research is on delivering new knowledge for a more just and inclusive socio-ecological transformation. She enjoys navigating between quantitative methods (i.e., computational social sciences and data analytics) and participatory approaches to building a broader societal engagement in climate change mitigation and energy transformations.

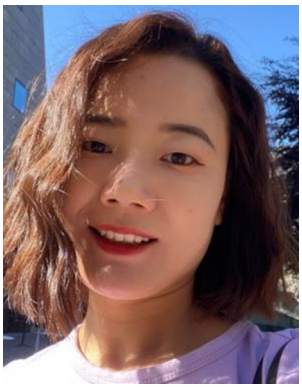
Doris Fuchs Doris Fuchs is Professor of International Relations and Sustainable Development and Speaker of the Center for Interdisciplinary Sustainability Research at the University of Muenster in Germany. Her research focuses on (the potential for and barriers to) sustainability governance with a special focus on power and participation, consumption, the role of religious norms and actors. She is particularly interested in questions of justice, responsibility and democratic legitimacy. Empirically, she focuses on agrifood, climate, and energy policy. She is a political scientist by training with an emphasis on political economy perspectives. Her research has been published in numerous journals and edited volumes.

Petteri Repo Petteri Repo's research focuses on how consumers wish to change markets. Dr. (Econ.) Repo is Research director at the Centre for Consumer Society Research at the University of Helsinki and Adjunct professor (Docent) at the Aalto University School of Business.

Wander Jager Wander's research and teaching focuses on how interactions between people give rise to the emergence of collective behaviour. In particular he is interested in the spreading of new technologies, opinion dynamics & polarisation and the societal transition towards sustainability. The methodology of social simulation, where people develop computer simulations of large populations, is a methodology Wander likes very much. Wander also likes to collaborate with people from different scientific disciplines on interdisciplinary challenges, and is very curious of all scientific developments.



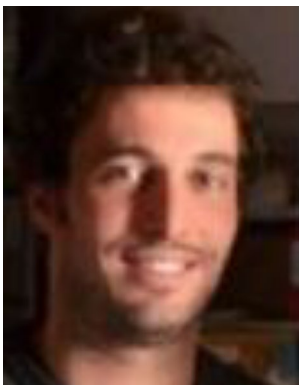
Christian Klöckner Prof. Dr. Christian A. Klöckner is a professor in social psychology and quantitative methods at the Norwegian University of Science and Technology. He leads the research group for "Citizen, Environment, and Safety" which is focusing on researching individual, social and contextual drivers of environmental decisions (including food, energy, mobility, housing). His personal research interest are modelling of environmentally relevant decisions and behaviour in the social and structural context, innovative environmental communication methods, societal disruption and transition, and psychological trade-offs in sustainability issues. He is engaged in many national and international research projects, coordinating several of them, among them the H2020 projects ECHOES, SMARTEES, and ENCHANT. He is author of more than 100 academic papers.



Shaoni Wang Shaoni, a postdoctoral researcher at the University of Groningen, is captivated by studying the dynamics of social systems. Her enthusiasm lies in revealing the intricate interplay between individual actions and collective phenomena through computational modelling, with a particular emphasis on agent-based modelling. Her research focuses on delving into the dynamics of group performance, opinion evolution, and polarisation. She actively seeks collaborations with researchers from various backgrounds, driven by a shared goal of enriching our comprehension of the complexities within society.

David Lamas David Lamas heads the Human–Computer Interaction (HCI) group at Tallinn University's School of Digital Technologies. He also serves as the chair of the Estonian chapter of ACM's SIGCHI (http://sigchi.org) and as an expert member of IFIP's TC13 (http://ifip-tc13.org). David's main research interests are design theory and methodologies. He has been designing organizations, communities and human technologies, systems and more since his post-doc at Michigan State University as a member of the MIND Labs network (http://www.mind-labs.org). He has done so in the USA, UK, Portugal, Cape Verde, Mozambique and recently in Afghanistan and Estonia, developing through his experiences an acute understanding of how to shape and lead transformation processes. David bootstrapped the Master in Human–Computer Interaction and the Masters in Interaction Design, the latter run online jointly with the Cyprus University of Technology. He has also been grooming the local HCI community with a steady stream of training events such as the seasonal courses on Experimental Interaction Design, Research Methods in HCI, and the Design of Human Technologies since 2010. He has also run a complimentary stream of dissemination activities such as the bi-monthly meetups and the yearly celebration of the World Usability Day. This recurring event alone brings together more than 600 researchers and practitioners every year, a bit from all over the world, but mainly from the Baltics and Nordic countries. David's contribution to the worldwide HCI community is also relevant as he served as chair of INTERACT 2019, NordiCHI 2020, AfriCHI 2021 and ICIDIS 2021. David also has a solid project participation record, taking part, leading and supporting his team in various research, development, educational and training other projects. Finally, David has successfully supervised forty-eight master students, seven doctoral students and two post-doc researchers. He currently supervises twelve doctoral students, three of which about to complete their studies.

Francesc Cots I'm a lawyer admitted to the bar both in the United States and Spain with 20 years of experience working in the fields of sustainable development, environmental policy and climate change. My experience working in different environments (academy, consultancy and the public sector) provide me a deep and transversal understanding of the issues at stake when moving public administrations, enterprises and communities towards sustainability. Currently, I am combining consultancy and research in Ecounion with lecturing in Energy and Sustainable Consumption, Governance and Resilience; and Sustainable Development in Universitat Oberta de Catalunya (UOC). I have a Phd in Environmental Policy and Law.



Eugenio Barchiesi In Kyoto Club since 2015, he has been the Coordinator of the International Unit since 2017. He is a renewable energy engineer, specialised in energy efficiency. At Kyoto Club, he manages international and EU projects, including activities such as training with High Schools and Universities, supporting local authorities in drafting and shaping sustainable territorial policies and strategies, awareness-raising and information campaigns, producing policy papers and recommendations towards national and EU institutions.

Erica Löfström Erica Löfström works with Radical Innovation for Sustainable Futures, and specialises in eco-visualisation, provotyping (provocative prototyping), and the design of new solutions as part of participatory processes. Her background in the cutting field between Computer Science, Science- and Technology Studies (STS), has allowed her to develop a new direction in environmental communication that involves Disruptive Communication and Eco-Visualization. In this new direction, art and design/interfaces are important ingredients. During the last few years, she has developed new co-design methodologies in addition to using existing ones. This is to meet the need for radical innovation and to achieve systemic changes to enable the transition to a low-carbon society. She continually carries out explorative research projects which actively involve end-users and other stakeholders.

Daniel Peniche Originally from Mexico and now based in Tallinn, Estonia. Member of the Human–Computer Interaction at Tallinn University where he is currently a Junior Research Fellow. His main research interest is exploring the impact of technologies in the built environment (especially sound) and the design challenges surrounding them, with a secondary interest in participatory design methodologies. He was part of the organising teams for different international ACM conferences like NordiCHI 2020, AfriCHI 2021, ICIDS 2021 and the 38th ACM/SIGAPP and from September 2024 serves as the Head of Curriculum for the Joint Master Program on Interactive Design Master Program between Tallinn University's School of Digital Technologies and Cyprus University of Technology. He has an extensive background on Media and Design production and lecturing, working on different contexts and spaces including cinema, animation, theatre, television and radio and branding. He is a hobbyist baker.

Yulia Sion Yulia is a mixed-methods UX Researcher with a passion for wearable tech and haptic interactions. She is a Ph.D. student at the HCI department of Tallinn University, located in a little digital country, Estonia. Her main focus of research is body-centric vibrotactile implicit interactions, enabled by e {electronic} – textiles. I am fascinated by the enormous potential of tactile communication which can be realised through haptic technology.

Vanessa Buth Vanessa has experience as senior research associate in projects such as CONNEX, DemoCiv, "Negotiating Brexit" and in the European Commission: Facing the Future" and its follow-up research projects. She has broad skills in qualitative research. She moreover has ample experience from the NGO sector as community organiser, climate policy analyst and in communication and political advocacy in the fields of climate change and just finance. Her main interests are grassroots democracy and just socio-economic transition.

João Limão PhD in Communication Studies: Technology, Culture and Society (FCT), from the University of Beira Interior, in a consortium with ISCTE-IUL – Instituto Universitário de Lisboa, University of Minho, and the Lusófona University, with a thesis on communication in processes of participation and democratic deliberation. His main research interests are in communication studies, especially in the areas of public and audience studies, public sphere, deliberation and participation, journalism and science communication, and he has published articles on how the public accesses information and how participatory budgeting is covered in the regional press. He works at the Centre for Ecology, Evolution and Environmental Changes (CE3C), University of Lisbon, as a post-doctoral researcher on INCITE-DEM – Inclusive Citizenship in a World in Transformation: Co-Designing for Democracy.

Sandra Oliveira Based in Lisbon, joined CE3C – Center for Ecology, Evolution and Environmental Changes/*FCiências.ID*'s 'INCITE-DEM' Horizon Europe project – looking forward to this aim of contributing to 'Co-designing for Democracy' in Europe. With a communication and anthropology background and experience in global citizenship, founder of NGO 4Change, has invested for the last 15 years towards participatory tools, projects and processes with the communities, managing projects concerned with facilitation of learning, C4D tools and local citizens engagement.

Claudia Reyes Diaz Claudia is an MSc student in Human–Computer Interaction with a background in Design and Crafts. Currently, her interest lies in generative design, combining technology and creativity to push the boundaries of design. She aims to use generative research to create meaningful and engaging outcomes that enhance the human experience. Her work has focused on exploring the textures and patterns of fabric through weaving, where she seeks to capture the intangible using metaphors and sustainable practices. Claudia sees fabric as a medium for storytelling and creating immersive experiences.

Lidija Živčič Lidija Živčič is the senior expert of Focus. Her work covers topics of sustainable development, climate, energy, transport, consumption, participation, degrowth and global responsibility. She has over 15 years of experience in managing projects at the level of Slovenia and the EU. Currently, she coordinates IEE funded project REACH. In the past, she worked on European projects, such as FP7 funded EJOLT, and numerous Slovenian projects. Also, she is experienced in policy work (developing policy framework and action plans in Slovenia and participating in the shaping of EU legislation). Lidija has extensive experience in communicating the listed topics in everyday life through education programmes, awareness raising actions and policy campaigns. She has access to a broad network of experts, decision-makers and campaigners in Slovenia and Europe. After completing her undergraduate studies of economics in Ljubljana in 2000, she completed a MSc course in Environmental Science and Policy at the Central European University in Budapest in 2001. In 2012, Lidija earned a PhD degree at Biotechnical faculty, University of Ljubljana, with her dissertation on raising awareness on climate change in Slovenia.

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