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RESEARCH ARTICLE



Co-design is not enough: reflections on creative collaborative public sector innovation to deliver net zero policy outcomes in Scotland

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ABSTRACT

Design continues to contribute to public service reform, systems thinking, and policy innovation, with approaches like design sprints, iterative prototyping, and creative citizen engagement applied to address diverse societal issues. As co-design proliferates as both a celebrated and critiqued method for fostering dialogue, ideation, and action among communities and stakeholders, questions arise about its suitability for addressing complex multi-stakeholder challenges and its potential to mediate effective policy design and delivery. There remains limited understanding of the relational and methodological dimensions that underpin co-design within policy processes, and of how these influence public sector innovation. This paper examines the role, capacity, and limitations of co-design in advancing the net zero policy agenda in Scotland's northern region. Through presenting a series of five regional-scale cross-sector events, we discuss how co-design, while valuable for fostering engagement and framing challenges, was constrained by systemic and institutional barriers. We present an adaptable framework for assessing co-design's capabilities within mission-led CPSI and offer three strategic recommendations for applying co-design methods to frame systemic innovation challenges, leveraging co-design principles and practices to create the conditions for collaboration, and positioning co-design as a creative approach to enable mission-led innovation. We argue that co-design is best positioned as a creative facet of a wider collaborative governance approach, one that demands critical attention to institutional conditions, cross-sector alignment, and how power is shared across public sector innovation initiatives.

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Co-design; collaborative public sector innovation (CPSI); net zero planning; policy innovation; stakeholder engagement

1. Introduction: co-design for net zero – addressing complex policy challenges through collaborative public sector innovation

Like many governments globally, the Scottish Government recognizes the need for interconnected and holistic approaches to meet climate change targets. Scotland's Just Transition Planning Framework (Scottish Government 2021) outlines the socioeconomic risks of unplanned and unbalanced transitions, previously demonstrated by the loss of employment and increase in poverty felt by coal-mining communities during deindustrialization. Decarbonizing the Scottish economy in today's policy agenda is therefore contextualized within the complex and interconnected challenge of ensuring communities are offered equal opportunities and prosperity. Framed within a *wellbeing economy* (Scottish Government 2023a), progress within Scotland's Just Transition will proposedly be measured not solely through traditional metrics of GDP but rather a National Performance Framework (Scottish Government 2024) of outcomes that determine collective wellbeing. This involves addressing biodiversity and emissions targets whilst using new industries to deliver affordable energy-efficient homes, access to transport, skills development, and employment opportunities. The cross-sectoral ambitions of planning, implementing, and monitoring progress across these outcomes demonstrate a need for systemically-framed approaches to public innovation. In recognition of this, the Just Transition to a Fairer, Greener Scotland policy strategy (Scottish Government 2021) outlines the need for a mission-oriented, agile

approach capable of responding to the unpredictability of shifting markets, new technologies, and customer needs.

Public sector innovation has been identified as the leveraging tool for delivering these policy agendas and national outcomes. Scotland's National Innovation Strategy (Scottish Government 2023b) lays out a ten-year plan for establishing ecosystems of innovation that will align businesses, public and private organizations, and universities around shared priorities. Regionally, the strategy proposes to utilize Smart Specialization: a place-based approach to identifying specialist areas for intervention in response to strengths and potential for entrepreneurial activity, whereby "market forces and the private sector discover and produce information about new activities, and the government assesses the outcomes and empowers those actors most capable of realizing this potential" (Scottish Government 2023b, 17).

As Scotland advances its ambitious net zero targets, it becomes increasingly clear that achieving these goals requires more than technological innovation; it calls for transformative, cross-sectoral collaborations capable of addressing interconnected socioeconomic and environmental issues. This emphasis on a wellbeing-oriented, systemic approach aligns with broader discussions in CPSI, which highlights the importance of multi-stakeholder alignment, adaptive leadership and institutional structures, and innovation practices responsive to context (Callens et al. 2022; De Vries, Bekkers, and Tummers 2016). While CPSI research highlights the potential of collaborative governance frameworks, it often stops short of offering practical tools or methods for bridging organizational silos, negotiating regulatory constraints, and working with diverse stakeholder interests. This paper explores how embedding co-design approaches and principles in Scotland's public sector innovation efforts can support more equitable and situated forms of collaboration, enabling cross-sector stakeholders to interpret and enact net zero policy in regionally responsive ways, while navigating challenges of power asymmetries, inclusive participation, and the translation of ideas into meaningful action. While co-design offers valuable approaches to shape policy engagement and interpretation, we argue that it is not enough on its own to deliver meaningful impact at a systemic scale.

The paper begins by contextualizing CPSI within current debates, exploring the capabilities required for cross-sector collaboration and effective stakeholder engagement to address complex societal challenges. It then outlines co-design's evolution and methodological potential for leveraging stakeholders' expertise and creativity to reimagine products, services, systems, and experiences, highlighting both its strengths and limitations in terms of intent, implementation, and impact. Focusing on the creative methods, tools, and techniques that were developed and applied to support collaboration, a case example presents five co-design events involving over 100 stakeholders across Scotland's northern and Highlands and Islands regions, aimed at establishing shared outcomes and partnership opportunities within a broader Net Zero Transformation program. Through thematic analysis of participant, collaborator, and facilitator reflections, the paper proposes actionable recommendations for applying co-design to collaboratively frame complex policy challenges and explore regional responses at a systemic level.

Building on these insights, we reflect on co-design's role and limits within mission-led CPSI. Here we contend that co-design's effectiveness in CPSI requires a flexible, embedded approach that works across multiple levels of governance, acknowledges regulatory and institutional constraints, and fosters equitable dialogue and shared ownership of outcomes. The paper concludes by presenting a framework to support those undertaking CPSI transformation programs in considering when and how to use co-design methods to frame intersecting challenges, shape conditions for collaboration, contribute to mission-led innovation, toward enabling policy to be delivered or challenged in ways that reflect local context.

2. Policy problem: contextualizing collaborative innovation – challenges and potentials of co-design in public sector transformation

Situating this paper within the broader literature on public sector innovation, design and policy, and design methods provides a context to support understandings of when and how collaboration occurs and its relationship to policymaking and implementation processes.

2.1. Navigating complexities in public sector innovation

To effectively navigate the complexities of CPSI, it is essential to examine the multifaceted factors that influence innovation outcomes, including governance structures, stakeholder engagement, and the interplay of internal and external conditions. As De Vries, Bekkers, and Tummers (2016) highlight, public sector innovation can manifest in several forms including process, product, and governance innovations, each seeking to improve services and tackle societal challenges. They identify key antecedents to innovation, such as political support, regulatory frameworks, leadership, resources, and individual actions. These factors set the stage for the success or failure of innovation initiatives in the public sector, underscoring that innovation outcomes are often mixed due to the complex interplay of these antecedents.

2.2. Internal and external conditions for innovation

Internal conditions, as Callens et al. (2022) argue, rely on permissive leadership and creative environments that reward risk-taking, while external conditions benefit from more open and diverse collaborations. Push and pull factors can be seen to shape innovation intensity in the public sector, including technological advancements, public demand, and policy requirements. Effective innovation, however, depends on the organization's capacity to integrate these factors, and as Clausen et al. maintain, "the pursuit of open and collaborative approaches in the innovation process for public sector organizations can be facilitated by developing the organization's innovation capabilities" (2020: 170).

2.3. Governance and collaboration dynamics

The cultural dynamics of public and private sector partnerships can further shape innovation outcomes. Vento (2020) contrasts hands-off "meta governance," which encourages external competition and diversity of ideas, with hands-on "interactive governance," where public agencies lead collaborative processes, engaging in public participation and strategic alliances to balance innovation with accountability (Sørensen and Torfing 2017). These mechanisms reveal both the potential and limitations of existing governance approaches in supporting CPSI.

Public sector networks seeking to innovate through cross-sector collaboration must navigate the complexities of demonstrating accountability and organizational readiness, and establish robust decision-making processes, partnership models, and evaluation mechanisms to interact with external markets. Tailored strategies that address these nuanced needs are crucial for fostering effective CPSI.

2.4. Integrating design approaches in CPSI: bridging governance, stakeholder engagement, and policy dialogue

Design methods have emerged as powerful tools for fostering public sector innovation – with Kekez, Howlett, and Ramesh (2018) highlighting the complexity of collaborative work in this domain. They argue that varying organizational capacities and coordination needs present challenges in achieving cohesive outcomes. This perspective aligns with Junginger's (2013) framing of policymaking as a design process in and of itself, emphasizing the need for adaptability and clarity. Mortati, Mullagh, and Schmidt (2022), advocate for design to play a role not only in implementation but throughout policy development, encouraging responsiveness, adaptability, and experimentation in tackling governance issues. In mapping multifaceted applications of design in policy settings, Kimbell et al. (2022) note its capacity to operate within and across public institutions, extend and expand community participation in decision-making, and employ a range of visual and material artifacts and tools "to make the consequences of or alternatives to a particular policy design more visible, tangible and thus accessible to the public" (2022, 8).

2.5. Co-design approaches for creative and inclusive collaboration

Prior research has explored how legislative tools in Scotland can enable local collaboration between community groups and public sector authorities, foregrounding Participatory Design's potential to

support decision-making through materiality, mutual learning, and the mobilization of community assets (Broadley and Dixon 2022). These premises are built upon principles and practices of co-design, in which stakeholders actively contribute to iterative prototyping and defining solutions (Sanders and Stappers 2008). Ball and Rejón (2024) argue that co-design can enhance policy outcomes by fostering collaborative relationships among stakeholders, ensuring that diverse perspectives are integrated into the decision-making process. However, ongoing debate exists around co-design's efficacy in complex policy contexts, where its potential can be undermined by structural governance challenges. These tensions are evidenced in Einfeld and Blomkamp's (2022) observations of power dynamics in policy innovation hindering co-design's capacity to instill stakeholder agency and collaboration.

2.6. Structural challenges and opportunities for co-design in CPSI

Cinar, Simms, and Trott (2023) note that co-design's effectiveness in CPSI can be constrained by top-down governance and delayed stakeholder involvement. Additionally, Brock (2021) critiques Policy Innovation Labs for their limited engagement with power dynamics, which can undermine inclusivity and adaptability. These structural limitations inhibit co-design's transformative potential, especially its capacity to support inclusive, bottom-up participation that ensures innovation reflects stakeholder capabilities and needs.

Co-design's effectiveness depends not only on the method itself, but on enabling organizational conditions and capacity for collaboration. As Anderson, Potočnik, and Zhou (2014: 131) assert in their review of innovation and creativity as an integrated and integral driver of organizational transformation, leadership plays a critical role in aligning idea generation and idea implementation. The interplay and impact of policy, politics, and participation underpins Torfing and Ansell's (2021) exploration of collaborative service design and systems thinking models, and positioning of "generative governance" in the public sector "aiming at bringing multiple parties together to engage in productive transformation," and which "facilitates and enables the emergence of productive interaction among distributed actors" (2021, 12).

These debates highlight a critical need for co-design to be situated within institutional and governance conditions that enable sustained collaboration, particularly when applied to complex, mission-led CPSI. This paper contributes to these debates in CPSI by examining how co-design was applied to support collaborative governance within Scotland's net zero policy ambitions. The findings outline the practical limitations of the co-design approach and the conditions required to improve its contribution toward CPSI systems transformation missions.

3. Co-design events within a program for regional net zero transformation

Since 2010 Scotland's regional hub program has coordinated community infrastructure development across five geographical areas. Each hub operates as a joint venture (hubCo), facilitating partnerships between public and private sectors guided by Strategic Territory Partnering Boards (STPBs) representing local stakeholders. While successful in delivering healthcare and schools' infrastructure, the hubCos aim to extend their capabilities to enhance cross-sectoral collaboration, particularly for net zero and decarbonization targets (EKOS 2021).

This paper illustrates the challenges regional hubs face in achieving integrated national outcomes for just transitions to net zero. Focusing on the Hub North region, which encompasses the largest area of Scotland's hubs – from the Northern and Western Isles to Argyll and Bute, across the Highlands and eastward to Aberdeen, Aberdeenshire, and Morayshire – the Hub North STPB, in collaboration with Built Environment Smarter Transformation (BE-ST), launched a regional Net Zero Transformation Program in 2023. This initiative aims to foster best practices in low-carbon construction and collaborative net zero leadership. Researchers from the School of Innovation and Technology at the Glasgow School of Art facilitated co-design events to support this program, engaging public and private sector representatives including Local Authorities and public bodies, NHS estates, supply chain members, and low-carbon experts. This process sought to advance the potential for long-term partnerships that would drive the collective action necessary for achieving net zero outcomes.

Table 1. Overview of the co-design events within a program for regional net zero transformation, which outlines the focus area of the five events along with key discussion themes and stakeholder participants within low carbon construction and net zero leadership streams. 2025. Authors.

		Participants	Low carbon construction (LCC) Organizations and individuals (public and private sector) involved in regional low carbon construction supply chains including: architects; contractors; developers; engineers; construction and builders; sustainability specialists; Local Authorities; police, ambulance, fire and rescue; health and social care.	Net zero leadership (NZL) Individuals (public sector) involved in regional strategic decision-making relating to Net Zero transitions from: Local Authorities; Central Government; public bodies; police, ambulance, fire and rescue; Higher Education Institutes.
			Discussion themes	Discussion themes
Event 1: challenge mapping		24 LCC, 19 NZL 30 organizations 9 public bodies	- Resource allocation - Modular and holistic approaches - Retro-fitting needs	- Cross-sectoral collaboration - Centralized route-maps - Governance requirements
Event 2: collaboration		25 LCC, 20 NZL 24 organizations 7 public bodies	Vision Statements for project case studies, including: a school, housing for health service staff, a fire station, and a hospital.	Vision Statements relating to: housing, skills, sustainable energy production, land use & localism.
Event 3: people and place		23 LCC, 20 NZL 24 organizations 9 public bodies	Best practice examples (rural and urban) of collaboration within Net Zero project.	The needs of rural and remote contexts to enable collaboration, and proposals to support.
Event 4: measuring success and program definition		23 LCC, 16 NZL 20 organizations 8 public bodies	Evaluation of best practice examples with focus on expertise and conditions required.	Evaluated readiness for each collaboration proposal, and potential impact.
Event 5: proposal development and financial collaboration		29 LCC and NZL combined 17 organizations 6 public bodies	- Development of regional Net Zero Transformation Plan including solutions areas, aims and objectives, case studies and potential impact metrics for: Embedding Net Zero skills within supply chains - Delivering clean, affordable and efficient energy - Supporting climate change adaptation and biodiversity - Increasing affordable, energy efficient buildings and homes.	

3.1. Research approach: enabling collaboration through participation

An iterative participatory action research approach centered on five co-design events was developed to promote cross-sectoral dialogue and reflection (Howard and Somerville 2014). Events operated across two streams: Net Zero Leadership (NZL) and Low Carbon Construction (LCC). Participants from Local Authorities, emergency services, and the NHS (NZL) collaborated with project developers and supply chain representatives (LCC) to tackle key net zero challenges. While NZL sessions addressed collaborative governance, LCC workshops focused on modern methods of construction, allowing for alignment around specialized knowledge. The co-design approach sought to facilitate collaboration around shared challenges, acknowledging the inherent politics at play when defining shared goals (Zamenopoulos and Alexiou 2018).

Following each event, the research team conducted thematic analysis (Braun and Clarke 2006) of workshop data and facilitators' reflective notes to interrogate and validate cross-sectoral needs through the lens of intended regional and national net zero outcomes. This adaptive approach allowed each event to respond directly to emerging discussion themes and participant needs, resulting in a final event that brought both NZL and LCC streams together to co-design a proposal for a collaborative Net Zero Transformation Plan (Table 1).

3.2. Co-design recruitment and coordination

Event recruitment was guided by the STPB, prioritizing cross-sectoral representation. Each event featured expert presentations on topics like place-based interventions and emerging technologies, fostering case study sharing and stimulating creative ideation. Across the five events over 40 recurring participants from up to 30 organizations in northern Scotland engaged in discussions and hands-on activities that facilitated creative and collaborative participation (Figure 1) to develop a Net Zero Transformation Plan. A more detailed overview of the event tools and method are outlined within a parallel program report (The Glasgow School of Art 2024).



Figure 1. An example of a participatory method used within event 3 with the LCC stream, which evidences project case studies as information inputs and live data collection through collaborative mapping. 2023. Authors.

Events 1 to 4 included parallel activities for the NZL and LCC streams, with structured crossover points to share insights. The final event united both streams to collaboratively craft the Net Zero Transformation Plan for the region along with project proposals for regional and national funding opportunities.

3.3. Event 1: challenge mapping

Prior to the first event NZL and LCC participants completed an anonymous survey to capture key issues they experience in relation to net zero transformation outcomes and collaborative working practices. Responses were thematically analyzed to identify cross-cutting themes and shared with participants as a series of textual Challenge Statements highlighting limitations in achieving net zero outcomes to encourage reflection (Yoo et al. 2013). During the event NZL participants transformed challenges into innovation opportunities and discussed required organizational capacities, while LCC participants visually documented successful projects to foster a shared understanding of objectives. These outcomes were translated into shareable information for the participants in preparation for Event 2.

3.4. Event 2: collaboration

NZL participants explored systemic issues surrounding the innovation opportunities, while LCC members built upon the regional case studies to inform prospective project ideas. The research team synthesized outputs into four Vision Statements aligned with cross-cutting themes: Affordable and Efficient Housing, Net Zero Skills, Sustainable Energy Production, and Land Use and Localism, each articulating the potential impacts of cross-sectoral collaboration. One-to-one reflective sessions with the STPB validated and refined these findings.

3.5. Event 3: people and place

This event assessed the resources needed to realize the Vision Statements through a place-based lens. NZL participants used visual mapping to compare infrastructural and governance needs across urban

and rural/island contexts, identifying elements that required a generalized or contextual approach. This collaborative method recognized the value of relational mapping to uncover intangible dependencies (Johnson, 2023). Concurrently, LCC participants revisited case studies to model effective collaborative projects.

3.6. Event 4: measuring success and program definition

The research team analyzed materials from Event 3 to identify collaborative processes essential for achieving the Vision Statements and overcoming the barriers to project success. Participants used these proposals for collaborative processes as information and provocation within Event 4. During the Event, the NZL group assessed proposals using an evaluation framework, while the LCC team examined diverse case studies focusing on systemic enablers and key capacities required for collaboration. At the end of the Event, both groups reviewed their contributions and identified shared aims to inform core components of the holistic Net Zero Transformation Plan, with STPB members later consulting funding experts to explore financial support.

3.7. Event 5: proposal development and financial collaboration

Data from Event 4 evaluations were consolidated into four actionable components of the Net Zero Transformation Plan, each supported by best practice case studies and impact metrics and presented as posters. Event 5 united NZL and LCC streams into cross-functional teams tasked with further developing one component. Overall, 29 participants joined this session representing 17 different organizations including 6 public bodies. Teams used the posters as input information along with a Collective Action Plan and Action Cards tool to roadmap steps and identify enablers like data-sharing systems, creating proposals designed to foster ownership and readiness for collaboration.

3.8. Program evaluation

Following Event 5, nine participants from NZL and LCC were interviewed to assess the co-design program's impact on collaboration readiness, partnership formation, and net zero innovation. Six months later, a reflective evaluation with STPB members gauged the program's momentum toward delivering regional proposals and the broader impact of a collaborative partnership approach to net zero transformation.

The following discussion reflects on the application of co-design across these events and examines how its outcomes and limitations were shaped by broader governance conditions, institutional constraints, and the cross-sectoral complexities involved in collaboratively delivering regional net zero policy.

4. Discussion: systemic challenges and pathways for co-design in regional net zero initiatives

This section draws from a thematic analysis of evaluation interviews with project partners, public and private sector participants, and our reflections as workshop facilitators to provide a comprehensive understanding of the co-design approach – its intentions, applications, effects, and necessary adjustments. These insights reveal both the strengths and constraints of co-design in navigating the complexities of CPSI for regional net zero ambitions.

4.1. Unpacking co-design's constraints in multi-stakeholder collaboration

Participants' feedback highlighted several limitations of co-design in complex, hierarchical settings. The division between public and private sector participants into distinct groups – NZL and LCC – often stifled broader dialogue on regional planning. While this structure allowed participants to build trust and explore shared priorities within their own sectors, it limited earlier opportunities for cross-sectoral exchange

and collaborative strategy-making. This tension was particularly evident in reflections on earlier events, with one participant noting “In an ideal world, we would have had all the CEOs sitting in the room talking strategy, but that’s just unrealistic.” The diversity of participants raised issues, particularly in gender and ethnicity, impacting dialogue depth. One participant observed, “It was just a room full of white people,” indicating that the lack of diversity might reflect industry roles rather than the program itself. Supporting Junginger’s (2013) argument that diversity is crucial for effective systemic design, Blomkamp (2022) warns that co-design can reinforce existing inequalities if inclusion is not prioritized.

Internal power dynamics complicated collaborative efforts, with instances of dominant voices noted by facilitators and participants alike. This imbalance reflects De Vries, Bekkers, and Tummers (2016) critique that top-down governance can hinder public sector innovation, underlining the challenge of fostering genuine collaboration in CPSI where authority and inclusivity must be balanced (Clausen, Demircioglu, and Alsos 2020). This highlights the need and capacity of systemic design to account for the complexity of interconnected systems, governance layers, and diverse place-based needs (Morisson and Doussineau 2019).

4.2. Navigating geographic and legislative complexity

Geographic, political, and legislative contexts posed challenges when translating ideas into actionable plans. While the co-design approach sought to propose diverse projects in northern Scotland, adapting to multi-level governance complexities proved difficult. During an activity to prioritize net zero proposals, discussions frequently returned to obstacles like funding cycles, election timing, and policy changes. Participants emphasized the need for a systemic approach, interweaving social, economic, and environmental dimensions, with some stating: “election cycles and one-year budgets. We have to break that, otherwise, we’re not going to make the progress.” Another participant urged an integrated view on decarbonization and biodiversity, stating, “We are reducing our carbon footprint, but not at the expense of someone living in abject poverty.” These responses highlight the critical need for a holistic framework to equitably distribute climate action benefits, avoiding unintended harm to vulnerable communities. For some, co-design activities fostered shared understandings and agency, emphasizing “the importance of not blaming one person or the other and taking collective responsibility.” This comment reinforces the need for representation to ensure that collective responsibilities emerge from genuine experiences and relevant issues.

4.3. Bridging ideation and implementation

A recurring issue was the gap between ideation and actionable outcomes. While the workshops generated numerous ideas, the delayed engagement of key stakeholders and limited mechanisms to scale ideas presented challenges. One participant expressed skepticism, stating, “The jury’s out for me on what happens with the outputs.” This mirrors critiques that CPSI efforts often stall at ideation without mechanisms to implement co-designed solutions (Brock 2021; Palm et al. 2024). These limitations underscore the need for co-design processes to align more effectively with system complexities and decision-making to achieve tangible impacts.

4.4. Embedding co-design in a systemic approach

Findings suggest several conditions and mechanisms necessary to embed co-design in systemic frameworks. Broad stakeholder diversity across governance levels is essential. Facilitators noted that without diverse participation from policy enablers and public sector implementers, discussions remained largely theoretical. Blending perspectives across sectors around common, mission-oriented objectives could address gaps in implementation and strategy alignment.

These findings echo ongoing debates in collaborative governance, which stress the importance of institutional design and networked leadership in enabling effective cross-sectoral collaboration (Torfing and Ansell 2021). Yet, our case suggests that even well-facilitated co-design processes struggle to gain traction without supportive governance structures and clear pathways for translation.

This notion resonates with Blomkamp (2022), who emphasizes systemic design practices' role in enhancing participatory policymaking through diverse stakeholder input aligned with systemic goals and challenges. Reflecting on multi-level governance challenges, Van der Bijl-Brouwer and Malcolm (2020) emphasize that reconciling local priorities with systemic goals is vital. This approach necessitates early, meaningful stakeholder engagement, allowing participants to reshape the complex system in which they operate. One participant noted the value of cross-sectoral engagement for defining innovation problems before stimulating effective investment: "getting that collective view; it has helped to articulate the problems that we have." Such engagement anchored around clearly defined goals and systemic challenges can align local aspirations and needs with broader policy objectives, including net zero targets.

Building on Palm et al. (2024), systems-level co-design can shift mindsets, institutional capacities, policies, and resources in response to societal needs. Brinkman et al. (2023) underscore that integrating design principles and practices in public sector processes can facilitate systemic approaches, ensuring that co-design informs policy and fosters collaboration across diverse governance layers. Conferring to Mazzucato's vision of a "mission-oriented approach" (2021), such approaches can help to lay the groundwork for collaborative innovation.

4.5. The role of iteration and evaluation

An iterative process featuring regular feedback and reevaluation is critical for maintaining the relevance and impact of ideas. The call for iterative processes in CPSI aligns with Blomkamp's (2022) assertion that regular feedback loops are essential, allowing participants to adapt their ideas to new challenges. Junginger (2013) stresses ongoing re-evaluation within complex systems to ensure co-design efforts retain value. Creative, participatory methods that capture local insights while addressing national objectives can attune collaborative processes to diverse stakeholder needs (Andersen and Mosleh 2021). Simultaneously, robust evaluation mechanisms are crucial to track the impact of co-design on policy implementation. Collaboratively defining clear indicators of change and actionable outcomes is essential to ensure co-design transcends ideation toward substantial policy impacts.

While co-design can bridge policy-making and local implementation (Clausen, Demircioglu, and Alsos 2020; De Vries, Bekkers, and Tummers 2016), without mechanisms, even promising concepts risk stagnation, rendering co-design a theoretical exercise rather than a driver of actionable change. Given the resource implications of large-scale co-design processes in a constrained public sector context, it is vital for this approach to deliver real value. As one participant noted, "if you're not successful, you just wasted lots of resources," emphasizing the need for co-design to be strategically embedded within collaborative governance structures to ensure it contributes meaningfully to CPSI outcomes.

5. Recommendations: toward a mission-oriented CPSI co-design framework – limitations and path forward

While the co-design events initiated cross-sectoral dialogue on net zero, their outputs risk being perceived as speculative without grounding in established policy channels. Van der Bijl-Brouwer and Malcolm (2020) argue that for co-design to effectively contribute to CPSI and systemic change, it must align closely with policy objectives and integrate with governmental processes. There are thus crucial opportunities for co-design to serve as a methodological component of mission-oriented CPSI, where collaborative proposals are positioned by the sector as robust, evidence-based inputs to governments for integrated transformation. Together, these conditions create a framework that allows collaborators to navigate the constraints of current conventions while remaining adaptable to complex policy layers. As Mazzucato (2021: 7) states, "by rethinking how relationships between the public sector and private sector can be better governed around public purpose, we can create growth that is better balanced and resilient." In such an approach, co-design not only invites creative exchange but also facilitates contributions to ongoing policy discussions and systemic transformation. To realize its transformative potential, future efforts must establish processes that transcend isolated collaborative engagements toward an integrated, strategic framework that actively supports policy translation and adoption.



Figure 2. A framework for assessing the capability of co-design approaches within mission-led CPSI, demonstrated through the regional Net Zero Transformation Program case example. 2025. Authors.

In this section, we outline three key recommendations, contextualized within a visual framework (Figure 2), to guide those undertaking complex system-level CPSI programs in determining when and how to adopt co-design methods for maximum value. These recommendations emerged from empirical findings from the case example and theoretical insights discussed in the paper and aligned to key literature, contributing to an enriched understanding of how co-design can effectively facilitate collective and mission-oriented public sector transformation. The framework demonstrates an adaptive and iterative approach of reevaluation, grounded within shared goal setting in response to framed systemic challenges and enacted upon through diverse participation and collaboration. Table 2 presents the empirical findings to demonstrate the capabilities of co-design within each phase of the framework along with the methods demonstrated and limitations identified.

5.1. Recommendation 1: applying co-design methods to frame systemic public innovation challenges

To achieve net zero transformation at a regional scale, unique and transferable challenges arise from the complex, interconnected, multi-stakeholder approaches required (De Vries, Bekkers, and Tummers 2016). The Net Zero Transformation Program demonstrates how co-design methods focused on visually mapping challenges, thematic areas of concern, and best practice case studies enabled participants to navigate these complexities and define shared public sector innovation goals that informed mission-led working areas. By articulating issues through governance, policy, public body, and market perspectives, the events established clear starting points for mission-oriented collaboration and effectively shaped innovation proposals.

Limitations in diversity, however, within collective challenge framing restricted the perspectives represented in agenda-setting, impacting the program's responsiveness to community needs. Co-design must actively seek and support diverse participation to avoid reinforcing existing power imbalances. The initial separation of participants into thematic streams enabled focused, sector-specific collaboration, but limited early opportunities for cross-sectoral learning and joint framing of systemic issues. Reuniting the streams into cross-functional teams in the final event provided a valuable opportunity

Table 2. An example of the framework being used to assess co-design's capabilities and limitations within mission-led CPSI system transformation using the empirical findings and insights from the net zero transformation program. 2025. Authors.

Co-design capabilities	Methods demonstrated	Limitations
1. Framing systemic challenges		
To collaboratively define shared multi-stakeholder challenges.	Challenge Mapping to co-creating sector-wide challenge statements.	• Diversity of participation is required to set appropriate challenges for the program. • The interconnectedness of challenges must be mapped and understood to ensure unintended consequences are managed. • Participants require permission and support from organizations to embrace divergent thinking.
Establishing potential cross-sector and multi-stakeholder working areas.	Analyzing challenges to identify thematic areas.	
Creating momentum by defining best practice.	Mapping case studies of emerging best practice. Analyzing best practice to define shared principles and ways of working.	
2. Creating conditions for collaboration		
Establishing shared aims and tangible visions of success.	Collectively translating challenge statements and thematic areas into vision statements.	• Top-down governance and imbalances of power will limit diversity of engagement. • Participants require support and permission to engage in non-siloed working. • Visions of success require tangibility to ensure buy-in. • Systemic rhythms may prevent open collaboration, e.g. reporting, policy and funding cycles.
Align visions to collaboration needs and capabilities.	Relationally map shared visions against the needs and capabilities of different stakeholders to identify needs for support.	
3. Enabling mission-led innovation		
Identifying appropriateness of place-based, regional and national approaches.	Mapping innovation proposals to the needs of specific places.	• Intelligence (data and community experiences) is required to define place-based needs. • Organizations and stakeholders may limit innovation approaches through risk-averse working cultures. • Decision-makers' representation and routes to influence policy are required to unblock the blockers of change and prevent disillusionment. • Robust evaluation and prioritization is required to maintain relevance and intended impact.
Prioritizing innovation proposals based on capabilities and potential for impact.	Collaborative evaluation and prioritization of innovation proposals. Identifying blockers and potential unblockers for undertaking proposals.	
Developing fundable and achievable innovation strategies.	Road-mapping thematically aligned innovation proposals and identifying the unblockers required to enable progress. Translating “quick wins” into collaborative funding proposals with impact metrics.	

to bridge these divides – helping to balance meta and interactive governance (Sørensen and Torfing 2017) and support the co-development of shared innovation proposals.

Perceived blockages at regional and national levels can inhibit the cross-fertilization of perspectives and collective ownership of mission areas, as noted by Clausen, Demircioglu, and Alsos (2020), who describe these as a lack of “pull” factors for change. Therefore, it is essential to scope and frame CPSI transformation challenges against policy challenges, ensuring appropriate representation from system change enablers.

5.2. Recommendation 2: leveraging co-design principles and practices to create the conditions for inclusive cross-sector collaboration

In the Net Zero Transformation Program, co-design principles were employed as a framework for knowledge sharing and divergent thinking, overcoming perceived resource constraints (Clausen, Demircioglu, and Alsos 2020). This included speculative visioning and co-creating future visions, which helped identify metrics for short- and long-term success within thematic transformation missions. Co-design balanced meta and interactive governance (Sørensen and Torfing 2017) by fostering dialogue between public sector participants and industry to create productive spaces for innovation proposal development. Participatory relational mapping enabled participants' active involvement within iterative prototyping and solution defining (Sanders and Stappers 2008) by aligning visions to place-based needs and capabilities.

However, top-down governance dynamics limited inclusivity and flexibility (Brock 2021). Cross-sector participants need organizational permission to engage in diverse collaboration, requiring senior roles to adopt practices that provide space for those delivering work to foster agency and influence decisions. Moreover, the lack of representation can lead to disengagement among participants. Within a systemic design framework, these integrated issues must be acknowledged across various contexts, levels, and localities.

To foster productive collaboration, visions of shared success must be tangible and achievable to mitigate disillusionment. In the net zero context this entails collaborative activities exploring mechanisms to address barriers and blockages to change. The scope of innovation visions should align with practical first steps within broader action plans and adaptive strategies. Systemic rhythms – funding cycles, electoral processes, and changes in policy or governance – can impede collaborative innovation momentum. These constraints must be addressed through appropriate policy and funding representation to facilitate open and collaborative innovation.

5.3. Recommendation 3: applying co-design as creative and adaptive approach to enable mission-led innovation

Throughout the final events of the Net Zero Transformation Program, co-design methods were employed to leverage participants' expertise and creativity in reimagining products, services, systems, and experiences. This highlights the responsiveness of co-design in fostering collaboration across sectors and engaging different perspectives within collaborative decision-making.

Co-design provides adaptable approaches for fostering collaboration across sectors and engaging diverse perspectives in decision-making processes. By embedding co-design methods over time, iterative feedback from stakeholders can be integrated into the collaboration, enhancing the conditions and support needed to overcome obstacles. This was understood through the interrogation of place-based, regional and national approaches and their appropriateness to deliver mission-orientated innovation. Likewise, collective prioritization and road mapping enabled the clarification of capabilities and resources required to deliver impact at different scales. In parallel, robust evaluation and prioritization is required to create realistic starting points and stage approaches to change. Beyond design interventions, regular feedback loops and embedded revaluation processes are needed to maintain relevance and targeted impact of innovation strategies over time (Junginger 2013).

Participants' capacity to translate ideas into actionable outcomes was often constrained, as was the ability of wider program partners to trust explorations of adaptation. While co-design can build trust and long-term partnerships, political or institutional inertia may limit action. The limitations of what can be achieved are relational to the representation of contributing stakeholders, particularly regarding resource allocation and enabling policy levers. Participation in innovation activities can also be limited by organizational climates that either support or hinder divergent thinking (Anderson, Potočník, and Zhou 2014). To enable momentum, senior, executive, and policy roles are essential for unblocking systemic barriers to progress.

By applying and embedding co-design in the development of innovation proposals, there is an opportunity for participants to engage in broader policymaking, extending beyond implementation activities (Mortati, Mullagh, and Schmidt 2022). However, this engagement is contingent on involving policy-making representatives and effectively governing transformation programs.

In the case example discussed in this paper, the co-design and research team faced challenges influencing the program's governance, including decisions on participant selection and preparation for contributions. Therefore, there is a pressing need to support generative governance and emergent interactions among distributed stakeholders around shared missions (Torfing and Ansell 2021) through the encouragement and adequate resourcing of participation.

6. Conclusion

By considering the role of co-design within the context of CPSI for mission-led transformation, this paper has demonstrated that co-design offers powerful contextually sensitive tools, but it is not enough on its own to deliver meaningful impact at a systemic scale.

We conclude that co-design principles and approaches must be embedded within a broader framework of governance, institutional, and processual conditions to be effective. Drawing on empirical analysis from a regionally focused Net Zero Transformation program in Scotland, this paper identified the benefits and limitations of applying co-design to support mission-led CPSI. Three overarching

and interlinked recommendations are proposed, each of which corresponds to a stage within a framework for assessing co-design's capabilities within mission-led CPSI: (1) applying co-design methods to frame systemic public innovation challenges; (2) leveraging co-design principles and practices to create the conditions for inclusive cross-sector collaboration; and (3) applying co-design as a creative and adaptive approach to enable mission-led innovation.

The capabilities and limitations of co-design in these phases are reframed as conditions and mechanisms required for embedding co-design within a systemic mission-orientated approach. These insights are consolidated as a framework and presented as guidance for others seeking to conduct and govern CPSI for system transformation through multi-stakeholder collaboration. While co-design offers many benefits, it requires institutional readiness, strategic commitment, and a willingness to engage with complexity and share power across levels of governance.

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