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A bird in the hand: empirically grounded archetypes of collaborative innovation in the public sector

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ABSTRACT



Normative approaches have dominated research on collaborative innovation arrangements in the public sector, but actual practices remain underexplored and uncategorized. We conducted an inductive, in-depth study of 35 collaborative innovation arrangements originating from the public sector and categorized them into overarching archetypes. In creating this empirically grounded typology of collaborative innovation archetypes, we found that public organizations prefer project- and programme-based development archetypes, and focus primarily on co-exploration activities. Moreover, such organizations lack experience using the collaborative arrangements suggested in the recent theoretical literature, but they actively use effectual reasoning, which previous studies largely have overlooked.


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KEYWORDS Collaborative innovation; arrangement; archetype; effectuation; public sector

Introduction

The notion of collaborative innovation describes a rich set of institutionalized joint activities in the form of cooperative, co-productive, cocreative, coopetitive, and otherwise jointly coordinated arrangements that aim to stimulate innovation both within and across participants (Bommert 2010; Hjelmar 2021). In recent decades, it has attracted considerable research interest that has crystallized into five autonomous research streams: interorganizational relationships (e.g. Parmigiani and Rivera-Santos 2011); innovation management (e.g. West and Bogers 2014); innovation studies (e.g. Powell and Grodal 2005); public sector collaboration (e.g. Osborne, Radnor, and Strokosch 2016); and public sector collaborative innovation (e.g. Sørensen and Torfing 2011). These streams have offered a large number of collaborative arrangements to facilitate innovation. Some examples include alliances and joint ventures (Parmigiani

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and Rivera-Santos 2011), clusters (Pittaway et al. 2004), innovation platforms (West and Bogers 2014), ecosystems (Jacobides, Cennamo, and Gawer 2018), R&D networks (Powell and Grodal 2005), innovation labs (McGann, Wells, and Blomkamp 2021), living labs (Fuglsang and Hansen 2022), service systems (Osborne, Radnor, and Strokosch 2016), public-private partnerships (PPPs; Wang et al. 2018), collaborative platforms (Ansell and Gash 2018), and public-private innovation networks in services (ServPPINs) (Djellal, Gallouj, and Miles 2013).

Because of their different origins, the collaborative arrangements discussed in the literature do not form a coherent group, complicating their comparison across research streams and their practical applicability to public sector innovation (Desmarchelier, Djellal, and Gallouj 2020; Mandell and Steelman 2003; Parmigiani and Rivera-Santos 2011). For example, many collaborative arrangements (e.g. networks, partnerships, and ecosystems) have roots in the generalized notion of *collaboration*, rather than in one that is *innovation*-specific. Thus, they focus more on the collaborative production of public value than on innovation (Bommert 2010), whilst their application is influenced heavily by the configurational legacy of general collaborative arrangements, e.g. public networks (Turrini et al. 2010) and collaborative governance (Ansell and Gash 2008). In turn, innovation arrangements with private sector origins that emphasize a wide and diverse range of actors are not always optimal choices for public sector innovation due to controversies related to public security, citizens' privacy, and public enterprises' interests; concerns about power imbalances and opportunism; and implementation difficulties in conflict-affected, high-risk areas (Hartley, Sørensen, and Torfing 2013).

Furthermore, this applicability challenge is exacerbated in that most studies in the field tend to focus on developing normative recommendations based on a particular, typically deductively derived, collaborative arrangement and on analysing its effectiveness or process dynamics under different conditions (e.g. Ansell and Torfing 2021; Hansen et al. 2021). Considering the institutional barriers to implementation of collaborative innovation (Cinar, Trott, and Simms 2019), such studies risk being related only loosely to actual practice and instead take the form of 'normative exercises' (Crosby, Hart, and Torfing 2017, 666). Given that they typically share an underlying assumption that the public sector has little connection with collaborative innovation, it is hardly surprising that discourse on the very applicability of collaborative innovation to the public sector remains active (e.g. Bommert 2010; Torfing 2019; Wegrich 2019).

Moreover, the normative and deductive nature of theorizing about collaborative innovation processes in the public sector has imbued existing arrangements with a logic similar to that described as 'causal reasoning' in the entrepreneurship and innovation literature (Sarvasvathy 2001). In the context of collaborative innovation, this reasoning implies viewing collaboration as a system of relationships that can and should be goal-directed, well-planned, and strategically governed to avoid potential pitfalls and increase the chances of success. This is evident, e.g. in the definition of *collaborative governance* as a governing arrangement for 'a collective decision-making process that is formal, consensus-oriented, and deliberative, and that aims to make or implement public policy or manage public programmes or assets' (Ansell and Gash 2008, 544). Specific examples of activities associated with causal reasoning include a rational evaluation of costs and benefits in selecting partners (e.g. Kesting and Parm Ulhøi 2010) or relationship forms (e.g. Parmigiani and Rivera-Santos 2011), and careful design and management of the collaboration process itself (e.g. Bryson,

Crosby, and Stone 2006,2015; West and Bogers 2014; Sørensen and Torfing 2019). In theory, such activities resonate with the public sector's emphasis on formalization and predictability (March and Olsen 2011), and might explain the virtual absence of effectual reasoning – a flexible and adaptive alternative to causal reasoning – from collaborative innovation research. However, whether this research status accurately reflects the empirical reality of collaborative innovation in the public sector remains unclear.

Thus, apart from attempts to capture anecdotal evidence in the form of exemplary cases, the diversity of collaborative innovation arrangements that actually are used in the public sector remains underexplored and uncategorized. This undermines efforts to justify alternative arrangements for public sector managers and policymakers who typically prefer practice-proven and politically popular solutions (Cairney 2016). For them, normative approaches that call for academically fashionable arrangements of collaborative innovation or suggest general guidelines for managing collaborative innovation might seem interesting but not feasible or specific enough unless related to their actual practice and immediate priorities (Newman et al. 2016). The lack of a categorization of established and practised collaborative innovation arrangements also makes policy design less efficient, as it complicates the choice of which collaborative arrangement framework should be supported and when to achieve specific innovation outcomes (Keast, Brown, and Mandell 2007).

Therefore, this article aims to create an empirically grounded, theoretically relevant, and practically applicable categorization of collaborative innovation arrangements in the public sector that may help overcome limitations in the growing, but fragmented, literature on the topic (e.g. Brogaard 2021; Desmarchelier, Djellal, and Gallouj 2020; Callens et al. 2022; McGann, Wells, and Blomkamp 2021; Sørensen and Torfing 2019; Torvinen and Jansson 2022; Tönurist, Kattel, and Lember 2017; Yuan and Gasco-Hernandez 2021). To achieve this aim, we formulated the following research question:

How can collaborative innovation arrangements that actually are used in the public sector be categorized and characterized to ensure their theoretical relevance and practical application?

In investigating this question, we *empirically* explored existing collaborative innovation arrangements in the public sector and constructed an empirically grounded typology of collaborative innovation archetypes. By *archetype*, we mean a distinctive configuration of processes and structures (Bryson, Crosby, and Stone 2015) that serves as a model for specific collaborative innovation arrangements.

To construct the typology of archetypes, we first identified analytical dimensions characterizing collaborative innovation arrangements within the five major research streams that focus on collaborative innovation, with an emphasis on insights from the public sector collaboration literature (e.g. Bianchi, Nasi, and Rivenbark 2021) and public sector collaborative innovation literature (e.g. Torfing 2019). We then applied these dimensions to explore systematically 35 collaborative innovation arrangements originating in the Norwegian public sector by collecting in-depth data from 35 interviews with 32 informants responsible for or deeply involved in these initiatives and secondary data from 2,905 pages of project presentations, reports, and evaluation documents, as well as 50 minutes of project videos. In the identification, characterization, and analysis of archetypes, we also relied on four focus group discussions held with 22 practising executives responsible for collaborative innovations in seven public sector institutions funding such initiatives.

Based on this unique triangulated approach, we contribute to the literature on collaborative innovation by providing an empirically derived categorization of collaborative innovation arrangements into overarching archetypes applicable as a tool for theory development and practical application. We identified six archetypes of established collaborative innovation arrangements that actually are used in practice and that public sector executives and policymakers recognize and view as meaningful. Four of these archetypes have a distinct causal orientation, and two have an effectual orientation. We also identified an effectual archetype of emergent collaborative innovation, which makes our study the first to recognize the common use of effectual reasoning in collaborative innovation, particularly in the earliest stages of and periods between formally initiated arrangements. This finding provides a new direction for further research on the use of causal and effectual reasoning in public sector collaborative innovation. Moreover, the focus group discussions revealed several discrepancies between our empirically derived archetypes and arrangements fashioned in the individual streams of the collaborative innovation literature. In discussing these analytical findings, we suggest explanations for the observed discrepancies and offer implications for innovation managers and policymakers in the public sector.

Diversity of collaborative innovation

Defining collaborative innovation

We define *collaboration* as the process of two or more parties working together in an arrangement requiring their coordinated behaviour to achieve outcomes (Hartley, Sørensen, and Torfing 2013; Keast, Brown, and Mandell 2007; McGuire 2006; Torfing 2019). Examples of activities facilitated by collaboration include resource sharing, production, service provisioning, decision making, and problem solving (e.g. McGuire 2006; Pestoff, Osborne, and Brandsen 2006).

As a special collaboration case, *collaborative innovation* implies various parties' joint efforts in facilitating creative problem solving (Torfing 2019), including various innovation activities (e.g. resource mobilization, ideation, and development and implementation of new solutions), and it entails generation of processual (e.g. learning) and material (e.g. innovation output) outcomes (Autio, Kanninen, and Gustafsson 2008). To ensure coordination and commitment, the joint work usually is institutionalized, that is, organized under specific arrangements ranging from contractual innovation alliances between two parties to collaborative platforms and large innovation networks or ecosystems involving all types of parties (private and public entities, the third sector, and citizens).

The focus on the whole innovation process – that is, both co-exploration and co-exploitation activities (Parmigiani and Rivera-Santos 2011)—as well as innovation outcomes differentiates collaborative innovation from other collaborative processes discussed in public management research, most notably collaborative governance, co-production, and cocreation. Whereas collaborative governance focuses on the governance aspects of the downstream implementation of public policy, public programme management, and public service delivery (Ansell and Gash 2008), collaborative innovation deals with the generation, development, and introduction of novel solutions. When used interchangeably to describe citizens' participation in various stages of the public sector innovation process (Voorberg, Bekkers, and Tummers 2015; Ansell and

Torfig 2021), cocreation and co-production can be viewed as special instances of collaborative innovation. In cases in which studies maintain the distinction between these concepts, cocreation describes resource integration in general (Hardyman, Daunt, and Kitchener 2015), whereas co-production implies actors' active involvement in public service delivery (Pestoff, Osborne, and Brandsen 2006).

Reasoning about collaborative innovation

Current research construes collaborative innovation in the public sector as a type of innovation strategy suitable for contexts with a common challenge and a need for external input, joint ownership, and implementation (Hartley, Sørensen, and Torfig 2013). It implies the broad inclusion of relevant actors who try to understand a common problem (Torfig 2019) and engage in a 'consensus-oriented and deliberate decision-making process' towards a common goal (Wegrich 2019, 12). As unplanned or uncontrollable situations (e.g. uncertainty, power asymmetry, and differences in partners' worldviews, experiences, and agendas) are viewed as unwanted and potentially detrimental, there is a preference for formally managing collaborative innovation, ideally by a 'central actor with sufficient authority, knowledge and experience, access to different kinds of resources, and a good organizational backing' (Sørensen and Torfig 2012, 8).

In the innovation and entrepreneurship literature, such thinking is known as *causal reasoning* (Saravathy 2001) and is characterized by setting goals prior to selecting means, focusing on expected returns, emphasizing industry analysis, exploiting pre-existing knowledge, and attempting to predict the future (Perry, Chandler, and Markova 2012). Considering its associations with planning, bureaucracy, and formalization, causal reasoning seems particularly appealing to the public sector (March and Olsen 2011), which may explain why its alternative—*effectual reasoning*—is virtually absent from collaborative innovation research. Effectuation entails relying on available resources, selecting goals based on given means, experimenting within affordable loss limits, emphasizing partnerships and pre-commitments, and leveraging environmental contingencies (Saravathy 2001). In collaborative innovation, this entails the primacy of existing social capital in the assessment of opportunities, goal setting, and collaboration intensity (Kerr and Coviello 2020). It also conveys that uncertainty is embraced as an integral part of innovation that, in turn, necessitates flexible processes and structures due to continuous networking with existing ties, forming new ties, and attracting pre-commitments from self-selected stakeholders who jointly cocreate goals and remain open to goal shifts (Engel, Kaandorp, and Elfring 2017). Thus, the composition of actors defines the innovation process and outcomes, not vice versa (Saravathy and Dew 2005). Although increasingly common in private sector studies (Brettel et al. 2012; Berends et al. 2014; Deligianni et al. 2020; Hauser, Eggers, and Guldenberg 2020), the only reports of effectuation in the public sector have been related to social entrepreneurship contexts, with an emphasis on individual, rather than collaborative, efforts (Chandra and Paras 2021; Kearney and Meynhardt 2016), or a well-controlled setting as a rare variation of the idea-generation stage in an otherwise causation-based process (Maensivu, Toivonen, Tammela, et al. 2016).

Perspectives on collaborative innovation arrangements

As with any empirically grounded construction of types (Kluge 2000), the development of an empirically grounded typology of collaborative innovation archetypes requires identifying analytical dimensions based on the existing literature to enable comparisons among collaborative arrangements. To identify such dimensions, we reviewed arrangements discussed in prior research on various aspects of collaboration, including research on interorganizational relationships, innovation management, innovation studies, public sector collaboration, and public sector collaborative innovation (Table 1).

Given our focus on collaborative innovation arrangements in the public sector, the latter two research streams are of direct relevance. The *public sector collaboration* literature comprises several large sub-streams, including collaborative governance (Ansell and Gash 2008), public network performance (Provan and Milward 2001), and cross-sector collaboration (Bryson et al. 2006; Bryson, Crosby, and Stone 2015). Each sub-stream offers its own definitions and frameworks (e.g. the 3C framework of Keast, Brown, and Mandell 2007) that address collaboration in general, but also may be relevant to collaborative innovation in particular. For example, the definition of *cross-sector collaboration* by Bryson, Crosby, and Stone (2006, 44) easily can embrace innovation outcomes. In this ‘generic’ collaboration literature, multiple theoretical frameworks attempt to justify cross-sector collaboration and describe approaches to its governance by focusing on process characteristics (Bryson, Crosby, and Stone 2015). However, they often seem to ‘conflate system context and conditions with the specific drivers of collaboration’ (Emerson, Nabatchi, and Balogh 2012, 11). Another distinctive aspect of public sector collaboration literature is its normative orientation ‘to help public managers and integrative leaders from any sector design and sustain effective cross-sector collaborations’ (Bryson, Crosby, and Stone 2006, 647), unlike private sector studies’ more explanatory orientation.

In turn, the public network performance (Turrini et al. 2010), PPP (Hodge and Greve 2007) and collaborative governance (Ansell and Gash 2008) sub-streams discuss structural dimensions. Examples of such dimensions include centralized vs. decentralized integration in public networks (Costumato 2021), supportive vs. less-supportive regulatory regimes in PPPs (Casady 2021), hierarchical vs. shared leadership in governance networks (Cristofoli et al. 2022), and participant-, lead organization-, and separate entity-governed networks (Provan and Kenis 2008). However, these literature sub-streams use structural dimensions to characterize variations in a particular collaborative arrangement, rather than compare alternative arrangements. This hinders development of collaborative innovation typologies that cross boundaries between the literature streams.

The normative characteristics and focus on process management also define the emerging literature specifically addressing *public sector collaborative innovation*. Describing public innovations as typically episodic and reactive, this literature usually assumes the sector’s limited innovation capabilities and risk aversion, and suggests overcoming it through collaboration with private actors (Sørensen and Torfing 2012), e.g. in the form of ServPPINs (Djellal, Gallouj, and Miles 2013) and their variants (Hansen et al. 2021). To differentiate amongst variants, the PPIN literature suggests dimensions such as context, actor type, innovation type, and mode of formation (Desmarchelier, Djellal, and Gallouj 2020). The PPIN literature also differentiates

amongst networks in which public sector actors play co-production vs. supportive roles. The latter role is implicit in the broader public innovation literature, which also mentions collaboration issues, but focuses on innovation in general or on innovation systems' role in stimulating economic growth specifically, rather than on collaborative innovation per se (e.g. De Vries, Bekkers, and Tummers 2016; Windrum and Koch 2008; Bloch and Bugge 2013). Because this literature views public sector actors more as facilitators of innovation than as procurers, users, or innovators, it views collaboration with private actors as a strategic necessity.

Lack of a coherent, empirically grounded approach

As Table 1 demonstrates, no single perspective offers a coherent selection of archetypes that could serve as structuring guidelines for designing a particular collaborative innovation initiative. Instead, each perspective tends to argue for the superiority of its preferred collaborative arrangement over those from other perspectives. Such a heterogeneous and somewhat conflicting combination of theoretically derived arrangements essentially invalidates any attempt to compile a functionally viable typology of collaborative innovation archetypes with a literature review alone. An alternative solution that can link theoretical advances with empirical reality, as well as facilitate the practical application of collaborative innovation, is to identify archetypes based on a theoretically informed exploration of existing practices in the public sector (i.e. assisted by the knowledge of dimensions characterizing collaborative arrangements in the literature). In Table 2, we compiled an overview of the dimensions used in the research streams to characterize collaborative innovation arrangements. These dimensions describe the actors involved (their number and diversity), the arrangements' structure and governance (the openness of interaction and degree of formalization), the social and environmental interaction contexts (including ways of sharing responsibilities), the object of collaboration (the nature and complexity of innovation and the degree of innovativeness), the results from collaboration, and collaboration dynamics.

Methods

To create an empirically grounded typology of collaborative innovation archetypes, we conducted an exploratory study in Norway and categorized collaborative innovation arrangements in the nation's public sector as a response to the joint call from seven Norwegian 'user organizations' (i.e. public organizations interested in using the typology, including government policymakers and public and private funding agencies; Figure 1). They shared the need for a systematic understanding of the numerous collaborative innovation arrangements that they had observed actively or funded directly. Responding to this specific call provided us with unique access to cases representing various collaborative innovation arrangements, as well as an opportunity to involve user organizations in the study. As public sector actors in 'Nordic countries emerge as active, eager reformers, applying a wide repertoire of different reform means and measures' (Greve et al. 2020, 706), we expected to find considerable diversity in collaborative innovation arrangements in this setting. Norway long has had some of the best conditions for accumulating a wide variety of collaborative innovation arrangements because it is an advanced, open economy based on a well-functioning

Table 1. Examples of arrangements and dimensions from relevant literature streams.

| Literature stream | Description | Example sub-stream | Example dimensions | Example of collaborative arrangement | Example source |
|--|--|---|--|--|---|
| <i>Private sector studies</i> Interorganizational relationships | Typically focusing on configurations of various collaborative forms (e.g. mergers, alliances, franchising, networks, and clusters) and how they affect intended outcomes of exploration (creating new solutions; e.g. Phelps 2010) or exploitation (capitalizing on existing solutions; e.g. Szulanski and Jensen 2008) | Strategic partnerships Networks Ecosystems | Intended outcome Context Openness | Alliance Joint venture Cluster Platform ecosystem | Parmigiani and Rivera-Santos (2011) Pittaway et al. (2004) Jacobides, Cennamo, and Gawer (2018) |
| Innovation management | Emphasizing micro-level dimensions in specific collaborative innovation arrangements, e.g. collaborating partners' characteristics (e.g. goal or partner type) and collaboration characteristics (e.g. the process of establishing collaborations), whilst neglecting comparisons between alternative collaborative arrangements | Employee-driven innovation Open innovation Value cocreation | Actor diversity Formalization Openness | Employee innovation Competition Innovation platform Service ecosystem | Kesting and Parm Ulhøi (2010) West and Bogers (2014) Lusch and Nambisan (2015) |
| Innovation studies | Emphasizing meso-level dimensions in specific collaborative innovation arrangements, e.g. the context and dynamics of national, technological, regional, sectoral, and other types of innovation systems (Edquist 2005), which rarely are applicable to alternative collaborative arrangements | Innovation systems Innovation networks | Context Formalization | Regional IS R&D network | Edquist (2005) Powell and Grodal (2005) |

Public sector studies

(Continued)

Table 1. (Continued).

| Literature stream | Description | Example sub-stream | Example dimensions | Example of collaborative arrangement | Example source |
|--|--|-----------------------------|--------------------|--------------------------------------|--|
| Public sector collaborative | Having largely normative orientation (Bryson, Crosby, and Stone 2006) and either emphasizing collaboration in general, often to justify cross-sector collaboration (Bryson, Crosby, and Stone 2015), or structural dimensions in specific collaborative arrangements (e.g. Costumato 2021; Cristofoli et al. 2022), limiting applicability to innovation, as well as comparability of alternative arrangements | Collaborative governance | Formalization | Governance network | Ansell and Gash (2008), Ansell and Gash (2018) |
| | | Public network performance | Integration | Community-based network | Provan and Milward (2001) |
| | | Cross-sector collaboration | Formalization | Cross-sector partnership | Bryson, Crosby, and Stone (2006), Bryson, Crosby, and Stone (2015) |
| | | Citizen involvement | Actor diversity | Living lab | Fuglsang and Hansen (2022) |
| Public sector collaborative innovation | Specifically addressing collaborative innovation, but emphasizing public-private collaboration due to the supposedly episodic and reactive nature of public innovations (Sørensen and Torfing 2012; Djellal, Gallouj, and Miles 2013) | Public sector co-production | Nature | Service system | Osborne, Radnor, and Strokosch (2016) |
| | | PPIN literature | Actor diversity | ServPPINs | Djellal, Gallouj, and Miles (2013) |
| | | Collaborative innovation | Formalization | Self-regulating network | Sørensen and Torfing (2011) |
| | | Social innovation | Context | Co-implementor model | Voorberg, Bekkers, and Tummers (2015) |
| | | Cocreation | Actor diversity | Cocreation arena | Ansell and Torfing (2021) |



Table 2. Collaborative innovation dimensions discussed in the literature.

| Area | Dimension | Explanation | Example articles |
|--------------|--------------------------|--|---|
| Actors | Number of actors | Dyadic or multi-partner collaboration | Isett et al. (2011); Rowley (1997); Turrini et al. (2010) |
| | Actor diversity | Actors' heterogeneity with respect to the resource base, experience, and motives behind collaboration | Bryson, Crosby, and Stone (2015); Djellal, Gallouj, and Miles (2013); Dockx et al. (2022); Kickert, Klijn, and Koppenjan (1997); Turrini et al. (2010) |
| Interactions | Openness of interaction | The possibility of new actors joining innovation activities over a collaboration's lifespan | Ansell and Gash (2008); Chesbrough (2003); Dahlander and Gann (2010); West and Bogers (2014) |
| | Formalization | The presence and extent of control mechanisms, structures, and systems designed to coordinate and facilitate collaborative innovation activities | Ansell and Gash (2008); Das and Teng (1998); Powell and Grodal (2005) |
| Contexts | Collaboration context | Innovation's social and environmental contexts | Baregheh, Rowley, and Sambrook (2009); De Coninck et al. (2021); Edquist (2005); Kattel, Lember, and Tonurist (2020); Osborne, Radnor, and Strokosch (2016); Provan and Kenis (2008) |
| | Degree of innovativeness | The extent to which innovation is novel and useful | Crossan and Apaydin (2010); Etlie, Bridges, and O'Keefe (1984) |
| Innovations | Nature of innovation | Innovation forms and/or types | Barrutia and Echebarria (2019); Baregheh, Rowley, and Sambrook (2009); Chen, Walker, and Sawhney (2020); Crossan and Apaydin (2010); De Vries, Bekkers, and Tummers (2016); Mu and Wang 2022; Schumpeter (1934) |
| | Innovation complexity | The extent to which innovation incorporates more than one form or type | Torugsa and Arundel (2016) |
| Results | Intended outcome | Various intended and unintended, and direct and indirect innovation outcomes | Aas and Pedersen (2010); Baregheh, Rowley, and Sambrook (2009); Brogaard (2021); Bryson, Crosby, and Stone (2015); Bloch and Bugge (2013); Lawrence, Hardy, and Phillips (2002) |
| | Collaboration dynamics | The extent to which collaboration varies over its lifespan | Doz, Olk, and Ring (2000); Isett et al. (2011) |

democracy characterized by a combination of free-market activity and government intervention, as well as the public sector's traditionally close ties to academia and civil society.

Considering that research on collaborative innovation typically has been conducted based on small-N case studies, there have been calls recently for medium-N research (Douglas et al. 2020). Reaching this number of cases can require data from diverse cultural and political contexts, but such contextual dimensions rarely are covered in the collaborative innovation literature (Table 1) or in the variables contrasting the cases (e.g. Cristofoli et al. 2022). Thus, the Norwegian context offered a semi-controlled setting in which the collaborative arrangements' configurational dimensions have varied significantly, whilst the cultural and political dimensions remained fairly stable across cases.

Data collection

We conducted data collection between April and December 2019, and executives from the seven user organizations (Figure 1) actively participated in organizing the data collection. To ensure data collection rigour, we followed multiple methodological strategies recommended for inductive public management research (Nowell and Albrecht 2019). To enhance our data's richness and trustworthiness, we resorted to an iterative data collection approach alternating between focus group discussions with user organizations and intermediate rounds of case-level data collection from informants directly involved in relevant collaborative innovation initiatives (Figure 1).

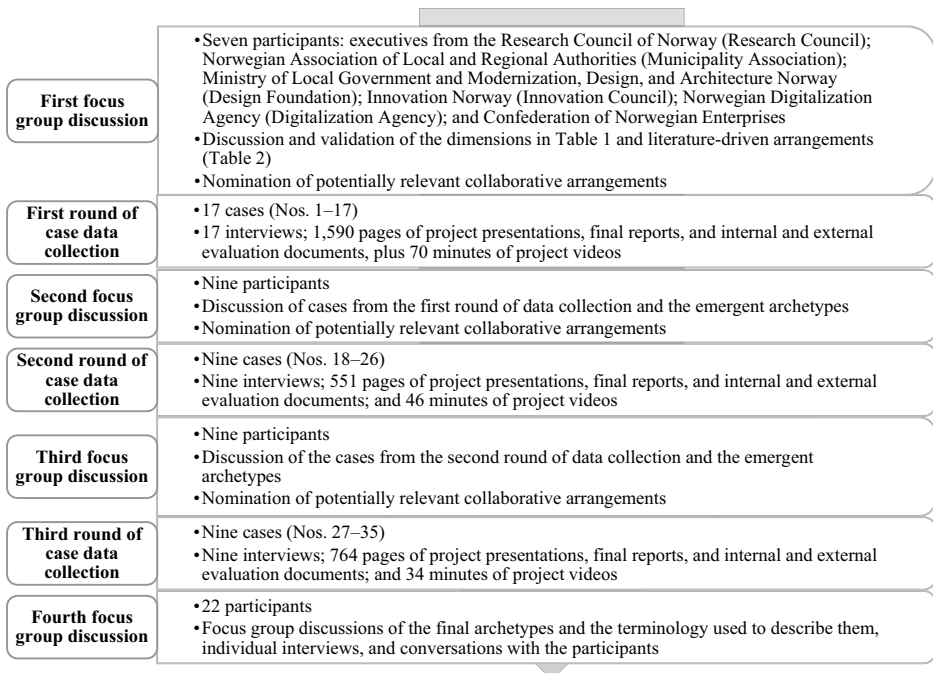


Figure 1. Data collection strategy.

We used focus groups to identify collaborative innovation arrangement cases, triangulate the data, and enrich the interpretation of results (e.g. Brookes and Wiggan 2009; Schillemans 2013). Altogether, we conducted four focus group discussions, which were organized as workshops comprising seven, nine, nine, and 22 representatives from the user organizations who were potential users of our typology (none participated in the cases directly). The final focus group contained more participants because it served as a final feedback discussion on the categorization of all cases. The focus group discussions covered a presentation of the categorization of the collected cases, feedback on the analysis of the cases (including the dimensions used to categorize them), and the nomination of cases by each participant. A minimum of three researchers participated in each focus group, with one researcher responsible specifically for making observations and taking interview and observation notes. Immediately after each focus group, interview and observation notes were shared amongst the researchers, and a debriefing was held in which the field notes were elaborated upon further (Emerson, Fretz, and Shaw 2011). Inputs from the focus groups then were used to identify case informants and conduct interviews.

The nomination of collaborative innovation arrangements that could serve as cases for our study was a facilitated process that took place during the first three focus groups based on purposive and snowball sampling to ensure that relevant, representative, and theoretically interesting exemplars were captured. The nomination process relied on two criteria, i.e. each nominee had to 1) be a real collaborative arrangement and 2) focus on innovation. Altogether, the user organizations nominated 84 potentially relevant cases. A team of three researchers, including two of the authors, assessed the nominated cases' relevance and, for each round of case data collection, identified types of arrangements that could enable data saturation. This procedure's objective was to ensure broad variability in the types of collaborative innovation arrangements and depth of insight. Of the 84 cases, 35 were selected on the basis of three criteria: 1) diversity in collaborative arrangements; 2) availability of interviewees; and 3) richness in secondary data. The selected cases represented a broad range of collaborative arrangements (Table 3) involving both private and public institutions (74%) and public institutions only (26%), with the informants occupying prominent positions. The arrangements addressed the major public sector innovation types identified by De Vries, Bekkers, and Tummers (2016); were situated within various traditional public service areas/sectors, e.g. health care, social welfare, education, research, urban/regional development, and regulatory services; and were initiated by public institutions ranging from local municipality to national government divisions.

For the 35 cases, we collected primary data from 35 interviews triangulated by secondary data from 2,905 pages of project presentations, final reports, and internal and external evaluation documents, as well as 50 minutes of project videos. Each interview lasted 1–1.5 hours and was conducted either by phone or online. We followed a semi-structured interview guide covering collaborative innovation arrangement dimensions (Table 2). Considering that senior informants were reluctant to allow audio recordings, we took detailed notes during the interviews. Immediately after each interview, we fully elaborated on our notes, then shared them for analysis and discussion.

Table 3. Cases and informants.

| No. | Case description | Informant | Gender | Position | Initiating institution | Institutional design ¹ | Intended innovation methods ² | Service area/sector ³ |
|-----|--|-----------|--------|----------------------------|------------------------|-----------------------------------|---|----------------------------------|
| 1 | International R&D partnership to reform local climate action planning | 1 | F | Senior adviser | County | Pu-Pri | New production methods | Agricultural support |
| 2 | Cross-sectoral knowledge development with 'university-municipality' format | 2 | F | Deputy director general | University | Pu-Pu | New forms of organization | Health care and social welfare |
| 3 | Intersectoral IT infrastructure initiative with university origin | 3 | M | Assistant director general | University | Pu-Pu | New data service | Research infrastructure |
| 4 | PP collaboration to reform regional voluntary sector services | 4 | F | Project manager | Private company | Pu-Pry | New service offerings | Volunteer sector |
| 5 | Multi-municipality and cross-government data-sharing collaboration | 5 | M | Project manager | Municipality | Pu-Pu | New digital services | Child welfare |
| 6 | International 'smart city' partnership with local origin and triple helix format | 6 | F | Project coordinator | Municipality | Pu-Pri | New 'smart city' technologies and services | Energy sector |
| 7 | Intersectoral monitoring service collaboration with national reach | 7 | M | Chief engineer | Government agency | Pu-Pu | New digital service | Environmental health |
| 8 | Public sector innovation programme with open calls and service design approach | 8 | F | Senior adviser | Directorate | Pu-Pri | New processes, organization forms, and services | User-directed public services |
| 9 | University/user incubation collaboration initiative | 9 | M | Innovation manager | University hospital | Pu-Pri | New products and services | Medical sector |
| 10 | Innovation centre at university location with broad industry participation | 10 | M | Professor | University | Pu-Pri | New processes and service offerings | Health care |
| 11 | Multi-level social welfare reform through digital service collaboration | 11 | M | Head of section | Government agency | Pu-Pri | New digital services | Social welfare |
| 12 | Interdepartmental collaboration for childcare reform with Nordic reach | 12 | F | Project manager | Directorate | Pu-Pu | New forms of organization | Education and child welfare |

(Continued)



Table 3. (Continued).

| No. | Case description | Informant | Gender | Position | Initiating institution | Institutional design ¹ | Intended innovation ² | Service area/sector ³ |
|-----|---|-----------|--------|---------------------------|--|-----------------------------------|----------------------------------|----------------------------------|
| 13 | Social recreational entrepreneurship initiative with private sector origin | 13 | F | Managing director | Private investment Company | Pu-Pri | New products and services | Recreational services |
| 14 | Social innovation initiative in public education with private sector origin | 13 | F | Managing director | Private investment company | Pu-Pri | New services | Education sector |
| 15 | Intersectoral collaboration for public sector use of service design tools | 14 | F | Project manager | Regional government association | Pu-Pri | New service design methods | Municipal services |
| 16 | Complex collaboration initiative for social inclusion with university origin | 15 | F | Associate professor | University | Pu-Pri | New products and services | Labour market services |
| 17 | Regional digital service innovation initiative with broad municipality reach | 15 | F | Associate professor | University | Pu-Pri | New digital services | Health care |
| 18 | Public/citizen collaboration to engage ordinary citizens in regional innovation | 16 | M | Senior adviser | Municipality | Pu-Pri | New services | Municipal services |
| 19 | Public/citizen collaboration to reform local voluntary sector services | 17 | F | Chief municipal executive | Municipality | Pu-Pri | New forms of organization | Recreational services |
| 20 | PP development collaboration to renew water and sewer infrastructure | 17 | F | Chief municipal executive | Municipality | Pu-Pri | New technology | Water and sewer |
| 21 | Regional PP collaboration to offer new services that encourage gender equality | 18 | F | Senior adviser | Municipality | Pu-Pri | New services | Agricultural support |
| 22 | Collaborative urban development initiative with own organization | 19 | M | CEO | PPP organization | Pu-Pri | Governance innovation | Development services |
| 23 | Collaborative urban development initiative with municipality origin | 20 | F | Programme manager | Municipality | Pu-Pri | Governance innovation | Development services |
| 24 | Long-term knowledge-sharing initiative with the 'university-municipality' format | 21 | M | Special adviser | Municipality | Pu-Pu | New processes | Municipal services |
| 25 | National digital service infrastructure initiative with financial industry origin | 22 | M | Special adviser | Private technological infrastructure company | Pu-Pri | New digital services | Citizen services |

(Continued)

Table 3. (Continued).

| No. | Case description | Informant | Gender | Position | Initiating institution | Institutional design ¹ | Intended innovation ² | Service area/sector ³ |
|-----|---|-----------|--------|-------------------------|---------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| 26 | Regional governance reform crossing refugee integration and social welfare | 23 | F | Senior adviser | Municipality | Pu-Pu | Governance innovation | Social welfare |
| 27 | Sectoral IT infrastructure development initiative crossing the PP boundary | 24 | F | Senior researcher | Governmental research institute | Pu-Pri | New data services | Regional planning |
| 28 | Intersectoral innovation initiative aiming to solve 'wicked judicial problem' | 25 | F | Research fellow | University | Pu-Pri | New services | Judicial services |
| 29 | Regional collaboration for sustainable transport with municipal governance | 26 | F | Planning officer | Municipality | Pu-Pri | New forms of organization | Transport Environmental health |
| 30 | Collaborative acute care service innovation initiative | 27 | M | CEO | Research institute | Pu-Pu | New processes | Health care |
| 31 | Intersectoral management innovation under directorate coordination | 28 | M | Deputy director general | Directorate | Pu-Pri | New management processes | Government regulation |
| 32 | Institutional process innovation initiative with 'university-agency' format | 29 | F | Senior researcher | Research institute | Pu-Pu | New processes | Social welfare |
| 33 | Cross-sectoral digital transformation with government agency origin | 30 | M | CEO | Government foundation | Pu-Pri | New digital services | Land use and regional planning |
| 34 | Collaborative initiative to develop multi-regional cocreation spaces | 31 | F | Project manager | PPP organization | Pu-Pri | New forms of organization | Municipal services |
| 35 | Welfare service innovation initiative with 'university-municipality' format | 32 | F | Project manager | Municipality | Pu-Pu | New services | Social welfare |

Note: (1) The collaborative arrangement's institutional design is characterized as either crossing the public-private boundary (Pu-Pri) or not (Pu-Pu). However, all Pu-Pu arrangements involve either representatives of private (profit) or non-profit institutions, or citizens in innovation activities, but without their institutions being formally represented in governing the arrangement. (2) The classification of innovation type is based on De Vries, Bekkers, and Tummers (2016) and the Schumpeterian innovation types of the Oslo Manual of OECD (2018). (3) The classification of service areas/subsectors is based on the public sector subsector part of the Norwegian version of the NACE standard.

Data analysis

To ensure analytical rigour, we followed established analytical strategies for inductive public management research (Nowell and Albrecht 2019). For each case, two authors and a third independent researcher analysed the transcriptions along the collaborative innovation dimensions (Table 2). Through discussions, we clarified each dimension's characteristics and content, as well as any overlaps and relationships amongst the dimensions that required refinement for use in the characterization of archetypes. During the focus groups, we reiterated these discussions with the user organizations, which helped establish the interpretations' credibility and relate theory and practice. For example, although the formalization and openness dimensions were distinct conceptually, they were concurrent empirically (i.e. collaboration initiatives with a high degree of openness were less formal than those with a low degree of openness).

Next, we applied consensus-based thematic coding to generate categories and identify themes, which varied from having binary categories (e.g. high/low under 'formalization') to having numerous, often-unrelated categories (e.g. product, administrative process, technological process, governance, mission, policy, management, partner, citizen, conceptual, explorative, and exploitative under 'nature of innovation'). To ensure confirmability, we conducted a hierarchical cluster analysis using SPSS 26 as an additional tool to explore relationships amongst thematic codes and the possibilities of grouping similar collaborative innovation arrangements (Appendix). Although the cluster analysis results suggested six different groups of collaborative innovation arrangements, they also demonstrated its limitations because two cases were not placed in any cluster.

Relying on cluster analysis only as a guide, we conducted manual classification following the procedure for the empirically grounded construction of typologies (Bailey 1994; Grodal, Anteby, and Holm 2021; Kluge 2000). The three researchers independently sorted the cases into six groups based on regularities in the collaborative innovation dimensions (Table 2). They then compared the cases jointly within each group to resolve any discrepancies in the classification and to ensure the archetypes' credibility and internal homogeneity (Grodal, Anteby, and Holm 2021). We then conducted comparisons amongst archetypes to ensure their external heterogeneity. We based the constructed archetypes' characterization on their combinations of attributes and meaningful relationships (Kluge 2000), and used descriptive terms that were both familiar to user organizations and compatible with the collaborative innovation literature. The emerging typology and findings were discussed iteratively with the user organizations during the focus groups to triangulate our findings, enrich emerging interpretations, and establish their credibility, as well as to explore correspondence between actual practice and the current literature on collaborative innovation arrangements (Nowell and Albrecht 2019).

Findings and discussion

Empirically grounded collaborative innovation archetypes

Archetypes of established collaborative innovation

Table 4 presents the six archetypes of established collaborative innovation identified on the basis of the 35 empirical cases.

Table 4. Archetypes of established collaborative arrangements and cases representing them (exemplar cases discussed in the text in bold).

| Archetypal form | Description | Structure | Function | Details | Cases |
|-----------------|---|-----------|---------------------------------|---|--|
| Project | Formal development collaboration with a project model governance structure | Formal | Addressing a specific issue | <p><i>Actors:</i> Limited number of homogeneous participants</p> <p><i>Interactions:</i> Fixed interaction formats with limited openness and a high degree of formality under hierarchical or contractual project governance</p> <p><i>Contexts:</i> Diverse contexts, but with participants' cultural proximity</p> <p><i>Innovations:</i> Specific innovation activities and often material innovation types of low to medium complexity and novelty</p> <p><i>Results:</i> Intended material outcomes, but lack of such often is justified by immaterial and processual outcomes</p> <p><i>Dynamics:</i> Predefined aim and time frame with few inter-arrangement alterations, but often with a previous history of participant relationships</p> | 3, 5, 7, 11, 12, 15 , 16, 17, 19, 20, 27, 28, 29, and 30 (14 cases) |
| Programme | Two-level formal model with collaborations at both project and programme levels | Formal | Addressing a broad problem area | <p><i>Actors:</i> moderate number of heterogeneous participants structured in smaller, homogeneous sub-arrangements</p> <p><i>Interactions:</i> Fixed interaction formats with limited openness and a high degree of formality in a portfolio or at the core of contract governance</p> <p><i>Contexts:</i> Contextual diversity between sub-arrangements of relatively close internal proximity</p> <p><i>Innovations:</i> Programme-level problem solving through innovation in multiple, modular, and often low-complexity innovation activities and types</p> <p><i>Results:</i> Intended material solutions to address problems using portfolio approaches to risk reduction and potential failures</p> <p><i>Dynamics:</i> Two-level dynamics with periodic (e.g. annual) changes at the programme level, as well as a predefined aim and time frame at the sub-arrangement level</p> | 2, 4, 8 , 9, 21, 23, and 25 (seven cases) |

(Continued)



Table 4. (Continued).

| Archetypal form | Description | Structure | Function | Details | Cases |
|-----------------|---|-----------|---|---|------------------------------|
| Centre | Formal model with physical or virtual location as the hub of separate collaborative innovation activities | Formal | Coordinating and managing interactions between partners | <p><i>Actors:</i> Moderate to high number of relatively homogeneous participants</p> <p><i>Interactions:</i> Fixed interaction formats with moderate openness and a high degree of formality under hierarchical, centralized governance</p> <p><i>Contexts:</i> Participants' contextual diversity harmonized by physical or virtual proximity through the centre</p> <p><i>Innovations:</i> Novel or complex innovations with centralized integration of modular innovations of different types requiring high-competence individual participants with specialized resources and practices</p> <p><i>Results:</i> Intended solutions to complex and often 'wicked' problems solved by competence integration</p> <p><i>Dynamics:</i> Centralized control of arrangement dynamics with opportunities for temporal flexibility</p> | 10 and 32 (two cases) |

(Continued)

Table 4. (Continued).

| Archetypal form | Description | Structure | Function | Details | Cases |
|-----------------|--|-----------|--|--|--|
| Network | Formal model with distributed responsibility for separate collaboration activities | Formal | Facilitating the exchange and implementation of best practices | <p><i>Actors:</i> Moderate to high number of moderately heterogeneous participants</p> <p><i>Interactions:</i> Fixed interaction formats with moderate openness and a moderate degree of formality under networked and decentralized governance enabled by trust and 'shared visions'</p> <p><i>Contexts:</i> Participants' contextual diversity harmonized by cultural proximity</p> <p><i>Innovations:</i> Novel or complex innovations that can have no central integration; often 'replications' of multiple decentralized innovations of different types or a combination of local innovations that can be integrated without central coordination</p> <p><i>Results:</i> Alternative and local solutions networked to solve complex and often 'wicked' problems without central integration</p> <p><i>Dynamics:</i> Local control and often autonomous development of arrangement dynamics with opportunities for temporal flexibility</p> | 1, 6, and 31 (three cases) |
| Partnership | Informal model of innovation collaboration with relatively few partners | Informal | Reducing bureaucracy and simplifying procedures | <p><i>Actors:</i> Low to moderate numbers of heterogeneous participants</p> <p><i>Interactions:</i> Flexible interaction formats with moderate openness and degree of formality enabled by personal trust and recognition of potentially conflicting goals and visions</p> <p><i>Contexts:</i> Participants' contextual diversity recognized and respected</p> <p><i>Innovations:</i> Conceptual innovations often involving novel or hybrid institutional logics or fresh perspective – taking on 'wicked' problems</p> <p><i>Results:</i> Resource mobilization and increased trust amongst previously detached stakeholders</p> <p><i>Dynamics:</i> Trust-driven dynamics with many opportunities for temporal flexibility</p> | 13, 14, 22, 24, 33, and 35 (six cases) |

(Continued)



Table 4. (Continued).

| Archetypal form | Description | Structure | Function | Details | Cases |
|-----------------|---|-----------|--|---|------------------------------|
| Arena | Open and informal model of innovation collaboration with many and often temporal partners | Informal | Facilitating acquaintances and encouraging new collaboration | <p><i>Actors:</i> Moderate to high number of heterogeneous participants with relatively low commitments</p> <p><i>Interactions:</i> Flexible interaction formats with high openness and a low degree of formality enabled by autonomy and self-organization</p> <p><i>Contexts:</i> Participants' contextual diversity recognized and viewed as a requirement for collaboration</p> <p><i>Innovations:</i> Novel relationships and early-stage ideas representing alternative perspectives – taking on collaborative opportunities and solutions</p> <p><i>Results:</i> Resource mobilization and novel relationships with temporary potential for transformation into innovation activities and multiple innovation types</p> <p><i>Dynamics:</i> Diversity-driven dynamics, often of limited duration, with many opportunities for temporal flexibility and further transformation into stable arrangements</p> | 18, 26, and 34 (three cases) |

Note. The data were collected and processed in compliance with guidelines from the Norwegian Centre for Research Data and the National Committee for Research Ethics in the Social Sciences and Humanities.

We classified 14 cases as representing the *project-based development* archetype. In these arrangements, collaboration had a formal project governance structure, with reference and steering committees ensuring stakeholder representation. The arrangements had a predefined aim and time frame, focusing on developing specific services or organizational innovations. An exemplar case that applied this archetype was a development project that the Municipality Association organized to devise service design tools for use by municipalities (Case 15).

Seven cases represented the *programme-based portfolio* archetype, comprising a two-level governance structure with specific partner constellations, aims, and time frames at the programme and project levels. Projects were organized in a portfolio and often competed at the programme level regarding financing and outcomes. Stakeholders and participants often differed at the programme and individual project levels. An exemplar case was the Digitalization Agency-funded service innovation programme, whose portfolio expansion relied on annual calls for projects that demonstrated digitally enabled cross-sectoral innovation activities (Case 8).

Two cases represented the *centre-based collaboration* archetype. These arrangements were organized as formal collaborations around a physical or virtual hub with several separate collaborative innovation activities. Aside from development projects, the latter often included a broader range of innovation-related activities, e.g. resource development and knowledge dissemination. An exemplar case was a Research Council-funded innovation centre in the health sector. The funding framework required collaborative arrangements to use a specific geographical location as a hub, preferably within a larger institution, e.g. a university hospital (Case 10).

A similar archetype was used in three other cases, but without a single hub organization and with formal responsibility for both collaboration and innovation activities distributed over a network of partners, which we defined as the *network-based collaboration* archetype. An exemplar case was a European network of smart cities in which one of our case municipalities participated. Each member city mobilized its own partners around demonstration activities in its location whilst collaborating with other member cities. Instead of a central hub, a steering committee comprising representatives of the member cities was established (Case 6).

Unlike the four aforementioned archetypes, which had distinct causal reasoning, the final two archetypes had a certain effectual orientation. Differing from the others in terms of degree of formality, openness, and diversity, these two archetypes were oriented primarily towards resource mapping and mobilization. Six cases represented the *innovation partnership* archetype, a relatively informal arrangement with different governance structures in use. Common to these arrangements was their lack of formality in terms of both contractual or legal regulations and normative rules regarding, e.g. outcomes and conditions for continuing or leaving the collaborative arrangement. Whilst they conveyed openness and flexibility in the inclusion of partners over the initiatives' lifetimes, the numbers of partners remained relatively small, and interactions were frequent, lasting, and stable over time. An exemplar case was one of two urban development collaborations (Case 22). Whereas its counterpart (Case 23) used the formal programme-based portfolio archetype to facilitate and control its urban development project portfolio, Case 22 relied on an informal partnership between relatively few strong and persistent stakeholders in an urban area. Case 22 also used a diverse range of collaborative innovation activities, e.g. development projects, experiments, and common events. The stability and persistence of

collaboration differentiated this arrangement from another informal and open archetype, the *collaborative innovation arena archetype*. In the three cases representing this archetype, partners were more heterogeneous and mainly participated in events with icebreaking and exploration activities, rather than developmental and implementation activities. Although this archetype facilitated collaborations owing to its open and inviting orientation, it entailed less persistent engagement and high turnover amongst participants. An exemplar case was a municipality's initiative to invite diverse organizations and individuals to a series of informal 'citizen dinners' over a period of one year. Each event's invitations and agendas were open. The dinners functioned as informal meetings, but they all were organized as a concerted set of events to explore new forms of citizen involvement in municipality innovation processes, with few formal obligations and requirements for participants (Case 18).

Archetype of emergent collaborative innovation

Table 4 provides a static picture of formally initiated collaborative innovation arrangements, but observations of these archetypes' dynamics, particularly the initiatives' earliest stages (including pre-phases), revealed that they were developing rather organically, with abstract aspirations and readily available, but often minimal, resources, and no specific objectives at first. Some cases had a pre-phase that lasted several years and did not have the ambition to shape the relationship into a specific collaborative arrangement. Essentially, collaborations often emerged in a circle of acquaintances, typically catalysed by a political decision and (potential) access to substantial resources. Thus, many arrangements originated in earlier collaboration efforts, with more or less similar constellations of partners who decided to seize an opportunity to strengthen or renew their collaboration in light of either recently issued directives or announced calls for funding applications. Such an approach resonated well with effectuation principles (e.g. starting by asking, 'Whom do I know?' and forming a partnership with stakeholders willing to commit). An example was a regional collaborative arrangement focusing on encouraging good citizenship (Case 4), triggered by a political decision to prevent privatization of certain public services and encourage problem solving through a joint effort between public and voluntary organizations. On the basis of the previous experience working together on sports, cultural, and other leisure events, the municipality invited specific actors to explore possible avenues for collaboration and identify problems to solve (rather than merely solve predefined problems).

Theoretical relevance and practical applicability of the typology of collaborative innovation archetypes

In analysing our typology's theoretical relevance and practical applicability, we relied on both the collaborative innovation literature and focus group discussions. This analysis resulted in four analytical reflections: 1) the project-based development archetype's dominance; 2) the missing empirical examples of recent theoretically informed arrangements from the collaborative innovation literature; 3) the primary focus of collaborative arrangements on co-exploration; and 4) the path-dependent use of the archetype of emergent collaborative innovation. Consistent with our analytical approach, we present these reflections in light of both recent theoretical advances and practitioners' interpretations.

The project-based development archetype's dominance

Despite the increasing diversity of collaborative innovation arrangements in the literature (e.g. Table 1), the project-based development archetype is fundamental to innovation activities in many public organizations. In fact, the user organizations' initial reaction to our findings was a recognition that 'the project-based archetype underlies all collaborative innovation arrangements; it is the base model on which funding is based. Other archetypes are just different frameworks for structuring portfolios of projects' (Research Council representative).

The main reasons for the project-based development archetype's dominance include its thematic clarity, temporality, and capacity for planning, control, and reporting required in public sector funding (Chaib 2019). In most cases, structuring and governing collaborative innovation projects followed the principles of a simple linear model with a few specific stages, typically used for in-house innovation processes and found in mainstream innovation and project management literature (e.g. Cooper 2008). As a senior Research Council representative noted, 'Almost all our funding schemes are implicitly based on the project-based archetype. There are some centre and network arrangements, but they are most often also structured and governed using the project-based archetype during call and auditing processes'.

The project-based development archetype essentially has shaped collaborative innovation activities in the Norwegian public sector. This phenomenon is likely part of a steadily increasing use of projects in many countries' public sectors, a process termed *projectification* (Hodgson et al. 2019). Nevertheless, our respondents also recognized that the project-based archetype has obvious limitations when applied to collaborative innovation activities: 'It is just not possible to represent all stakeholders in a steering or reference committee' (Design Foundation representative).

Missing examples of theoretically informed arrangements

Our data provide few viable empirical examples of the collaborative innovation arrangements developed in the literature on innovation networks (Desmarchelier, Djellal, and Gallouj 2020; Hansen et al. 2021) and collaborative governance regimes (Emerson, Nabatchi, and Balogh 2012), and virtually no evidence of the arrangements from the literature on industry platforms (Parker, Van Alstyne, and Choudary 2016), ecosystems (Adner 2017), and public collaborative platforms (Linders 2012; Mergel and Desouza 2013; Sørensen and Torfing 2019). Instead, our data demonstrate that public institutions prefer well-established and tested types of arrangements, particularly when public institutions must play an active role throughout the innovation process. This suggests that overcoming barriers to public sector innovation processes (Cinar, Trott, and Simms 2019) is more feasible in commonly used arrangements, but challenging in novel collaborative arrangements. Such challenges can be explained partly by innovation arrangements' temporal nature, compared with arrangements for persistent governance, decision making, and service provision (Emerson and Nabatchi 2015). Moreover, novel collaborative arrangements often are perceived as threatening to the stability embedded in the public sector's established regulatory, normative, and cognitive institutions (Torfing, Sørensen, and Røiseland 2019).

Collaborative innovation arrangements suggested in the recent theoretical literature are lacking even among the cases aiming for sustainable innovations, in which Norway boasts a significant number of new local initiatives:

We have a lot of models in areas of, e.g. local waste management and recycling, but frankly, these collaborative arrangements are very local and fragile, relying heavily on local conditions that can't be generalized. I mean, I have worked in this sector myself, and what I saw there hardly resulted in solving any of the grand challenges of ageing and so forth

(Research Council representative). Interestingly, the user organizations were familiar with theoretically informed collaborative innovation arrangements through private sector initiatives in which the public sector was a major, but passive, funding or governing partner, and not an active participant in the collaboration. However, they did not view such initiatives as public sector innovation because innovation outcomes were viewed as being generated *outside* rather than inside the public sector. This was evident, e.g. in the facilitation of regional innovation systems within Norwegian innovation policy, with the Innovation Council managing a large cluster facilitation programme supporting over 100 regional clusters since 2002. For them, cluster models were suited 'to facilitate private, not public, sector innovation' (Innovation Council representative).

Primary focus on co-exploration

Unlike theoretical indications (e.g. Parmigiani and Rivera-Santos 2011), very few cases applied arrangements to support co-exploitation activities. This observation elicited intense discussions in the focus groups, particularly concerning the Oslo Manual's description of innovation as 'a new or improved product or process (or combination thereof) that ... has been made available to potential users ... or brought into use' (OECD 2018, 20). Regarding outputs of collaborative innovation arrangements in the public sector, this description prompted a distinction between 'making something available for use' (viewed as innovation) and 'bringing into use' (viewed as operations). Activities or processes of relevance in terms of 'bringing into use' (e.g. adoption, diffusion, and implementation) often were viewed as lying outside the scope of collaborative innovation arrangements: 'You must remember that the cases you have studied are about innovation collaborations, not collaborations about bringing innovations into use. If you asked for that, you would have gotten other cases' (Design Foundation representative). A similar bias characterizes the collaborative governance literature favouring 'upstream problems', rather than the 'downstream problems' related to innovation 'implementation, evaluation, and accountability' (Sørensen and Torfing 2021, 1591).

In discussions with the user organizations, we also tried to use the terms *co-exploration* and *co-exploitation* (Parmigiani and Rivera-Santos 2011). Again, the user organizations asserted that co-exploitation usually lied beyond the scope of collaborative innovation arrangements in public sector contexts, leading to other concepts, e.g. cooperation or co-implementation: 'The terms "co-exploration" and "co-exploitation" are misleading in the public sector. We would term this "cocreation" and "co-implementation"'. However, co-implementation models differ from models of cocreation and describe what we see as transformation of innovations into operations' (Municipality Association representative). These observations suggest that the comprehensive and paradigmatic interpretation of the term *cocreation* applied in recent collaborative innovation literature (Torfing, Sørensen, and Røiseland 2019) may face resistance or confusion when introduced to practising public sector executives and policymakers.

Moreover, the term *value creation*, informed by the classic innovation literature (Schumpeter 1934) and co-production literature (Ansell and Torfing 2021), and the term *cocreation of value*, informed by service-dominant logic (Osborne 2018), may face serious challenges in public sector practice. As our focus group discussions indicated, the user organizations viewed the separation of implementation activities from innovation in a positive light, essentially viewing development and implementation as two related, yet completely separate activities deeply rooted in the public sector's institutional norms. In fact, when we suggested that the separation between these activities might be a potential weakness of collaborative innovation arrangements (Bentzen 2020), the user organizations defended the norms by asserting that a difference exists between public and private sector innovation. This is in line with previous research indicating that the procedural approaches to decision making, similar to those we find overrepresented in our cases, primarily stimulate the earlier stages of value creation (Van den Oever and Martin 2019; McGann, Wells, and Blomkamp 2021; Yuan and Gasco-Hernandez 2021).

Path-dependent use of the archetype of emergent collaborative innovation

The in-depth examination of arrangements revealed several cases in which partners were bound by a longer history of collaboration and experience with multiple archetypes. Furthermore, the user organizations pointed to a growing change towards more effectual activities due to heavy investments in the dissemination of 'service design methods' in the Norwegian public sector (e.g. Cases 8 and 15). The adoption of the so-called triple diamond model, a processual service design framework inspired by effectual reasoning (Sarvasvathy 2001) and design thinking (e.g. Clune and Lockrey 2014), has been particularly influential. This framework starts with resource mobilization – characterized by 'the bird in a hand' principle of effectuation (Read et al. 2016)—and continues with exploration and development. For some of our respondents and user organizations, this framework was not only an alternative approach to innovation, but also a path-dependent collaboration framework that signified the switching between archetypes and, more importantly, between effectual and causal modes of reasoning over an unspecified period of time. As a Design Foundation representative explained it, 'The investments in service design methods have made us view collaborative innovation projects as embedded in a high-level structure illustrated through the triple diamond framework of service design'. Digitalization Agency representatives supported this notion by emphasizing that 'collaborative arrangements may have to be restructured several times throughout the triple diamond stages'.

Previous research has provided much evidence on the dynamic use of effectuation and causation over a venture's life cycle (Reymen et al. 2015), including a preference for effectuation during the early stages and causation during the later stages of innovation and venture creation processes (e.g. Berends et al. 2014; Reymen et al. 2017). Our findings suggest that the dynamics in the use of effectual and causal reasoning may indicate an instrumental treatment of causal processes and structures. Unlike the private sector, in which actors compete for outcomes (e.g. a larger market share and higher profits), the public sector is characterized by competition for resources (e.g. funding). When new resources become potentially available (e.g. calls for proposals and directives with associated funding), partners with a history of successful collaboration start to apply various creative and transformative tactics to generate new goals (e.g. brainstorming to identify new objectives based on existing

competencies and previous work). Essentially, the path-dependent use of the archetype of emergent collaborative innovation prompts other collaborative innovation archetypes (e.g. the project-based archetype or centre-based collaboration archetype) to play the role of a ‘bird in the hand’, i.e. given means that collaborating partners use to generate new opportunities and innovation goals.

Upon hearing these reflections, the user organizations recognized that the use of ‘the effectual archetype of collaborative innovation as a framework for other collaborative arrangements is something we haven’t thought of before, but that’s what actually happens in practice’ (Municipality Association representative). These findings are striking, as they not only demonstrate the presence of effectuation in well-established public institutions, but also suggest that effectual processes in the public sector are diverse, ranging from sporadic problem- or opportunity-based decision making at the individual level, to continuously evolving processes of long-term collaborative innovation at the collective level.

Implications and conclusions

This study contributes to the collaborative innovation literature by developing an empirically grounded typology of collaborative innovation archetypes and by uncovering discrepancies between recent theoretical advances and actual practice. Our findings suggest that public sector collaborative innovation research, which takes a normative orientation and seeks to elicit the use of novel theoretically informed arrangements of cocreation, may be ‘far ahead’ of the practical application of such arrangements in mainstream public innovation initiatives, at least in Norway. As collaborative arrangements are well-developed in Scandinavian contexts (Stiglitz 2015), their ‘underrepresentation’ may be even greater in other cultural and political contexts. This implies that normative research on collaborative innovation needs to be complemented more systematically by empirical approaches to theory development to enable a wider application of the suggested arrangements and a more effective dissemination of research results in both academic and professional contexts. As our study demonstrates, such research efforts can benefit strongly from practitioners’ active involvement in research activities, including discussions of results.

The path-dependent use of the archetype of emergent collaborative innovation calls for broader inclusion of effectual reasoning in normative and descriptive theory development. It also indicates the transformative potential of experimenting with new approaches to innovation (e.g. service design), previously noticed within private organizations (Kurtmollaiev et al. 2018) and echoed in public governance (Bason and Austin 2021). This justifies the need to examine the public sector’s practical experimentation with new approaches to innovation further, rather than use an exclusively deductive, principle-based approach to develop new collaborative innovation arrangements.

In our experience, our collaborative innovation dimensions (Table 1) may serve as a useful checklist for policymakers, funding agencies, and responsible institutions in discussions about collaborative innovation arrangements. As our focus group discussions indicated, making and sharing reflections along these dimensions encourage managers to explore arrangements beyond the default project-based development archetype. Moreover, such reflections challenge policymakers and funding agencies to be more aware of implicit and explicit requirements in calls for innovation

initiatives because favouring certain characteristics or arrangements may hinder adoption of more diverse approaches to collaborative innovation in the public sector. We also encourage managers and policymakers to be aware of biases related to tendencies to apply 'safe' and well-known arrangements, and to favour co-exploration over the combination of co-exploration and co-exploitation (Sørensen and Torfing 2021).

Although we employed multiple methodological techniques to ensure data richness and trustworthiness, as well as the results' robustness, our study still has some limitations that call for further research, including the use of only one informant per case (typically with responsibility for managing the collaborative arrangement), though we minimized any effects by using data from secondary sources and user organizations. Given that the study also is limited to the Norwegian context, future research that involves multiple informants with different roles and focuses on other geographical contexts can enrich our results. Moreover, as our research focus was limited to creating a typology of archetypes, specific contextual factors affecting their implementation and effectiveness remained beyond the study's scope, but may be of theoretical and practical interest for future research. We also encourage conducting future in-depth longitudinal studies of causation and effectuation within and across specific archetypes, which can increase understanding of these processes in public sector innovation.

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Abbreviations

- Digitalization Agency – Norwegian Digitalization Agency
- Design Foundation – Design and Architecture Norway
- Innovation Council – Innovation Norway
- Municipality Association – Norwegian Association of Local and Regional Authorities
- Research Council – Research Council of Norway
- R&D – Research and development
- OECD – Organization for Economic Cooperation and Development
- PPP – Public-private partnership
- ServPPINs – Public-private innovation networks in services

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