The opportunities and challenges to co-designing policy options for tree health with policy makers, researchers and land managers

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ABSTRACT

We describe experiences between 2018 and 2021 co-designing tree health policy options linked with the UK's evolving land use policy post EU-Exit within the Future Farming and Countryside Programme. Policy makers, researchers and more than 250 land managers took part in a series of co-design engagements in a three-phase iterative co-design process that culminated in a new Tree Health Pilot. After defining the components of co-design, we describe how relationships between policy makers, researchers and land managers were built, the methods researchers introduced into the process to build capability and support participation, and the outcomes in terms of the key opportunities and challenges for policy co-design. We conclude that it is possible to move policy design beyond user focused research and into co-design. However, this relies on adequate time and resources required to build trust and fully engage all parties in a meaningful way, including the development of tools and techniques that include experimentation, different knowledge types, and moving from research and evidence collection into design. Having policy makers with participatory mindsets in the same space as land managers was important to facilitating active learning between all of those involved in the collective. Researchers played a critical role in the co-design, balancing the views and understandings of the policy community with those of the land manager community, facilitating learning, and selecting tools and techniques to make design options explicit. We conclude that policy co-design in the land-based and environmental sector is a real opportunity at an early stage of realisation, but the effectiveness and range of positive and negative outcomes and impacts will need to be evaluated in the future.

1. Introduction

Participatory approaches to land use and land management issues have become relatively ubiquitous internationally (Bradwell and Marr, 2017). Over the years, different ways of describing, understanding and driving these participatory and collaborative ventures have developed and evolved, including the concept of co-production and co-design, terms which remain confusing and contested (Tsouvalis and Little, 2019). Co-production has received a good deal of recent attention as governments and public sector organisations in many countries have sought ways to improve the efficacy, efficiency and legitimacy of interventions and initiatives by including user-focused understandings, perspectives and resources in policy design and delivery (Bason, 2014b; Bovaird and Loeffler, 2012; Pestoff, 2018). Bovaird and Loeffler (2012):3 describe co-production as the "public sector and citizens making better use of each other's assets and resources to achieve better outcomes or improved efficiency". They identify co-design as a specific component of the 'co-production umbrella' and define it as allowing end users to take part in the design and testing of a public service or intervention, in a way that moves beyond consultation and brings an 'outside-in' perspective (Bovaird and Loeffler, 2013; 2012). Blomkamp (2018), suggests that it is important to understand co-design as design

thinking which itself breaks down into constituents of process (iterative stages of design thinking), principles (build and include people in policy design) and tools (use participatory and practical tools for exploring and developing), or what Sanders (2014) characterised as methods, mindset and tools. The mindset that Sanders describes is particularly important to note, as it distinguishes between a 'participatory' mindset based on 'faith' that people can contribute using their lived experience as expert knowledge of context, and an 'expert' or 'big ego' mindset in which the design expert's suggestion is the only possible solution (Blomkamp, 2018). Without a participatory mindset, co-design processes will not shift power towards those people involved to make an active and substantive contribution. What is also important to recognise is that co-design processes for public policy making will involve a "diverse range of participants in exploring, developing, and testing responses to shared challenges" (Blomkamp, 2018:731). This will include not only different parts of the policy community, but researchers, consultants, policy labs and others mediating between policy and citizen's worlds, building a joint-perspective which informs design, from the "outside-in" and the "inside-out" (Komatsu et al., 2021:3), creating a necessary 'collaborative weave' between research, policy and land manager practice and knowledge (Chambers et al., 2022).

In summary, co-design for policy as we define it here is a component of co-production. It shares common principles, including building relationships with stakeholders, employing participatory mindsets and shifting power dynamics within the design process, and using innovative tools and techniques to engage and develop co-designed solutions (see Fig. 1.).

Examples of co-design processes in a land use context can be found in a range of situations and contexts, both rural and urban, focused on green infrastructure provision, agriculture, conservation or forestry policy (see for example: Basnou et al., 2020; Bellon et al., 2009; Blake et al., 2021). However, the focus is more frequently on service delivery rather than on public sector policy design, which remains under-reported in the research literature (Blomkamp, 2018; Tsouvalis and Little, 2019).

2. Objectives and method

2.1. Objectives

In this paper our objective is to fill some of the evidence gaps associated with the co-design of public policy, by reporting our reflections and describing the evolution and early outcomes of a policy co-design process with an Action Research (AR) component. AR integrates well with co-design since it is "an orientation to (scientific) inquiry that seeks to create participative communities of inquiry in which qualities of engagement, curiosity, and question are brought to bear on significant practical issues" (Reason and Bradbury, 2001:1). A critical part of AR methodology is Reflection-in-action (Costello et al., 2015; Schön and Rein, 1994). Reflective exercises focus on distinctly different elements, including the research process, research content or the research premises and assumptions (Coghlan and Brannick, 2005). The purpose of reflection-in-action is to move researchers beyond an analysis of the data collected as part of an action research project, towards learning from (and evidencing) the process and subject of inquiry. We used reflection-in-action to realise our objective, through answering the following research questions important to understanding the specific challenges of policy co-design:

1. What can a policy co-design process look like, what principles, tools, and methods can be used, and what are the outcomes?
2. How can stakeholders be engaged in the process and how democratic or representative is the result?
3. What are the key opportunities and challenges for policy focused co-design that emerge from practical experience?

2.2. Reflective method

The co-design activities undertaken generated significant amounts of data and evidence that fed into the policy design process, with the methods and outcomes used to generate and evaluate them having been reported in Ambrose-Oji et al. (2019), (2020), (2021). In this paper, we report insights that were generated in regard to the co-design process by a reflective working practice adopted by the research team (which numbered from 8 to 12 at any one time and included a mix of
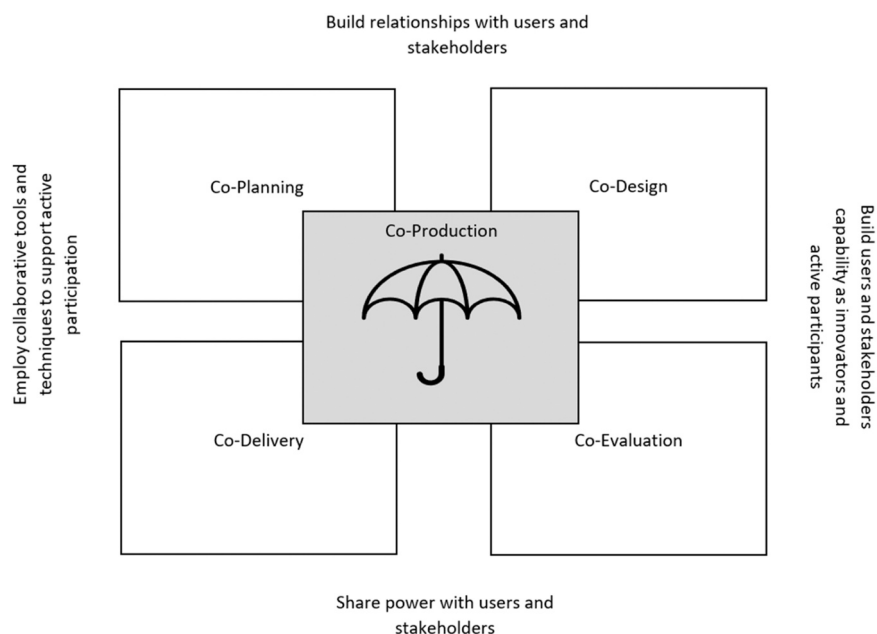

Fig. 1. Defining Co-design as a component of the co-production umbrella.
Source: using ideas presented in Blomkamp (2018) and Bovaird and Loeffler (2013), (2012).

researchers, an environmental Non-Governmental Organisation – eNGO - and policy makers as detailed below). Central here were the group discussions held at the end of each action research cycle, roughly every six months. In total, six such discussions took place face to face and which on average lasted around 2–4 h each. Key learnings from six such group discussions were deliberated, agreed and documented in the form of meeting summary notes, an evidence set that stood as a record against the questions addressed in this paper, as well as providing direction for iterative development of the co-design process. It is the reflective practice that informs the arguments in this paper. Section 3.1 elaborates in more detail on the co-design methods used during the co-design process and the type of data and evidence collected.

2.3. Policy context: Co-design supporting England's future farming and countryside programme

The UK voted to leave the European Union (EU) in 2016. The Department for Environment, Food and Rural Affairs (Defra) was responsible for negotiating EU agricultural, marine and environmental policy on behalf of the UK, so has been closely involved in meeting the challenges of the evolving policy context for those sectors since then. At a national level, Defra has responsibility for developing environmental and agricultural policy related to land uses previously covered under the EU's Common Agriculture Policy for England, rather than developing these policies for the UK as a whole. From the outset, Defra quickly committed to including land managers and the organisations which represent them and their industries at the heart of discussions about what the new farming and forestry policies in England should look like. Defra also made some clear internal and external statements about where and how co-design processes would be used to develop the Future Farming and Countryside Programme (see for example, Hughes, 2020). This included the Environmental Land Management (ELM) scheme in England, a policy which seeks to support land managers move towards the production of public benefits in exchange for government support.

Over a corresponding period, the introduction of designers and "design thinking" principles and approaches have been brought into public policy work in many areas of government (Bailey and Lloyd, 2017; Einfeld and Blomkamp, 2021), including within Defra (see for example UK Government, 2012). Defra has been at the forefront among UK government departments in experimenting with participatory design methods for policy development (see Little et al. in this Special Issue). Much of the early discussion incorporating these perspectives within different Defra directorates and agencies was around 'user centred' design. The focus was on design as innovation, moving through specific phases from scoping, through to design and testing, a move from a defined 'problem space' towards a 'solution space'. This reflects steps in

co-design processes identified by Sanders (2014) as pre-design, discovery, design, test and sell, but mirrors too the Design Council innovation framework which moves through phases of discovery, problem and solution definition, solution development and delivery presented as the design process Double Diamond (Design Council, 2005). The diamond provides a visual representation of how a design process moves through divergent and convergent process steps as broad evidence and opportunity scoping narrows to more focused analysis, review and selection (Tschimmel, 2012) as indicated in Fig. 2. The similarity in process steps, principles and involvement of 'end users' in both user centred design and co-design processes has been the subject of some discussion within Defra directorates and agencies, differences between the two approaches being hard to define and distinguish (see for example, Hughes, 2021).

2.4. Case study specifics: Tree health policy options as part of the Future Farming and Countryside programme

One important area of policy linked to the Future Farming programme is that of tree health. In recent years, the pressures and risks to tree health from pests and pathogens on a global and regional scale have increased significantly. This is due to a range of factors such as globalisation of trade and travel moving novel species into territories, airborne circulation of pests and pathogens across territories, and pests and pathogens evolving and cross-breeding (Potter and Urquhart, 2017). These pressures not only threaten populations of trees themselves, but have economic impacts on the commercial forestry sector and the wider provision of important ecosystem services and public benefits (Freer-Smith and Webber, 2017). Although an international issue, examples of either collaborative or co-design approaches to developing and testing policy options for the management of forest pests and pathogens remain relatively few in number (see for example, Hill et al., 2021; McAllister et al., 2017; Sheremet et al., 2018).

In England, the Tree Health Resilience Strategy lays out government ambitions to develop policy responses which will "build the resilience of England's trees, woods and forests …. by mitigating and minimising the impact of pests and diseases and improving the capacity of …. trees to adapt to changing pressures" (Defra, 2018:8). Fundamental to this strategy has been the development of policy options that support the behaviours and actions of land managers in ways that slow or limit the spread of tree pests and pathogens, and ensure that appropriate restocking is undertaken after a pest and disease outbreak, so that landscape recovery takes place and public goods are protected. Changes to forestry policies associated with the development of Defra's Future Farming programme, including the Countryside Stewardship Programme that hosts tree health measures, combined with increasing
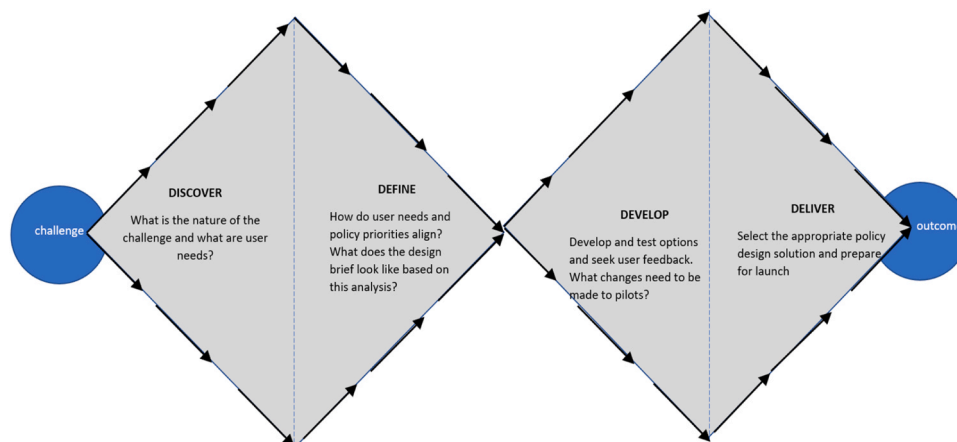

Fig. 2. The Double Diamond innovation framework for user-centred design processes.
Source: Adapted from the Design Council (2005).

pressure from a widening pool of pests and pathogens that have become policy priorities, has also prompted a redesign of the policy options related to tree health. A co-design approach to developing new tree health policy mechanisms was the preferred route not only to follow the ethos across Defra, but also with the aim of improving the effectiveness and impact of any future support for land managers to tackle tree pests and diseases. The specific foci of the new tree health policy options were to encourage and improve responses to specific pest and disease outbreaks through felling, treatment, and to follow-on with restocking using appropriate and biosecure tree stock. In addition, because managing tree health requires a landscape scale forest pathology understanding and response (Holdenrieder et al., 2004), the new policy options were to consider mechanisms for encouraging timely and coordinated action between different land managers at local and regional scales.

3. Results

3.1. Agreeing co-design principles and applying a participatory mindset

The team leading on the co-design process was, over the period, made up of 29 individuals from applied research organisations (7 from Forest Research, 1 from ADAS and 3 from Fera), two universities (4 from CCRI University of Gloucester, and 1 from Bangor University), an e-NGO (2 from Sylva Foundation), as well as policy makers from several parts of Defra's plant health team (7) and the Forestry Commission (4). A significant first step, and one that was repeated at various points during the co-design work, was to build a common understanding of language, aims and boundaries. What emerged from discussions were the essential elements of the 'group contract' that embodied the team's co-design principles, namely that: i. the process would be outcome focused; ii. all partners would be flexible, and maintain flexibility, as the process should be able to evolve and respond to changing perspectives, conditions and opportunity whether driven by policy or land manager contexts; iii. the process would involve periods of reflection to ensure that cycles of co-design built on what was learnt and would provide space for innovation and policy development; iv. active engagement with stakeholders would be based on a developing relationship that respected their time, knowledge and opinions, and their engagement would be sought at moments when input could be meaningful. The extent to which land managers would be included in the process and how much freedom they would have to shape and direct the policy options was a major discussion point. The boundaries within which the co-design process was working were relatively fixed. Some decisions about the policy options had already been made, high-level objectives had been set, the behavioural focus was mainly around the use of incentives and support for collaborative groupings of land managers, and there were already assumptions about how those might be designed. For some of the team this raised questions around the difference between user-focused research and co-design, where co-design should ideally have been much less delineated, trusting land managers to deliberate their own experiences and behaviours and have the freedom to explore beyond incentives and existing options. For policy colleagues, controlling and confining the process design was appropriate since moving beyond what was to them genuinely possible in a policy and political context presented a risk, and might have raised expectations amongst land managers about what the co-design process could realistically do. A participatory mindset existed across the team in so far as believing that land managers are experts in their own experiences and were essential participants in the design processes, but in terms of risk perception and process design, the possibilities for innovation were clearly bounded.

3.2. Developing the co-design process and stakeholder relationships

It was known from the outset that the arc of the co-design process would extend across a number of years. There was a policy development

and Parliamentary legislative timetable that dictated the speed of design, with a specific date by which a prototype set of policy options would need to be ready and a final scheme would need to be complete. The co-design process began in 2018 and will end with the launch of a final tree health policy scheme in 2024. From the outset, the team was encouraged to view the co-design process as a series of steps, each building on the other, and each bringing land managers along on a co-design journey. Three steps or phases of codesign occurred between 2018 and 2021, each of a year in duration, following funding cycles (Ambrose-Oji et al., 2021; 2019; 2020). Each phase began by engaging and building relationships with land managers through a process of understanding their lived experiences dealing with tree pests and diseases, learning more about how they did or did not act in response and how their actions were related to the current tree health policy mechanisms. The process then became more focused on defining what policy options might be more supportive and leverage particular kinds of impacts, and what the detail of those options might be. At the time of writing (in May 2023), a Tree Health Pilot scheme is being tested, with participating land managers fully engaged in learning and evaluation exercises coordinated by the same co-design team. The step-wise process can clearly be conceptualised as mirroring the steps of the Double Diamond as illustrated in Fig. 3.

Engaging land managers in this process presented a number of significant challenges. The policy options needed to include consideration of a variety of significant tree pests and pathogens, with a very wide geographical distribution across the rural to urban continuum. This meant there was significant diversity in the type of land manager and land-based businesses responsible for the different tree species affected on different kinds of land holdings. In addition, the objectives of public policy in this domain include engaging with individuals who are otherwise unlikely to act without policy support. In other words, engaging with what policy might consider 'hard to reach audiences' (Rose and Little, 2020). Agreeing on an effective and fair way to engage stakeholders was the subject of robust debate within the co-design team. Although using segmentation approaches as a way to group land managers and then map out and agree who might be engaged was challenged, some conceptual scheme to direct resources, build representation and understand who had or had not been involved was needed. In the end, previous research was reviewed (Ambrose-Oji et al., 2018) and a loose characterisation of land managers based on differences by land management objectives with some bearing on tree health management provided a scheme. This was combined with a regional focus[1] to account for the various tree pest and disease distributions and
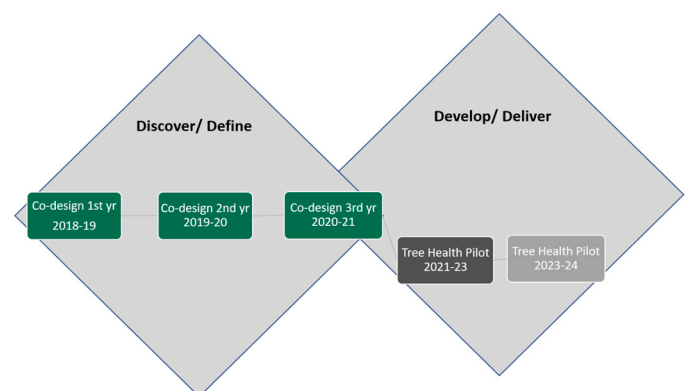

Fig. 3. The Tree Health Policy Options co-design process 2018–2024.

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[1] North West (Cumbria), South West (Gloucestershire, Wiltshire and Bristol/ Bath, Dorset and Somerset) and South East (Kent, Surrey, East and West Sussex)

different ecological, market and socio-economic conditions affecting land manager decision making in different parts of the country.

Land managers were recruited into the co-design process by sending invitations for face to face and on-line meetings, and survey links via: i. co-design partners mailing list and social media; ii. newsletters and mailing lists of other relevant organisations. The result was as a non-probabilistic self-selecting sample. Bias in the kind of land managers recruited was accounted for by balancing the numbers of different land manager types during the invitation confirmation process.

Further work was required to understand how best to engage with 'difficult to reach' stakeholders and establish some basic understanding of what they knew about tree health and what, if any, action they were already undertaking to protect it. In the context of this policy area 'difficult to reach' included 'farmers' and other agricultural land managers for whom forestry and tree health were not necessarily priority concerns. It also included owners of small woodlands who have often perceived forestry policy to have little relevance to their specific context. Connecting with, and forging relationships with the 'hard to reach', relied in part on inviting 'gatekeeper' organisations into the co-design process. These are organisations with links to or memberships amongst those 'hard to reach' land managers.

The time and available budget dictated the number of co-design events that could take place across the regions, the mix of locations, and the level of investment available to connect with difficult to reach stakeholders. Although co-design began with in-person events, the COVID 19 pandemic meant that a change in strategy to on-line engagement was needed, which complicated matters. Overall, between 250 and 350 different land managers took an active part in co-design. Land managers were invited to take part through the whole arc of the co-design process. A core group of around 40–60 were engaged through the full three-year process.

3.3. Identifying and using different methods, tools and techniques

A schematic description of the co-design process methods, tools and techniques used is presented in Fig. 4, with information about the data
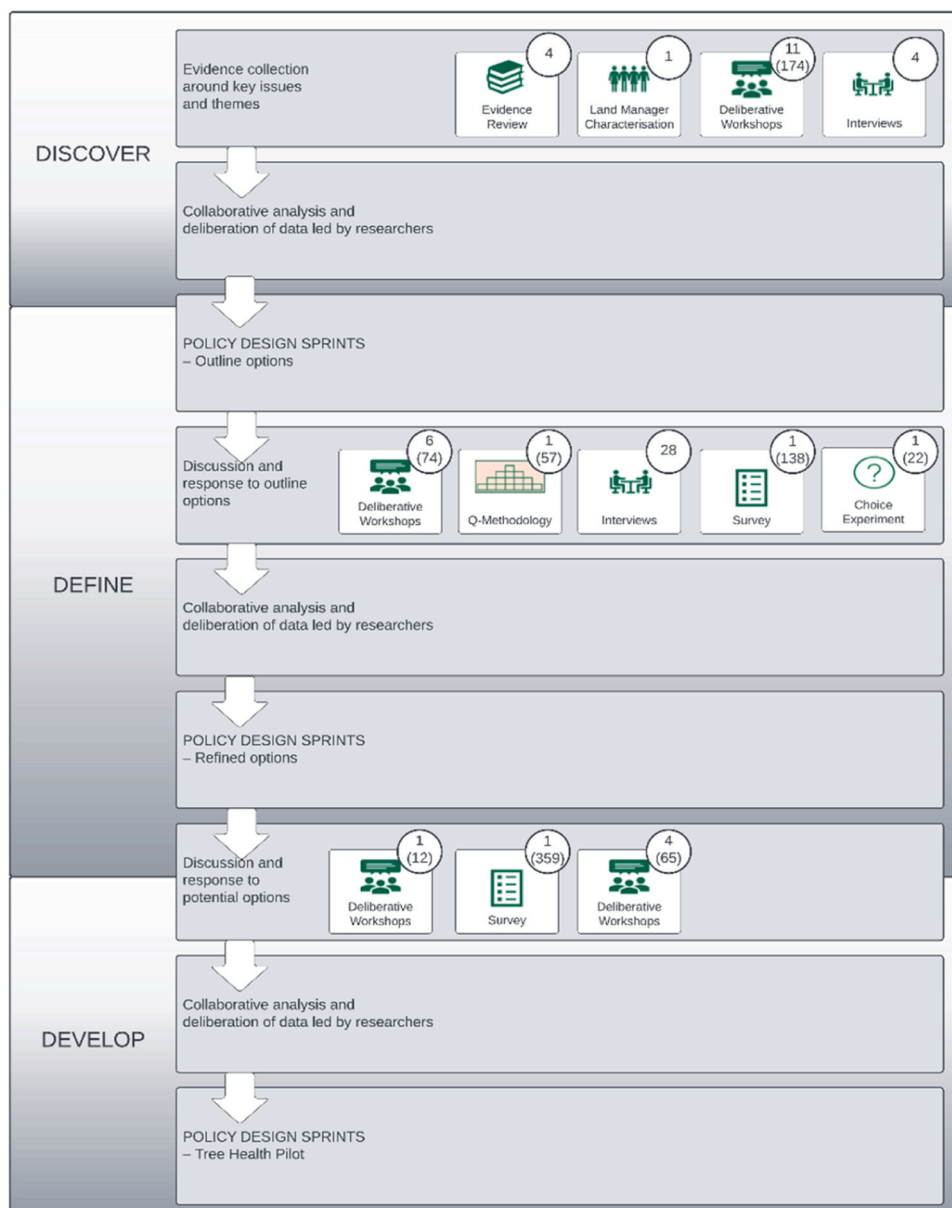

Fig. 4. The Tree Health Policy Options co-design process methods and tools * . * NB. Numbers in parentheses represent the number of participants engaged with each tool or technique.

produced summarised in Table 1.

In the course of each year, a six-month period with land manager engagement ended with a period of analysis and critical interpretation by the research team, followed by a six-month period of policy design sprints that checked evolving designs for acceptability and affordability with other parts of government. The alternating periods moved from discovery and initial evidence collection to producing outline policy options, taking those back for discussion, and then moving through to developing policy options for testing. In the first round of engagement activity, the focus was on relationship building and building a basic understanding of the areas of policy priority. Methods were limited to meetings and workshop-style discussions, with some research interviews to collect narratives of land manager experiences. Efforts focused on introducing land managers to policy makers and policy makers to land managers. This allowed both sides to establish the boundaries of the co-design process and explore the levels of uncertainty policy staff and land managers were working with in the changing land use context. It was really important to have policy makers present that were fully engaging in the workshops with stakeholders, responding to their questions, first hand and directly, to allay concerns that policy was not really listening to their issues and suggested solutions. The second period of co-design was more varied and creative in the tools and techniques employed. A national survey elicited further views on how far land manager networks might provide collaborative working for tree health at a landscape scale and how this might be integrated into policy design (O'Brien et al., 2021). Deliberative workshops included exercises involving card sorting, scenario and story-telling techniques to discuss high level design issues, e.g., the balance between regulation, incentive, advice and guidance, as well as more detailed consideration of the range of policy options. One of the hardest tasks at this point was moving the policy mindset to being less risk averse and more relaxed about sharing the detail of potential policy options. It has been suggested that the development of environmental policies would benefit from greater use of Q methodology because of the potential of the technique to facilitate better problem definition and specification of policy options, as well as to reveal complex patterns of perception within and across individuals beyond, e.g. traditional characterisations and simple lists of ranked issues and preferences (Tuokuu et al., 2019; Urquhart et al., 2019). It was

Table 1

Summary description of co-design evidence collecting tool, data produced and analytical procedure.

Method/Tool	Data and analysis
22 deliberative workshops (in person and on-line)	Workshop session guides structured conversations. Workshops lasted between 2.5 and 4.5 h. All sessions digitally recorded and professionally transcribed. Thematic analysis of transcripts to produce summarised account of key issues.
32 semi-structured interviews (in-person and on-line)	Interview guides structured conversations, which lasted 45–90 min. All sessions digitally recorded and professionally transcribed. Thematic analysis of transcripts in Nvivo to produce summarised account across interviews.
2 surveys	On-line platform SmartSurvey or LimeSurvey. Recruitment through direct email and social media. Descriptive statistical analysis using EXCEL and R.
Q methodology	In person exercise in the form of three, day-long, multi-stakeholder workshops using 30 printed question cards and corresponding sorting matrix using a 4 point grading scale. Conversations during the sorting transcribed and subject to thematic analysis. Quantitative matrix data analysed using PQMethod software package.
Choice experiment	Choice architecture presented using SurveyMonkey. Recruitment through direct email and social media. Descriptive statistical analysis using EXCEL.

for these reasons that a Q methodology exercise was introduced into the workshops. This proved very effective in supporting policy stakeholders and researchers to work together and make explicit some of the potential policy options developed in the light of the first phase of co-design engagements with land managers. Using the Q methodology also provided insights into the complex decision-making processes land managers undertake as they judge and trade-off multiple factors and options against each other. Analysis of the Q methodology matrices revealed three different clusters of land managers with different responses to bundles of policy options. The Q methodology also brought forward debate about potential unexpected outcomes of the policy option design. Land managers responded to the exercise positively, not only because it was an intellectually challenging variation from engagement tools they were familiar with, but because it created a good deal of debate with their peers, and prompted them into thinking not only about their individual responses, but the challenge of designing policy that supports outcomes on a complex issue such as tree health at a sector and landscape scale. A choice experiment, drafted with policy colleagues, discussed with land managers in workshops, and then sent out to respondents, also tested more explicit policy options (Ambrose-Oji et al., 2020). The role of researchers was critical here. Having introduced the Q methodology and choice experiment, they played a part not only as data collectors and analysers, but as learning facilitators shifting the risk perceptions of land managers and policy makers. This paved the way for the final set of co-design engagements, and enabled policy colleagues' to more easily and more quickly draft refined policy options. At this stage, COVID 19 pandemic restrictions meant that travel and in-person engagements could no longer take place. An on-line questionnaire-based survey was developed as the most appropriate way to continue to engage the largest pool of land managers of different types across the regions in the final testing of detailed policy options before developing the 'prototype'. Participants from the core group of land managers took part in designing the survey, and beta testing it. The collective views emanating from the survey and a final series of deliberations in on-line workshops were integrated into options presented in the Tree Health Pilot now being trialled with land managers.

4. Discussion

4.1. What could a tree health policy co-design process look like?

Looking at the process, principles and tools employed during the process to date, and recognising the multiple perspectives brought to the process by the various organisations and individuals involved, it is important to debate how far this could be considered a co-design process rather than user-focused research or consultation. If the "transition from user-centred design to co-design implies the active involvement of users at multiple stages of the development process from analysing user needs, defining the challenge with users, involving users in jointly developing concepts, testing prototypes with users and refining solutions with users" (Whicher and Crick, 2019:292) then this was (and continues forward as) a co-design process. The key issue is defining 'active' and how far that embodies the core principles of co-design, particularly building capability to contribute to policy design in a meaningful way, and, through a sharing of influence, in a way that leads to design which all of those involved can feel they played a role in shaping and have ownership over.

What emerges from this co-design process is the fundamental importance of relationship building in shaping what 'active' looks like. Having open, patient and sharing mindsets facilitated active learning between all of those involved in the collective, particularly in a two-way learning process between land managers and policy stakeholders. In learning about each other's working and management contexts, a collective understanding about the challenges different participants had to deal with, whether this was developing areas of policy or dealing with tree health issues and the impacts of policy on the ground, meant that

participant roles were humanised, and more realism was integrated into the options being discussed. This resonates with much of what Burt et al. (2021):11 observed: "Mutual reciprocity was fundamental to overcoming the limitations of taken-for-granted understanding of words, language and narratives", and what they call a 'dissociative jolt' or a or 'lightbulb moment' when stakeholders in a process begin to fully understand each other's realities and joint aims. This facilitated integration of views and perspectives as well as different knowledges in active design outcomes.

This policy co-design process had some clear boundaries and limits to what the co-design process could do. This could be interpreted as a weakness of co-design, limiting the freedom to explore solutions to tree health policy issues beyond initial conceptualisations of policy makers. However, it might also be argued as a strength, in so far as it avoided a problem often associated with public service focused co-design, that participant expectations are raised, and then there is little or no follow through on realisation because of political, professional, or technical non-starters to the design.

Stakeholders in the tree health policy co-design suggested different approaches to those originally conceived by the policy makers to engage land managers, and they also pushed for more emphasis on the advice and guidance they felt was needed at different stages in their tree health response. During the design sprints, policy was able to move closer to ideas around land managers working together, suggesting policy options known to support the early stages of collaboration (Cisilino and Vanni, 2019). The issue of developing advice and guidance has created more of a challenge in terms of the wider policy context, even though it is well recognised that information, guidance, and knowledge networks are critical both for established managers of trees as well as hard to reach audiences (André et al., 2017; Baycheva-Merger, 2019; Fisher, 2013; Hasanagas, 2016; Lidskog and Sjödin, 2014; Matzek et al., 2014; Nourani et al., 2018; Pfeffer and Sutton, 1999).

The researchers social scientific approach and input into designing and facilitating the process as well as documenting evidence created legitimacy with the other participants, but it opens up the question of whether the co-design was led by research and evidence or led by design (Whicher and Crick, 2019). Any participatory process needs to pay attention to the choice of methodologies, techniques and tools with respect to their inclusivity, transformational, scientific and evidence goals. A key issue was moving past the technical and scientific knowledges towards capturing tacit knowledge which is important to embedding real rather than imagined stakeholder contexts into the policy option design process (O'Rafferty et al., 2016). Tacit knowledge is embedded and implicit personal knowledge based on an individual's intuition, experiences, ideas, values and emotions (Rahman et al., 2019; Nuthall and Old, 2018). This kind of knowledge in particular is difficult to share as 'information' because it is personal, local, contextual and difficult to verbalise. It is normally communicated through the sharing of stories, practical demonstrations or some other physical rather than abstract engagement (Hulme, 2014, Pfeffer and Sutton, 1999). The challenge is in finding techniques which can capture this, and understanding that the move to on-line methods makes the co-design experience very different, and further removed from the exercises with physicality.

4.2. Who was engaged in co-design for tree health, and how representative was that?

How representative and 'democratic' the co-design process was is difficult to judge. It is hard to imagine bringing in a wider variety or larger number of people into a voluntary and self-selecting process within the budget and time available. The loose characterisation developed at the start of the process was useful in guiding engagement efforts towards a reasoned and directed effort at reaching a broader and more representative set of participants than might have happened without a framework and running the process by opening up to all and any land manager stakeholders electing to participate. London and Cadman (2009) have even gone so far as to suggest that 'open participation' without targeting to represent the population of interest can become exclusionary. With a land use policy issue such as tree health, the constituency of interest is very broad, and assessing inclusivity or the legitimacy of the representation achieved remains problematic.

The most significant issue in representative engagement was with those 'harder to reach' land managers. Whilst there was some success engaging owners of small woodlands, engagement with 'farmers' remained fairly limited throughout the three years. This must in part be attributed to the differences in land use policy priorities, peer networks, language and culture between sectors. The forestry and woodland policy context does not necessarily resonate with farming objectives, risk tolerances, environmental values and land management identities (Dessart et al., 2019; McDonagh et al., 2010). Two issues arise from this situation. The first is whether the resulting policy design will attract farmers in subsequent phases of testing, or once progressed to a full scheme. Finding ways to evaluate and learn from farmer uptake, or lack of engagement will be important. The second issue is more around how to communicate and connect with agricultural land managers who have trees and woodland on their land, to raise awareness of tree health issues as well as the importance of acting and managing them. This kind of cross-sectoral understanding, as well as the role of farming identity and culture on tree management practices in a complex land use policy and production climate would bear further exploration (Brown et al., 2021; Huff et al., 2019).

The other issue that arises are the implications of variation in participation by different land managers over the three years. It could mean that representative views and contributions were narrowed by the smaller core group that took part in the full process, but equally, being able to carry through a core group might imply that their contributions were more meaningful as they became more trusting of, and expert in, the co-design process and able to share and debate policy options.

4.3. Key opportunities and challenges emerging from tree health policy co-design

The tree health policy co-design process has not yet come to an end, so the opportunities and challenges that have emerged and are discussed here relate to the design phases rather than the testing and evaluating of a 'prototype policy', which is the function of the Tree Health Pilot.

One of the opportunities or benefits identified relates to the role of researchers. Clements et al. (2021) and others have already outlined how researchers can help push forward the land use policy co-design process, and also build new social science insights to better support land use change. The role of researchers in the tree health policy co-design process was very important. Researchers played a significant part in balancing the views and understandings of the policy community with those of the land manager community, as well as facilitating their learning and focus on policy option design. Land managers and policy makers accepted researchers as relatively independent arbitrators of the relationships, perceptions, evidence and policy option design suggestions. Researcher skills with positive participant engagement, open communication, and handling mixed methods data, particularly assuring the veracity of qualitative evidence, were all essential. Misgivings have been expressed by some as to the role of external professional agents in policy co-design processes that might question the legitimacy and quality of outcomes (Howlett and Migone, 2013). However, during the tree health co-design process researchers were able to interpret information and evidence with the policy community to suggest how design interventions might work in some contexts and not others, moving the co-design towards an 'intention to reach' (Nilsen et al., 2013), rather than just an 'intention to influence'. In addition, the use of methods that could be presented as evidence collection/research tools within the co-design process was pivotal in overcoming some of the perceived risks held of the policy community. The risks were not so

much to do with what Blomkamp (2018) has described as diminished control or increased complexity of design, but were more about being explicit about design options and experimenting with those. A major risk was that the explicit articulation of design options might then be held up as a policy promise by some participants of the co-design process and not understanding that any policy options were experimental and potential. Using research tools, administered by researchers, helped to reframe some of the co-design activities reducing potential risks.

The policy co-design process provided opportunities for social learning and the integration of knowledges held by the collective. The roles of the different contributors need further recognition in this regard, just as land managers are not homogenous, nor are policy makers and the professional roles they fill (O'Connor et al., 2021). Policy maker knowledge is also differentiated by role, and is scientific, tacit and practical depending on their context. They were able to apply this to move land managers into thinking about a range of potential future options beyond those they had benefitted from or could reimagine.

Significant barriers to policy co-design are the time and resources, not only to find pathways to engage with hard to reach and more marginal stakeholders, but to maintain stakeholder engagement. The policy co-design timeline passing through stages in the Double Diamond framework occurs over a matter of years. Even though this can be explained to stakeholders at the outset, it remains a frustration to some potential participants and a burden of commitment to others.

4.4. How generalisable are our findings for developing other policy?

The Double Diamond approach we have outlined above (Discover, Design, Develop, Deliver) is not limited to the relatively narrow confines of policy for tree health. The problem of tree pests and diseases lies within a much broader policy area concerned with developing incentives that improve land management for a range of objectives - biodiversity, flooding, recreation, soil health, etc. As with much health policy co-design (Greenhalgh et al., 2019; Grindell et al., 2022), it is not suggested that a single, off-the-shelf framework will apply to other policy development instances, rather that the process described here can serve as a basis for co-design frameworks in future policy development. One limitation of co-design is that it lends itself most readily to work with small groups in localised settings, which can be problematic for generalising or scaling the results, particularly for policy having multiple delivery channels (Blomkamp, 2018; Lewis et al., 2020), and as was the case with our focus on tree health, tackling multiple issues and context specific conditions. We addressed this by including various ways of engaging with all parties in the co-design process, which enabled engagement through time and different spaces allowing participants to engage over longer periods and wider geographical localities.

5. Conclusion

This paper uses the example of an ongoing tree health policy options co-design process to make some practical observations and contributions to understanding land use policy co-design. We conclude that the principles of co-design can be accommodated within other land use policy development processes, however, where the policy focus is wide-ranging and complex rather than narrowly bounded, building a co-design process that can engage with audiences that exist between and across land management sectors, and which elevates more marginal audiences, will present challenges and resource implications at whatever scale is considered. This issue of scale will continue to raise debate and challenge along two additional axes. Firstly, research continues to show that policymakers prefer scientific, quantitative and economic data rather than "evidence produced through qualitative and interpretive approaches" like co-design (Watson et al., 2020:3). Secondly, uncertainty persists concerning how far locally-proposed solutions can be scaled-up into system-wide responses aimed at higher level policy change, where co-design makes the "leap from designing programmes

and services to developing and implementing public policies" (Blomkamp, 2018:737). This may depend on "how well the process is embedded within the policy innovation system" (O'Rafferty et al., 2016:3573).

We have shown that if co-design for policy is to move away from 'user-research', innovation in the tools and techniques used is critical. But with innovation comes a complex set of trade-offs such as balancing time, resources, and the experimental space needed to find techniques that are inclusive, those which are innovative yet appropriate, and to build the learning feedback loops required to discuss, design, prototype and trial policy options. Digital engagement within co-design may be an innovative route to broadening engagement across types of individuals and spatial locations, and may work to include harder to reach audiences (see for example, Bazzano et al., 2023; Mora et al., 2022). However, the types of interaction enabled by digital engagement may be suited to specific steps in the co-design process, e.g. information collection for problem definition, rather than fully integrating knowledges of more marginal stakeholders, or reaching consensus with them.

We believe "[co-]design offers a different way for policymaking to be done" (Bason, 2014a: 3) but, it remains an emerging domain where policy practice and academic theory move at different speeds. Consequently, we emphasise the important role of researchers as 'boundary agents' arbitrating between the realms of land use policy and land managers (Hilger et al., 2021). Of significant importance here is building the participatory type of mindset linked with trust and social learning amongst all participants in the policy co-design process. Trust is linked with risk perception. Fulfilling the role of objective facilitators and analysts, researchers can ameliorate some of the felt risks and build the trust of participants, by encouraging and communicating the expression of many viewpoints as part of the deliberative method and in-process analysis. This is important to overcoming the particular sensitivity to political risks inherent to sharing policy design options and possibilities felt by the policy community.

Researcher involvement in co-design will continue to have a role, not only in developing processes, but also in building an evaluative evidence base that can clearly articulate the effectiveness and range of positive and negative outcomes and impacts from emerging co-design projects.

Declaration of Competing Interest

Data Availability

The authors do not have permission to share data.

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