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Working with an advisory group to co-create innovative intergenerational climate change research

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ABSTRACT

This article discusses the opportunities of working with an Advisory Group on intergenerational climate change research. We co-created creative workshops to explore and articulate climate change perceptions and future imaginaries between younger and older people in Wales, UK. This 12-month programme of research activities led to a bilingual (Welsh and English) and bespoke comic, and a follow-up project that co-created an intergenerational activity book. Using a research diary format, we show how to practically follow the Responsible Research and Innovation dimensions of inclusion, reflexivity, anticipation, and responsiveness during the data collection stage. The opportunities for co-creation discussed here relate to two main areas: imagining and communicating futures through intergenerational workshops; and the extent to which the Advisory Group were co-creators. The voices of four members of the Advisory Group and the work of comic book artist show the benefits of an early involvement of time, resource and trust in a group who are potential critics, advocates, and bridge-builders. We make four recommendations: the importance of time and imagination in intergenerational climate research; the value of Advisory Groups in improving participatory methods; the need for sustained community-university partnerships and that Advisory Groups should be involved from the very beginning of research.

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1 Introduction

This paper uses concepts and theory from Responsible Research and Innovation (RRI) to reflect upon a year-long intergenerational climate research initiative. This research was funded as part of a wider initiative that contributed to healthier and more sustainable environments in which we age. However, our focus here is to further innovations in climate change research that create meaningful opportunities for younger and older people to enter dialog. The project works with artistic methods—such as collage (Williams, 2023) and walking drifts (Singleton, 2024)—and so promotes a form of creativity that is emplaced or specific to a given location. The project culminated in the creation of *The Climate Comic* (or *Comic yr Hinsawdd* in Welsh) to communicate with the wider world. The comic itself is largely an achievement of Laura Sorvala] in collaboration with the research team and some Advisory Group members. In doing so, we recognize that creative outputs will take flight (Rogers, 2011) and be consumed differently in other contexts.

The interdisciplinary research team (Aled Singleton, Merryn Thomas, Carol Maddock, Aelwyn Williams, Deborah Morgan, Charles Musselwhite and Tavi Murray) spans geography, health, and ageing studies. Due to the nature of the funding, an early career researcher Thomas led the project and paid for two days' per week for postdoctoral researcher Singleton. Though the team benefitted from the experience of two

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established professors and mid-career researchers, the balance towards early career staff allowed them to develop innovative methods and emerging practice around inclusion. Of note, the RRI framework was not originally part of the project methodology. Though we always intended to follow a process of co-creation, meaning 'the coming together of actors across organizational boundaries to create mutually beneficial outcomes' (Elkjæ et al., 2021, 2), it only became clear towards the latter stages that co-creation was also critical to RRI (Jansma et al., 2022). For example, we shared a desire for wider society to be involved in science (Owen et al., 2012; Ten Holter, 2022), to confront societal challenges (Fisher, 2022), to be involved in the governance of global challenges. Climate change can be considered a 'wicked problem', referring to complex, interconnected challenges without clear solutions, where attempts to address one aspect often generate new issues elsewhere (Buchanan, 1992).

This writing starts by setting the context for intergenerational climate research. We then outline the RRI practice and its processual dimensions of inclusion, reflexivity, anticipation, and responsiveness (Stilgoe et al., 2013). We present the research framework as originally proposed (sites, participants, and methodology) and discuss the difference made by establishing a diverse project Advisory Group (including authors AG1-AG4). To illustrate the value of RRI we present a form of reflexive diary. This format explores how establishing this Advisory Group embodied reflexivity, helped develop a workable plan of inclusive workshops and anticipated some deliberative processes that we would follow. We also reflect on what the Advisory Group members learned from the project for their own volunteering roles and professional disciplines. The latter is important as our work was designed to embrace futures and specifically use the word 'imaginaries'. In our conclusions we stress the importance of providing time, space and funding for researchers to form and maintain meaningful community-university partnerships (Olabisi et al., 2023) for co-creation to be effective and possible. To that end we briefly outline how this initial work with an Advisory Group led to a co-created output—the *Climate Comic Activity Book* (Thomas et al., 2025a).

1.1 Intergenerational climate research

Research shows climate anxiety amongst younger people. From within 2,000 young people surveyed about climate change in 2020, nearly three quarters were worried about the state of the planet, and close to a half did not have faith in their parents' generation to tackle the challenges (Cunsolo et al., 2020). This sentiment connects with a perception of climate 'denial' amongst some older respondents in a previous study (Weber, 2015). More recent media reports highlight negative media representations of older people's climate change views (Catanzariti, 2022; Sundaravelu, 2022). However, more detailed studies show that higher levels of climate skepticism only exist amongst some groups of older people (Poortinga et al., 2011). To further explore these contradictions there is a need to build on the limited examples where older people are involved alongside younger generations in climate change research (Ayalon et al., 2022; Shrum, 2011).

Intergenerational approaches are limited in policy making. However, they are starting to influence the European Union (Jensen & Pfitzner, 2025). Wales is particularly forward thinking as the devolved Senedd (or Welsh Parliament) established a Cross-Party Group on Intergenerational Solidarity in 2020 (complementing the World Health Organization Decade of Healthy Ageing). The Senedd passed an Environment Act in 2016 and the Wellbeing of Future Generations Act in 2015. The latter established a Future Generations Commissioner, appointed by the Welsh Government (the executive who govern the Senedd), who is able to scrutinize policy and practice in terms of promoting sustainable development, the protection of natural resources and needs of those yet to be born. The recently appointed Future Generations Commissioner encouraged young and old to work together and to 'leave behind a liveable planet' for future generations (Walker, 2023). Later in this article we explore how such powers and legislation are being used within Wales.

1.2 Responsible research and innovation (RRI) framework

RRI was embraced by the European Commission at the turn of new Millennium because 'Citizens were increasingly distrustful of institutions, expertise and politics, or simply not interested in them at all'

(Owen et al., 2021, 218). A new paradigm would bring the process of research closer to society and to encourage greater dialog. This is of particular interest to the case study in this paper as the research aimed to lay foundations for the design of future environments. RRI is founded on the four processual dimensions: inclusion, reflexivity, anticipation, and responsiveness (Stilgoe et al., 2013). These four dimensions are briefly defined here and subsequently developed as we explore the case study in more detail. Inclusion is described by van Mierlo, Beers and Hoes as meaning:

> … participatory, tailormade techniques for public dialogs are used to include the public, NGOs and other stakeholders that are usually absent from science, development and innovation, with the aim to open up the innovation process' (2020, 361).

Jansma et al. (2022) go beyond 'public dialogs' and argue for the sharing of power among participants and other stakeholders. In large public sector innovation projects research can involve decisions about organizational efficiencies and cutting resources. Partly due to these pressures Seravalli et al. (2021) make an important argument for the nurturing and encouragement of co-learning. The case study featured in this paper has not had to make organizational decisions and has instead created outputs such as the comic.

Given the nature of the case study, this paper focuses on how an Advisory Group can share power by embodying reflexivity in the co-creation of research. For example, they can reflect and scrutinize the wider moral and societal mission (Jansma et al., 2022). This paper pays particular attention to the biographies of four Advisory Group members who act as co-authors and the changes they made to the research design. This background helps to understand how they offer a role in the future focused role of anticipation, meaning:

> … a precautionary approach that promotes a regime of vigilance, that is informed by historical experience, and that requires imagination for what might happen in the world as we know it—without anticipating impacts or requiring knowledge of what the future might hold (Nordmann, 2014, 95).

Anticipation is partly a method, and also a form of governance, which can be extended to the work of a research team itself. In a recent paper Urueña (2024, 10) cites von Schomberg's (2012) description of anticipation as helping to 'overcome the often too narrowly conceived problem definition scientists implicitly work with'. Anticipation can bring forward 'narratives of expectation as well as other plausible pathways that may lead to other impacts: to prompt "what if…" questions' (Owen et al., 2012, 755). In this paper the Advisory Group helps the research team understand the role of past choices and to be genuinely open to what the future could hold.

Finally, Heltzel et al. refer to responsiveness as the 'translation of the other three principles into practice (2020, 174). Responsiveness is seen by some as the act of institutions joining the 'integrated processes of anticipation, reflection and inclusive deliberation [or inclusion] to policy and decision-making processes' (Owen et al., 2012, 755). Of note, the latter authors have reversed the order of the processual dimensions. For the purposes of this paper, and given the need for simplicity, we will follow the order as originally stated in Owen et al. (2012).

1.3 Presenting responsible research in the form of reflexive diary

The iterative nature of designing participatory research can be understood in 'project management terms' (Ten Holter, 2002, 285). Such a frame helps to explore how previously agreed processes are evaluated, changed and lead to subsequent cycles of co-creation (Foley et al., 2022). For example, the research journal aims to follow a linear process according to how events unfold (Ortlipp, 2008). At times the diary format can challenge the traditional Introduction, Methodology, Results and Discussion format. However, there are precedents in RRI exploring reflexivity in fields such as healthcare improvement (Davidoff et al., 2009; Garritty et al., 2020). For the purposes of our project the research diary format helps to bring forward the voices of Advisory Group members. For them it is easier to see the project as a process in which they have played a part, rather than sharing the same interests or understanding of methodology, results, or discussion as the research team. In this paper authorship is important and Advisory Group members provide more than a quarter of the written content. This diary structure therefore brings forward voices from the Advisory Group and the work of artist Laura Sorvala. These perspectives represent the importance of bridge-builders—or what Olabisi et al (2022) call 'boundary spanners' - who allow the project team to put

co-creation at the center of the research activities. For example, one co-author worked in politics during the project and was interested in how to bring more people into climate change discussions. This latter position, amongst others, is explored within this paper.

2 Materials and methods

The project's primary focus was to explore how climate change affects environments and therefore the health and wellbeing of people as they reach older age (Peace, 2022; Wanka et al., 2014). The project set out to explore wicked problems through processes which are creative and participatory (Buchanan, 1992; Marschalek et al., 2022). The project met a tight timescale: funding call in spring 2022, submission date mid-June and a decision in July 2022. The work had to start in October 2022 and be complete by the end of September 2023. As such the decisions made about sites and methodologies were made early in the process and were difficult to amend greatly during the project. The study was carried out in accordance with the principles of the Declaration of Helsinki.

We proposed workshops in five everyday environments, specifically: a street comprising shops and services located just outside the city center; a small settlement whose economy previously relied on carbon intensive industry; a farming area; a setting where primary school children visit a care home; and a coastal town. During the workshops we used cutup and collage (Williams 2023), outdoor walking methods (Singleton, 2025; Thomas et al., 2023; Springgay & Truman, 2022), online walks (Singleton et al., 2024), the use of comics (Thomas et al., 2021) and games (Thomas et al., 2018). Such approaches offer effective means to involve intergenerational groups in articulating intangible values and exploring change by making the familiar strange and forcing us to linger and to notice (Mannay, 2015).

We engaged participants ($N = 55$) through five workshops (Table 1). An equal number of participants were older (over 65) and younger (under 25). The workshops aimed to capture stories of climate change perspectives, behaviors and—with particular interest to RRI - visions for the future (Nordmann, 2014). We concluded the project with a shared learning event, where participants, Advisory Group members, artists, community activists, government representatives and other stakeholders came together. For a more detailed reflection on the project outcomes see Thomas et al. (2024).

This case study presents and analyzes reflective comments recorded during the workshops, notes from project meetings and observations from the team. Some reflections were gathered from members of the Advisory Group towards the end of the project through debrief meetings and written reflections.

2.1 The advisory group in this case study

We moved quickly to develop our Advisory Group. In the first week of the project an advert was written in English and Welsh. This was circulated via social media, word-of-mouth recommendations, and

Table 1. Members of the advisory group.

Name or role	Organization	Over 65
*Russell De'Ath, policy advisor	Natural Resources Wales/Cyfoeth Naturiol Cymru	Yes
Community development officer	Regional Government	No
Dr Keith Halfacree	Swansea University	No
Lead for engagement and participation	Local Government	No
Honorary researcher	Swansea University	No
Volunteer	Works with children	Yes
Phoebe Brown	Repair Café Wales	Yes
Loz	Independent social care trainer	No
*Jennifer twelvetrees	Volunteer, Women4Resources	Yes
Social care commissioner	Local Government	No
Policy advisor	Regional Government	No
Artist	Local arts charity	Yes
*Tom Bateman, senior communications officer	Working for former former Member of Parliament Beth Winter	No
Early career researcher	Indian University	No
*Luci Attala, anthropologist	University of Wales Trinity St Davids and United Nations Educational, Scientific and Cultural Organization (UNESCO)	No

through the email list of more than 1,000 people by [suppressed for anonymity] a community university partnership (Olabisi et al., 2023) that works with older people and those in policy and practice. The timeline of Advisory Group involvement is shown in Figure 1 and its members are shown in Table 2. There were five distinct phases to their involvement, including the development of an inclusive research approach, workshops (see Table 1), comic creation, public engagement, and a learning event.

In total, 15 people played a role on the Advisory Group (Table 1) alongside a research team comprising 7 individuals. The members of the group included a social care professional, volunteers working in environmental projects, an artist specializing in activities for children and young people, policy advisors working at both the Wales and UK Government level, public sector engagement professionals, and the leader of an environmental charity. It is notable that four academics were on the Advisory Group, including an early career researcher based in the Global South, a specialist in rural geography, an emeritus researcher exploring climate communication and Luci Attala an environmental anthropologist. The ratio of two Advisory Groups members to each research team member offered a diversity of voices to discuss and challenge decisions made by researcher staff. As is discussed later they took part both in formal meetings and communicated their recommendations by email. Looking at the power balance from a different perspective, there were 14 people working in the community and 11 people with a PhD. This closely resembles another case which developed a toolkit for intergenerational research (Turcotte et al., 2023), where the advisory committee consisted of nine academic researchers and 11 community partners.

All Advisory Group members were invited to be co-authors for this paper. Some contributed anonymously, and those who chose to be named are marked with an asterisk (Table 1).

The Advisory Group was involved in each stage of the project from October 2022 through to its completion in September 2023 (Figure 1). In the following section of this paper, we show how the Advisory Group played a significant role shaping the research methodology later used with participants. Specific examples are discussed and analyzed with regard to ongoing debates around inclusion, reflexivity, anticipation, and responsiveness. Through each example the voices of Advisory Group members Jennifer, Tom, Russell and Luci add commentary as they consider practicalities and potential policy outcomes. Beyond the data collection and creating the comic book, the Advisory Group members helped to stage a public exhibition, host a shared learning event, and facilitate dissemination through an international publication.

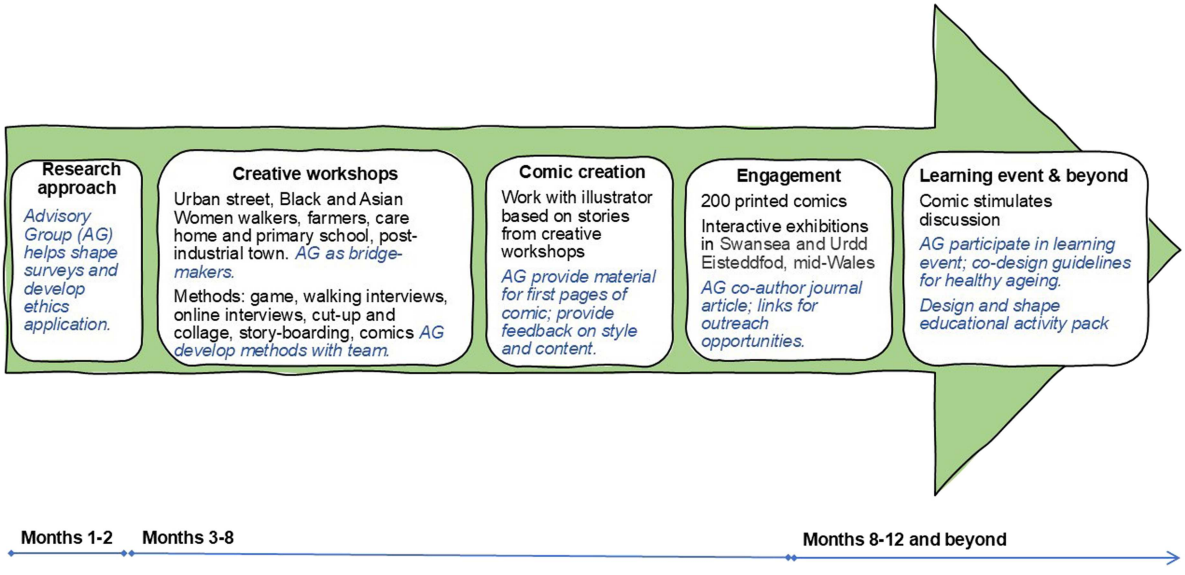


Figure 1. Development of the project with our Advisory Group (AG).

3 Following the four stages of the responsible innovation process

3.1 Inclusion

As introduced earlier, inclusion means designing bespoke and participatory approaches to public dialogs (Van Mierlo et al., 2020) and to spread power among participants and other stakeholders (Jansma et al., 2022). Turcotte et al. (2023) present a useful study of older people guiding the decision-making process for intergenerational participatory action through various phases, including co-designing a toolkit. Of note, this latter case study was a three-year project with staff to manage the committee of older people, whereas our own research project was relatively lightly resourced, with no staff solely dedicated to the project. This section focuses on some of ways that the Advisory Group contributed to the inclusivity of the project, by scrutinizing contents of the draft ethics application and helping shape the methodology.

The workshop timetable (Table 2) was discussed during an early Advisory Group meeting. In response a commissioner of adult social care was concerned that some interventions involved too much technology and would not be accessible to those living in care or with sensory loss and limited or no digital skills. The latter position was also backed by one member of the Advisory Group aged over 65. As a result, we planned activities that were analog, such as embracing the physicality of objects (Figure 2). Where we used digital communications, it was part of a predominantly in-person setting. Moreover, technology was used at a gentle pace. This followed previous RRI research on ageing and technologies, where Bechtold et al. (2017) state that 'within a shared responsibility constellation, we suggest that the potential user of the technology should have the last say on that question' (2017, 171).

Two Advisory Group members stressed the importance of including people who are not comfortable with using English or Welsh, particularly in written form. As a result, the Participant Information Sheet and Consent Form were designed to be easy-read, and more visual. One simple measure was to include an image of each researcher on the form with their name underneath. It was felt that this would benefit both older people and children. Significant elements of the workshop activities, such as the cut-ups and collages (Williams 2023), were designed to facilitate non-verbal communications. Examples of the comic book feature later in this paper, using visuals, short phrases, and simple language to communicate.

The Advisory Group further shaped the research approach by testing the entire workshop format (Table 2). Through two pilot workshops we included all methods and a trial of pre and post event surveys—for details see Thomas et al. (2024). One workshop was held in person at the university, comprising both indoor and outdoor elements, and the second held online a week later. The results of piloting the workshops are now briefly discussed. After provision of information sheets, discussing and signing consent forms, we took part in an ice-breaking activity. This involved each participant choosing a physical object (Figure 2), introducing themselves, and saying how the object related to climate change. Artefacts were brought by the research team and included a model of a space shuttle, a smart phone, a

Table 2. Format for three hour workshop.

0:00	**Arrivals** Reading and signing consent forms and questionnaires
0:20	**Welcome** Introduction to the project and team, housekeeping, confidentiality, etc.
0:30	**Icebreaker** Twenty artefacts laid out and participants asked to choose one. Participants and facilitators introduce ourselves, and say why we chose the item and how (if) it relates to climate change.
1:00	**Discussion in breakout groups** "Finish the sentence" activity
1:20	**Coffee and comfort break**
1:30	**Break out activities** One activity per participant, chosen prior to workshop: - mobile interview - online spatially-led interview - comic-creation activity - cut-ups and collage activity - story-board
2:30	**Wrap-up** Reconvene with drink, discussion, wrap-up, thanks and debrief
2:50	**Final questionnaire and close** Ask participants to complete final questionnaire, collect vouchers and debrief sheet.

Figure 2. Objects used in the ice-breaking activity.

shell of unknown age, a jar of dried lentils, images of renewable energy technologies and others. These activities helped members of both the research team and the Advisory Group to introduce themselves and explore biographies and perspectives.

These pilot workshops allowed Advisory Group members to lay important foundations for the comic book. Indeed, the first section of the comic to be completed interpreted stories of resource usage and climate change during the lifecourse of Loz (female, 75–84). The moment of inspiration is described in the comic book itself (Thomas et al., 2023, 21) and was prompted by the shell (see Figure 2). She worked with the artist and research team to finalize the contents of the double-page spread. It was important for an older person to set the tone for how they were depicted, and Loz described seeing herself in the comic for the first time as a privilege (Thomas et al., 2024, 12).

On a final note, some members of the Advisory Group offered stronger criticism of our plans through email after the workshop. One noted the lack of ethnic diversity in the proposed research sites, exacerbated when work with one proposed site became unfeasible. The Principal Investigator later made connections and contact with a Black and Asian women's walking group in a nearby town. This resulted in a very productive outdoor workshop, which greatly extended and improved inclusivity.

3.2 Reflexivity

Reflexivity is a core concept in qualitative research, including in the social sciences and gerontology. The choice to establish an Advisory Group in the case study initially aimed to avoid an extractive approach. As such three members of the research team previously formed an Advisory Group with older people in a significant international energy project that used co-design techniques (Maddock et al., 2023). The research team felt strongly that Advisory Group members should benefit from being involved in the process and outcomes, as well as vice-versa. Here we introduce four co-authors who sat on the Advisory Group. Their biographies, motivations and values are important when we consider some of their actions here, coupled with reflections later in this paper, and contextualize the ways in which they benefited from being part of the case study project.

Jennifer is a longstanding local resident. Jennifer's imagination of what older people, as she describes herself, can pass on to future generations relates to her experience of the 1960s and 1970s ecofeminism movement (Mies & Shiva, 1993). She remembers how women's protest marches in the early 1980s from south Wales to the nuclear weapon store at Greenham Common (Kerrow & Mordan, 2021) helped people become aware of what was happening in the wider world. Jennifer is part of the Intergenerational Network UK and cites examples of place-based relationships between younger and older people in Edinburgh and north Wales. Coming to the research project, she was interested in techniques which bring older generations out of their houses.

Russell works for Natural Resources Wales / Cyfoeth Naturiol Cymru who are principal advisers to Welsh Government about issues relating to the environment. He brought recent experience of capturing community knowledge of nature loss through a Wales-wide conversation. This work started with online events and quantitative surveys, but later shifted towards focus groups. He was interested in exploring the specificity of climate change in certain places and testing whether one message applies everywhere.

During the project Tom was Communications Officer for Beth Winter, at the time a Member of Parliament (MP) reprenting the Cynon Valley in south Wales. Though flooding has been a major issue, and the climate crisis was a core pillar of the MP's work and platform, Tom noted that climate change hadn't inspired much engagement from constituents. Research around Climate Assemblies staged across the UK in 2021 (Carrick et al., 2023) confirms that middle-class people in cities, and those already passionate about climate change, were more likely to attend. As such Tom sought approaches to broaden involvement.

Luci is an environmental anthropologist and the Deputy Executive Director for the global BRIDGES coalition of the United Nations Educational, Scientific andCultural Organization (UNESCO). Its core mission is to foster transdisciplinary research in collaboration with communities, generating policy-relevant evidence for an Intergovernmental Council of Member States. Luci emphasized that meaningful change is only possible when it is adopted and shaped by the public. Projects like the case study play a vital role in this process by supporting people to imagine and articulate the futures they want. By creating spaces for collective imagination and dialog, the case study aligned with the initiative's core values: placing people, not technology, at the center of sustainability transformations.

Taken together, the contributions of Advisory Group members and the research team's approach highlight how reflexivity was embedded throughout the case study, not only as a methodological stance but as a commitment to co-learning, mutual benefit and ethical engagement. Each co-author's perspective reveals how personal, professional and place-based experiences shape how people understand and respond to climate change. In bringing these insights into dialog, the project deliberately reduced the intensity and pace to allow time for reflection, relationality, and imagination; the hallmarks of responsible, slow innovation, following Steen (2021). Rather than extracting knowledge from participants, the project aimed to cultivate shared ownership of both the process and its outcomes. In this way, reflexivity was not merely a research tool, but a transformative practice, which helped the participants, including the researchers, to question assumptions, reconsider roles, and recognize how values, positionalities, and lived experiences influence the futures we are capable of imagining and creating together.

3.3 Anticipation

Given the aforementioned anxiety around climate change (Cunsolo et al., 2020), the workshops had to sensitively represent accounts of the past alongside *imagined* climate-changed future environments. Carefully facilitating such conversations could not only allow important surfacing of conflict and differences but also show how to build intergenerational solidarity desired by Welsh policy makers (Walker, 2023) and the transmission of knowledges between generations (Jensen & Pfitzner, 2025). In this section we explore how Advisory Group members helped the project team anticipate the types of discussion where participants engage with the past and future. Indeed, by virtue of their diversity in age and lived experience, an Advisory Group can bring a range of perspectives. Particularly they complement theory with situated reflections on societal contexts; a combination important to co-creating knowledge for sustainability

(Mauser et al., 2013, 423). For example, Jennifer's experience of environmental protest and Russell's work on environmental policy designed to benefit future generations.

We start with a significant example of intervention from the Advisory Group. As presented in Table 1, the first main activity in each workshop involved participants picking up objects that interested them and using the object to frame a brief introduction. The response would feature some perspective on the environment or of climate change. The second main activity was designed to focus more specifically on the place in which the workshop was staged. Originally, we intended for participants to take a card and then construct a sentence from that starting point. For example, 'The ways we did things in the past were…' Other cards started sentences focused on the future and some were explicitly negative. Some Advisory Group members felt that the sentences would limit discussions to topics set by the research team. Moreover, the language was seen as too complex for children. Luci commented that climate change conversations can be creative points and opportunities where ideas or approaches can begin to grow. In her view the wider narrative around climate change needs to be reconfigured away from the fear of an apocalypse and destruction to encourage people to think about how to be human on this planet today, in current conditions. This latter thought hits at the type of vigilance demanded by Nordmann (2014) and urges us not to think too far into imagined futures.

Taking the above criticisms, we greatly changed this exercise by designing a dice game and with a different stress on the words. The first dice throw provided the first two words of the sentence. This conveyed a temporal dimension (past, present or future) and also some degree of emotion. The second dice throw defined the setting or activity. Altogether there could be 36 different combinations, such as looking forward with 'I hope nature.' or thinking to the past with 'I remember places.'. An illustration of how to play the game forms part of the final comic book as shown in Figure 3. This includes more than twenty responses given by participants. Sharing this detail makes the process open (Van Mierlo et al., 2020) and encourages a knowledge commons that supports co-governance (Foley et al., 2021).

Tom noticed that the speed of the dice game allowed people multiple attempts and therefore relieved any pressure they may have felt. This comment regarding perceived pressure is important because research participants are aware that their expectations (Jansma et al., 2022) or views may differ to others in the group. We return to the dice game in the discussion.

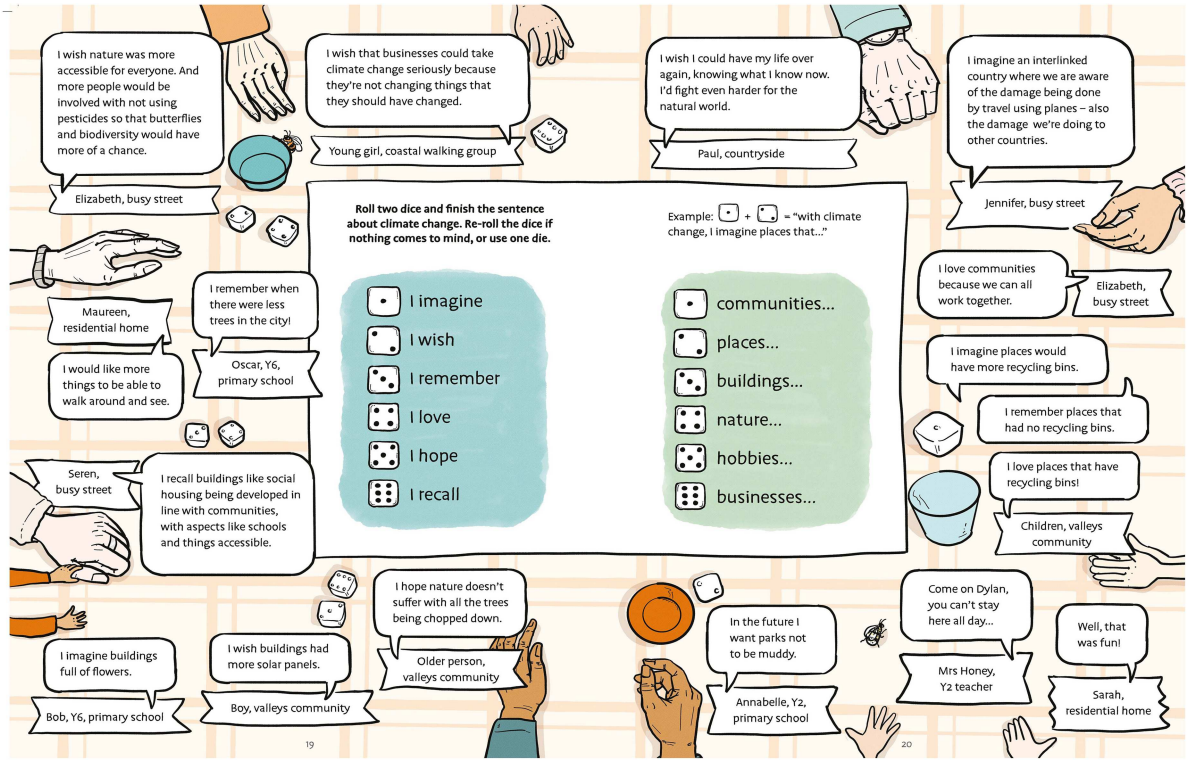


Figure 3. The dice throwing game © illustrated by Laura Sorvala.

The types of openness to change research methodology described above reflect Jansma, Dijkstra, and Jong's findings from three co-design projects that 'adaptation is easier to achieve in an early developmental stage of the technology, as there is still room for adjustment than in a later stage' (2022, 43). In our case the 'technology' - see more in Buchanan, (1992) - was the toolkit for the workshops, including the use of objects, dice and other methods. All recommendations fed into an amended ethical framework led by the Principal Investigator. In the next section we consider responsiveness.

3.4 Responsiveness

Heltzel et al., (2022) argue that responsiveness is the least conceptualized of the four dimensions of responsible research and innovation. Some refer to responsiveness as the part of the research or innovation process that responds to 'significant events outside the initiative or unexpected results of the initiative's own actions' (Van Mierlo et al., 2020, 367). This ambiguity provides opportunities for us as authors to see responsiveness both in terms of process and also in terms of outcomes. Whilst some outcomes are considered in the discussion, particularly reflecting on the comic book and its onward influence, in this section we briefly consider the importance of the place-based context for the process of intergenerational workshops and climate change. Continuing the reflexivity thread, we again voice what members of the Advisory Group have gained from the project.

Intergenerational dialog around climate change has been developed at a European level (Jensen & Pfitzner, 2025) but more localized examples are limited. Advisory Group member Tom was interested in broadening conversations about climate change in smaller places where such dialogs do not happen. He played a significant role in brokering the opportunity for a workshop in a peri-urban location with nearly 5,000 inhabitants. This settlement is near to the former Tower Colliery, which closed in 2008 and was one of Great Britain's last deep coal mines. Attachments to carbon intensive industries, such as coal, can be powerful (Lewis, 2024), especially as the alternative forms of energy generation, such as wind, employ fewer people. Tom offered the following reflections from the dice game (see Figure 3) in this location. As the workshop started, one subgroup initially contained only older people and no younger people. Tom recalled the format and selection of verbs used led older people to a discussion about the past, more sustainable lifestyles, with a perceived stronger sense of community, less individualism, consumption and isolation. When these older workshop participants were thinking about climate change in the future, Tom noticed that many were not keen on reducing choice towards more locally-grown food or other products. Instead, they wanted big solutions (Ludwig et al., 2022) such as making aviation more sustainable. Aled also noted that attitudes started to soften when these same older individuals were joined by younger people. For example, they discussed how an annual summer duck race event on the river is less predictable than in previous decades. This story features in the comic book (Thomas et al., 2023, 13).

A similar desire for technological solutions came from a different workshop, centered on a walk along a beach close to a large industrial setting, where one older participant asked: 'why we can't develop biodegradable packaging when satellites are in space'? Similar to the observation made by Tom, this comment was made during a one-to-one conversation with a researcher rather than being in the direct presence of younger participants.

The notion that older people in some locations, such as those with a heritage of carbon intensive industries, may look for systemic and state-led solutions to climate change is a useful insight for future research. However, a dialog between older and young people may also have an influence on thinking. In a workshop involving a walk along on a busy urban city street participants sought apparently local measures, such as wanting to convert redundant car parking into spaces to grow food and wishing to close the street to vehicles altogether. Though we did not gather socio-economic data concerning participants, attendees in this workshop were principally older people—such as Jennifer—who are active in community volunteering projects. Of note, there was also a mother with a young baby in a buggy. To some extent their shared desires echo a degree of *dream catching* found in other research from urban settings; meaning that 'people's values, motivation, aspiration, fears, memories, visions, wishes, feelings' (Eronen & Wikberg Nilsson, 2023, 28) went beyond the techno-rationalist problem-solving approach (see Marschalek et al., 2022).

How place and people—particularly having representation across generations—seemed to frame these different workshops was a critical learning point from this research project. At this juncture we return to some of the questions posed at the start of the paper: the degree to which Advisory Group members are co-creators, and what this case study offers in terms of intergenerational research to imagine and communicate climate change.

4 Discussion

4.1 The degree to which our advisory group were co-creators

Co-creation is important for responsible research as it represents 'a shift in thinking from the primary enactors (producers, policymakers or innovators) as definers of value to a participative process in which customers, citizens, or other stakeholders together generate and develop meaning and value' (Jansma et al., 2022, 29). In its simplest form co-creation means mutual benefits from a coming together across organizational boundaries (Elkjæ et al., 2021). However, it can take very different forms when applied across large policy areas. For example, participatory health research includes many examples of patient, carers or members of the public being members of advisory boards, committees, panels, groups, councils, and other types of collective form (Koskinas et al., 2022).

Looking to the research diary presented in this paper and noting the requirement to deliver the project within one year (see Table 1), the choice of location and methods were largely pre-determined before the Advisory Group were involved. As detailed earlier, members of the Advisory Group helped to improve inclusivity both as representatives of older people and for research participants. Moreover, the process of creating the bilingual printed book *The Climate Comic: Tales Between Generations* (Thomas et al., 2023) was a strong foundational opportunity for further co-creation. Beyond the 14 pages of stories made from the workshops (see Figure 4), the book partly acts as toolkit (Turcotte et al., 2023) with eight pages that explain the role of the Advisory Group, function of the workshop methods, the dice game; and finish the

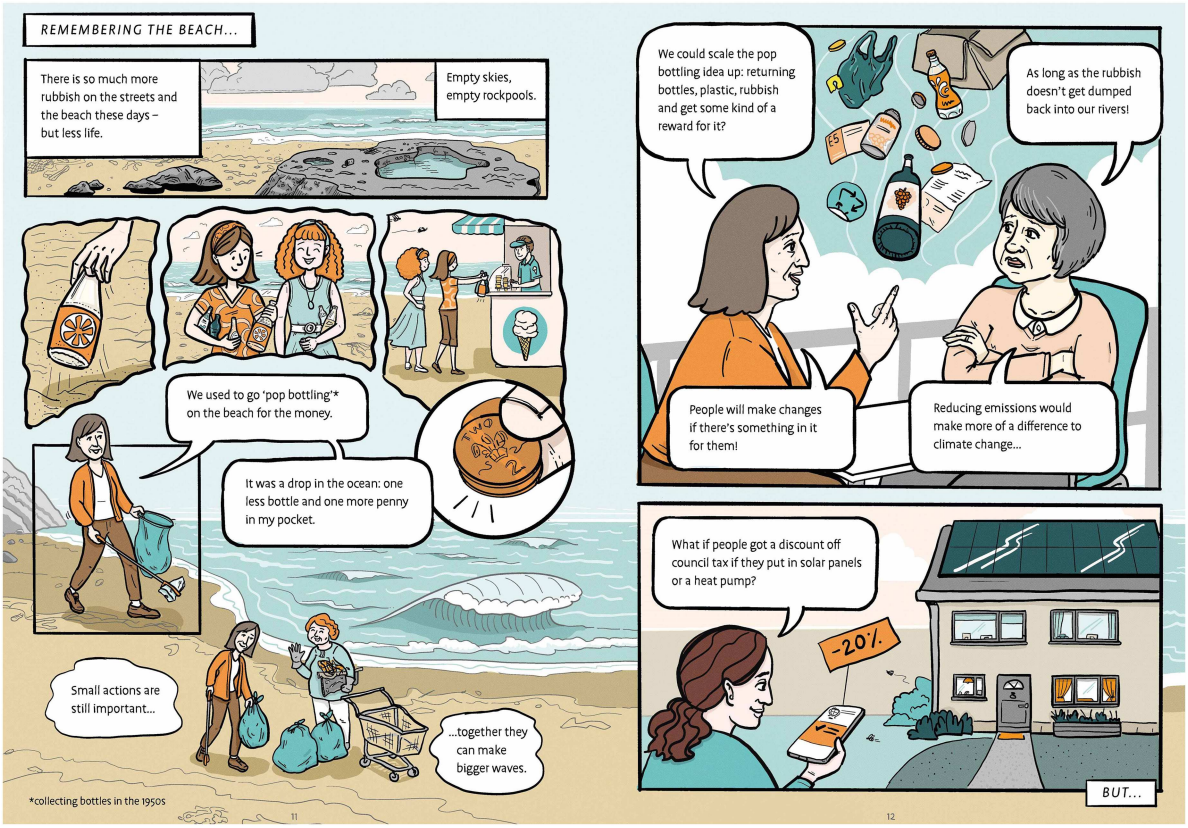


Figure 4. Story remembering the beach © Laura Sorval.

sentence activity (Figure 2). Purposefully designing elements to be reused and so build a knowledge commons (Foley et al., 2022).

As discussed in more detail in Thomas et al. (2024), the extent of co-creation possible in this project was limited by available resources and times. However, thanks to an additional impact grant of approximately £ 15,000 awarded in 2023, a follow-on project co-created a set of resources designed with and for educational settings and care homes for older people. This project involved a larger degree of active co-creation. Building on the work by artist Laura Sorvala, the research team worked with schoolteachers, volunteers from the previous Advisory Group, and care home staff and residents to actively design and shape the resources. The Activity Pack has so far engaged 140 older people, 222 children, 91 younger people and more widely reached 263 other stakeholders (Thomas et al., 2025b).

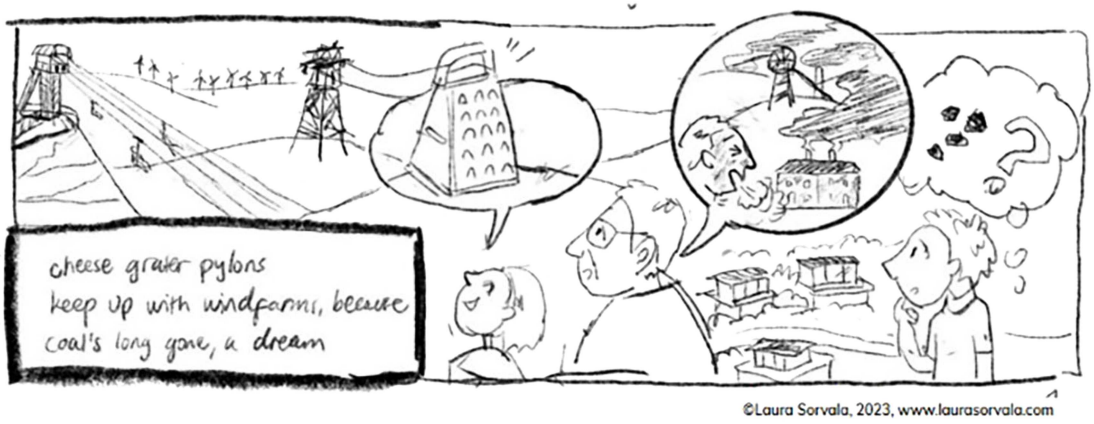
4.2 Imagining and communicating intergenerational climate change futures

There was limited time for dissemination as the case study lasted only 12 months. However, the research team took some important actions. For example, the publication contains a foreword from the Chairperson of the Climate Change Committee at the Senedd (or Welsh Parliament). Amongst a number of measures to disseminate the research, the research team submitted evidence to the Senedd's Intergenerational Solidarity Group and the National Infrastructure Commission for Wales's call regarding Communicating Long-Term Climate Threats (Thomas et al., 2025a). Members of the Advisory Group were able to contribute to shaping and delivering future intergenerational climate change policies. Here we briefly discuss how the dice game technique proved to be very successful in one workshop, and how two members of the Advisory Group saw routes able to apply knowledge to climate related communications in the future.

The dice game, adapted thanks to the Advisory Group as detailed earlier, became somewhat of a hero or a serious element (Ruggiu et al., 2022) of each workshop. In the workshop in a seaside setting (Figure 4), primary school children were taught how to play the game prior to visiting a care home. In turn they showed the residents how to play, and we based their whole session around the game. In a workshop staged at a youth club (see setting in Figure 5), the room became a hive of intergenerational activity as the children and older adults rattled and clattered the dice, taking their turn to generate new sentences to complete. It is notable that many reflections from the past (see Figure 3) commented on how the present day is better. For example, one person said 'I remember places that had no recycling bins'. A sign of appreciation was how some participants, including some who were schoolteachers and youth workers, took copies away with them to adapt and use within their own setting.

Looking to wider engagement and dissemination, Advisory Group member Russell explained that public bodies need to counter the rigidity of their communications. For example, he explained the paradox of vision statements relying on words alone and demanding the reader to create a visual representation in their own minds. Fortunately, public bodies are increasingly interested in touching what Russell calls 'the heart and head'—such as valuing specific phrases or stories that resonate. Being a member of the Advisory Group helped him to learn how people respond to visual imaginations of the future and the value of approaches that find deeper narratives. He could therefore take evidence back to his work. Indeed, his employer has been exploring different methods to engage new and diverse audiences, including the use of audio and visual tools such as comic strip characters. Advisory Group member Luci, who also works in academia, created an opportunity to share our work in a UNESCO publication designed to mobilize co-produced sustainability services for global impact (Figure 5). We included a description, a comic and a poem derived from a workshop (Singleton & Thomas, 2023).

In summary it is important to reaffirm that inviting Advisory Group members (Table 1) to contribute to the analysis and writing of this paper is a form of co-creation. The voices of the four co-authors who responded demonstrate that future intergenerational climate and ageing research should embed co-creation and Advisory group Participation from the very outset of project design. Early involvement of a transdisciplinary (Mauser et al., 2013) and intergenerational team (as detailed in Table 1) - ensures that research questions, methods, and outputs genuinely reflect multiple perspectives. Advisory Groups should be treated not as consultative bodies but as *co-learners and co-creators* who help to shape ethical practice, inclusivity, and creativity throughout the research process. Jennifer describes how higher education helped



OPTIC: UNDERSTANDING OLDER AND YOUNGER PEOPLE'S PERSPECTIVES AND IMAGINARIES OF CLIMATE CHANGE

Overview: This transdisciplinary project from Wales, UK, uses creative methods and intergenerational dialogue to explore understandings of climate change to produce a graphic novel that illustrates differences in perspectives.

Context: Through climate change, threats are emerging in previously hospitable environments. Understanding older people's climate change perspectives, behaviours, and future visions will enable environments to be shaped and managed effectively for health, wellbeing and sustainability. The illustration (above) shows one of the ways in which participants' stories are being retold in the comic.

Method: Interactive OPTIC workshops explore perspectives and future imaginaries from 55 older and younger people, including urban food growers, a primary school, a coastal care home, a women's walking group, farming family and a former industrial settlement. In these events we used creative methods including games, comic-creation, collage, cut-ups, walks, on-line interviews, Haikus and storyboarding. We wrote haikus to represent how older and younger people describe past and present climate change:

> Cheese grater pylons
> keep up with wind farms, because
> coal's long gone, a dream

In Laura's image we see how coal infrastructure (and the health impacts associated with it) are replaced by a zip wire for tourists, and how future environments could benefit pollinators such as bees – or not. These methods help our participants and us to take time to linger and notice, articulate hard-to-say values, and explore change by making the familiar strange. Workshops are audio recorded and stories are developed into a bilingual (Welsh and English) comic book by Illustrator Laura Sorvala.

Benefits: Results of this work are being shared with policy makers (Future Wales) to design guidelines for environments that better address older people's climate change perspectives and behaviours.

Figure 5. Comic used in international publication - image (c) Laura Sorvala.

non-traditional learners of all ages (Mayo, 2020) during the 1990s and 2000s, but this has been lost due to the gradual marketisation of universities. This is an example of failing to institutionalize responsible innovation (Dabars & Dwyer, 2022). When adequately resourced however, these groups act as 'boundary spanners', bridging academia, policy, and community sectors to make research more responsive and socially relevant.

5 Conclusions

This research extends the application of Responsible Research and Innovation (RRI) to the field of intergenerational climate and ageing research. By integrating the processual dimensions of inclusion, reflexivity, anticipation, and responsiveness into creative, community-based workshops, the study demonstrates how Advisory Groups can meaningfully shape both methodology and outcomes. Theoretically, the paper contributes to RRI scholarship by showing how co-creation across generations broadens notions of responsibility and innovation—from designing technologies or policies to designing relationships, dialogs, and shared imaginaries of the future. We offer four principal findings and recommendations for future research.

First, the importance of time and imagination in intergenerational climate research. We offer ways to involve older users in design (Fischer et al., 2020) and extend intergenerational climate change research. The comic book has been well received and has led to further resources being generated. The resulting activity pack was successful in having more ownership by both older and younger people. Furthermore, the book contains visual accounts regarding methods and guidance on potential usage (see Figure 2). This furthers the desire to make processes open (Van Mierlo et al., 2020) and encourages a knowledge commons, which supports co-governance (Foley et al., 2021).

Second, that an Advisory Group—comprising of experts by experience and people working with communities and in governmental organizations—can offer important criticism and insights at the stages of inclusion and anticipation, which improve using the participatory methods described here. An Advisory Group is therefore an early commitment to co-design (Jansma et al., 2022). In this case study they also offered responsive routes to future policy and practice at the completion of the research.

Third, that academic researchers and members of Advisory Groups need to ensure that momentum and trust of community partners is not lost. Researchers need to have 'humility, empathy, deep listening, and the ability to admit mistakes and course-correct' (Olabisi et al., 2023, 14) when forging community-university partnerships. From our experience we find such qualities to be deeply ingrained in Responsible Research and Innovation. However, the latter authors (ibid) stress that these are not characteristics which are encouraged or rewarded in academia. As a result, projects like ours must often start from scratch when establishing community partnerships, such as this Advisory Group. We would recommend that future projects have more than two months to prepare and only one year to deliver! We also stress the importance of and responsibility for nurturing relationships with non-academic partners before, after and between projects, and if possible, factoring in time and resources accordingly.

Fourth, that working with an Advisory Group can be rewarding and motivating throughout the research process and beyond. By contributing voluntarily, rather than being involved in a contractual capacity, they can work quickly and explore very specific issues that people face. This case study has involved people who bring practical knowledge and opportunities to work directly with communities. For any future work, however, we would follow a view expressed by Jennifer that she and the people she has met through this project should have been involved at the very first stage of research design. Effectively this would position the Advisory Group members as more active co-creators of the research. Meaningfully involving Advisory Groups from the earliest stages can help ensure intergenerational climate change research is inclusive, reflexive and adaptive throughout; and helps to further the responsive qualities of responsible innovation.

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Author contributions

AS, MT, CM, AW, DM, CBM, TM, JT, TB, RD, and LA conceptualized and designed the study. AS, MT, CM, AW, DM, CBM, TM, JT, TB, RD, LA and LS participated in the collection, analysis, and interpretation of the data.

AS, MT, CM, AW, DM, CBM, JT, TB, RD, LS and LA drafted the first version of the manuscript. AS, MT, CM, AW, DM, CBM, JT, TB, RD and LA provided feedback on the first version of the manuscript. All the authors revised and approved the final version of the manuscript.

Disclosure statement

The following authors are on the editorial board for Cogent Gerontology, Deborah Morgan, Swansea University, Wales, Charles Musselwhite, Aberystwyth University, Wales, UK, Merryn Thomas, University of Exeter, UK, The authors declare that there is no other conflict of interest.

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Data availability statement

Due to confidentiality, interview files and transcriptions are only accessible to the authors. Supplementary materials are provided in Thomas et al., 2024.

Ethical approval

Ethical approval for this project was granted by Swansea University's School of Health and Social Care Ethics Committee (reference 108948).

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