

Learning by Doing: Transdisciplinary Science and Ex-Durante Evaluation in Public Administration Research

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Abstract: This article examines how transdisciplinarity unfolds between scientists and public servants during ex-durante policy evaluation and how it enables a design-science approach to public administration research. Drawing on a longitudinal diary study conducted over more than one year in two German municipalities, the study analyzes a transdisciplinary collaboration accompanying the implementation of a training program for digitalization change agents. Based on researcher self-reflections and interviews with municipal managers and program participants, the findings show that transdisciplinary engagement enhances policy responsiveness, learning, and legitimacy by enabling real-time feedback and iterative adjustments. At the same time, the collaboration generated role-specific challenges, particularly related to time demands, coordination, and shifting responsibilities. For researchers, embedded collaboration prompted a reflexive shift in understanding scientific practice as relational and co-constructed, requiring methodological adaptability and negotiation of authority. The article concludes that despite its challenges, transdisciplinary, design-oriented evaluation offers significant potential for strengthening evidence-informed policy implementation.

Keywords: Transdisciplinarity; policy evaluation; policy implementation; design science; diary studies

Learning by Doing: Transdisziplinäre Zusammenarbeit und begleitende Evaluation in der Verwaltungswissenschaft

Zusammenfassung: Dieser Beitrag untersucht, wie sich Transdisziplinarität zwischen Wissenschaftler:innen und Verwaltungspraktiker:innen im Rahmen von ex-durante-Politikevaluationen entfaltet und wie sie einen Design-Science-Ansatz in der Verwaltungswissenschaft ermöglicht. Auf Grundlage einer über mehr als ein Jahr angelegten longitudinalen Tagebuchstudie in zwei deutschen Kommunen analysiert der Beitrag eine transdisziplinäre Zusammenarbeit, die die Implementierung eines Trainingsprogramms für Digitallotsen begleitete. Basierend auf Selbstreflexionen der Forschenden sowie Interviews mit kommunalen Führungskräften und Programmteilnehmenden zeigen die Ergebnisse, dass transdisziplinäres Arbeiten die Anpassungsfähigkeit, das Lernen und die Legitimität von Politikmaßnahmen stärkt, indem es Echtzeit-Feedback und iterative Anpassungen ermöglicht. Zugleich brachte die Zusammenarbeit rollenspezifische Herausforderungen mit sich, insbesondere in Bezug auf Zeitaufwand, Koordination und sich verschiebende Verantwortlichkeiten. Für die Forschenden führte die eingebettete Zusammenarbeit zu einer reflexiven Neubewertung wissenschaftlicher Praxis als relational und ko-konstruiert, die methodische Anpassungsfähigkeit und die Aushandlung epistemischer Autorität erfordert. Abschließend wird argumentiert, dass transdisziplinäre, designorientierte Evaluation trotz ihrer Herausforderungen ein erhebliches Potenzial zur Stärkung evidenzbasierter Politikimplementierung bietet.

Schlagwörter: Transdisziplinarität; Policy Evaluation; Policy Implementation; Design Science; Tagebuchstudien

1 Introduction

The origins of public administration as a discipline are deeply rooted in its direct impact on practice, with the collaboration between public administration scholars and practitioners seen to be crucial for effective policymaking (Frederickson, 1980; Waldo, 2017 (1948)). Over time, however, a divide between research and implementation emerged, which Romme and Meijer (2020) describe as the split into validation and design. Recently, discussions on public administration as a design science have resurfaced (Meijer, 2025), emphasizing the need for scholarship that actively contributes to shaping and improving governance, moving from validating to also designing solutions. The design science approach is closely connected to transdisciplinary research, as it involves public administration practitioners as important scientific stakeholders. This article reflects on the potential of transdisciplinarity work in the realm of data collection during policy implementation to enable ex-durante evaluations, which are assessments conducted while policy implementation is still unfolding (Bressers et al., 2013). We argue that such real-time evaluation fosters adaptability, ensuring policies are responsive to emerging challenges.

In the German-speaking context, transdisciplinary research has gained increasing prominence since the early 2000s and is now supported by a growing body of scholarship and dedicated funding programs aimed at strengthening collaboration between science and practice (Michellini et al., 2025; Shennan & Stewart, 2025). Within public administration and related fields, existing research has primarily focused on identifying success factors, evaluating the quality and societal impact of transdisciplinary collaboration, and developing frameworks for knowledge integration and process monitoring (Graf et al., 2023; Meijer & Ettlinger, 2025; van Drooge & Spaapen, 2022). While these contributions provide valuable insights into how transdisciplinary collaboration can be structured and assessed, there is comparatively limited work that examines such collaborations in the context of ex-durante or formative policy evaluation, particularly within municipal administrative settings. Some studies adopt reflexive or project-based approaches to assess transdisciplinary processes ex post (Brink et al., 2018; Hölzle & Krütli, 2025), and recent work has begun to develop frameworks for formative evaluation of transdisciplinary research processes (e.g., Wiefek et al., 2024).

Building on this emerging literature, our research is guided by a central research question: *How does transdisciplinarity unfold between scientists and public servants during ex-durante policy evaluation?* As an illustrative case, we present a diary study methodology (Hyers, 2018; Ohly et al., 2010) applied in two German municipalities during the implementation of a training program for digitalization change agents (Fischer & Breagh, 2025). The longitudinal study over the timespan of over a year relied on heavy engagement between researchers and practitioners. By engaging individuals directly affected by the policy, the diary studies provided rich, time-sensitive insights into its impact, facilitating iterative adjustments to the program. Beyond the empirical reflection, we also assess implications for both scholars and

practitioners. To do so, we draw on data collected from eleven individuals involved in the research project. These include self-reflections of the main researchers (N=3), and semi-structured interviews with the program managers (N=2) and participants (N=6) of the training program.

We begin by defining transdisciplinary research, design science and dig deeper into approaches to policy evaluation. We then present our methodological approach to reflect on a transdisciplinary research project. We describe the case and show that all involved stakeholders point to positive and negative aspects of transdisciplinarity and a certain impact on practice and science itself.

2 Design science, Transdisciplinarity and Public Administration

The ideas of transdisciplinarity and design science offer pathways for bridging the long-standing divide between scholarship and practice in public administration (Frederickson, 1980; Meijer, 2025; Waldo, 2017 (1948)). A growing body of research has examined how such collaboration can be structured, evaluated, and leveraged for societal impact, particularly in the German-speaking and European context (Michellini et al., 2025; Shennan & Stewart, 2025). While transdisciplinarity highlights the involvement of multiple knowledge communities in addressing complex societal challenges, design science emphasizes scholarship's role in developing actionable solutions.

Transdisciplinarity extends beyond multi- and interdisciplinarity by explicitly integrating knowledge from academic disciplines with the experiential and practical expertise of societal actors. It emphasizes joint problem framing, co-creation of knowledge, and a focus on solutions that are both scientifically valid and socially robust. By integrating different practical knowledge and scientific knowledge, transdisciplinary approaches can generate context-specific yet generalizable knowledge (Bohnet et al., 2025; Nicolescu, 2002). It can contribute to heightened levels of knowledge translation (Archibald et al., 2023) originating in the debates on "Mode 2" knowledge production (Gibbons et al., 2010, p. 19). Mode 2 knowledge production contrasts with traditional, discipline-based ("Mode 1") science by emphasizing context-specific, problem-oriented knowledge that is co-produced with societal actors and oriented toward practical application. Transdisciplinarity has gained traction as an approach suited to complex, dynamic policy problems and is especially developed in studies related to sustainability and its governance (Jahn et al., 2012; Kreß-Ludwig et al., 2024). Existing studies have, in particular, focused on identifying success factors of transdisciplinary collaboration, developing frameworks for knowledge integration, and assessing its quality and societal impact (Meijer & Ettlinger, 2025; van Drooge & Spaapen, 2022). In public administration, transdisciplinary research means that policymakers, practitioners, and researchers collaborate in diagnosing policy issues, designing and testing interventions and adjusting policy solutions accordingly. This collaboration aims to increase the legitimacy, usability, and responsiveness of knowledge in practice (Hoffmann et al., 2019). However, comparatively little attention has been paid to how such collaborations unfold during ongoing policy implementation and how they can support ex-durante evaluation processes.

Design science views scholarship as describing and validating existing realities while, at the same time, designing and testing alternative solutions (Romme & Meijer, 2020). The approach is characterized by its iterative cycle. It typically starts with a problem diagnosis rooted in practice, proceeds to the design of artifacts, followed by their implementation and evaluation in real-world settings, and concludes with iterative refinement based on empirical feedback. This iterative logic aligns closely with recent approaches to formative evaluation in transdisciplinary research, which emphasize continuous monitoring and adaptation throughout the research and implementation process (e.g., Wiefek et al., 2024). In public administration, Meijer (2025) has called for embracing this paradigm to ensure that research contributes directly to improvements in public administration practice. Rather than positioning theory and practice as separate domains, design science defines them as mutually reinforcing, where theoretical insights inform practice, and practical experimentation enriches theory (Meijer, 2025).

Transdisciplinary research can therefore be seen as a form of co-design of policy and its implementation by scientists and practitioners, which Christensen and Lægreid (2025) argue to be a strong future avenue for public administration research. While they primarily focus on co-design between citizens and public administration, the idea easily travels to transdisciplinarity (Mejía et al., 2023). Importantly, recent contributions emphasize the temporal dimension of co-design, arguing that collaborative engagement should not be confined to early “founding moments” of problem identification and policy formulation (Considine, 2025). Many of the most consequential challenges in complex policy fields emerge only after programs are underway, when standard models of co-design tend to recede and adaptive capacity weakens.

From this perspective, transdisciplinarity and design science imply the need for continuous, systematic forms of evaluation that accompany policy implementation. The following section therefore turns to approaches to *ex-durante* evaluation as a methodological bridge between transdisciplinary collaboration and design-oriented public administration research.

3 Policy evaluation

Policy evaluation is the systematic and evidence-based assessment of the design, implementation, and outcomes of policy and programs based on their intended impact, and effectiveness (Mergoni & Witte, 2022, p. 1339). It is a critical aspect of the policy cycle, with the opportunity to influence (and potentially improve) future policy development (Pal, 2005, p. 9). It also offers the opportunity to systematically review programs and policies typically from a critical perspective, feeding into improved policy design, supporting good governance approaches like transparency and accountability (Pal, 2005, p. 287). From an academic perspective, policy evaluations generate data and produce knowledge with the opportunity to study various processes in public organizations. As a result, evaluations are both instrumental for improving government performance, and conceptual for generating knowledge.

Evaluation serves several interrelated functions. First, it provides evidence on whether public resources are being used effectively, addressing political and managerial demands for

transparency. Second, the learning function describes enhancing the understanding of what works, for whom, and under what conditions, contributing to organizational and policy learning (Chelimsky, 1997, p. 9). Third, policy evaluation focuses on refining programs and processes during implementation. Fourth, it contributes to theory-building about causal mechanisms and governance processes. These functions coexist in practice, but often compete in the evaluation process, reflecting different institutional and political contexts (Vedung, 2000).

Evaluations vary with regard to their timing within the policy process. For example, *ex-ante evaluations* are conducted before implementation and focus on anticipating potential impacts, feasibility, and risks in order to inform policy design (Wollmann, 2017, p. 393). *Ex-post evaluations* take place after implementation has been completed and assess outcomes, effectiveness, and goal attainment. *Ex-durante evaluations*, by contrast, are conducted while policy implementation is still unfolding (Wollmann, 2017, p. 394). They focus on processes, emerging effects, and implementation dynamics, allowing for real-time feedback and adaptive adjustments. As such, ex-durante evaluations emphasize learning and responsiveness rather than retrospective judgment (Dunlop & Radaelli, 2023, p. 76). However, in both cases, the focus lies on the effectiveness of the programs and/or policy approaches (Wollmann, 2017, p. 395).

The methodological approaches taken for policy evaluation mirror epistemological approaches (Wollmann, 2017, p. 397). They range from highly structured designs, such as randomized controlled trials and quasi-experimental methods aimed at causal inference, to qualitative approaches including case studies, interviews, and in-depth fieldwork that emphasize process understanding and contextual dynamics. Policy evaluations may also involve short surveys, expert assessments, or rapid appraisal techniques, depending on the evaluation's purpose, timing, and available resources.

Policy evaluation is not always politically neutral; the results can be interpreted, contested, ignored or framed in ways that drive political agendas (Bovens et al., 2008, pp. 322–323), used to justify program cancellations or to justify decisions already made in a post-hoc manner (Howlett & Ramesh, 2006, p. 218; Pal, 2005, p. 286). As such, they can shape the policy discourse in both formal and informal ways.

Policy evaluation thus emerges as both a methodological and relational practice shaped by learning, interpretation, and power. Ex-durante evaluation is particularly well aligned with transdisciplinary and design science, as it embeds evaluation within ongoing implementation and enables continuous feedback and adaptation. The following section presents a case study of a transdisciplinary project that applied an ex-durante evaluation approach during policy implementation.

4 Case Study

4.1 Context

As an example of a transdisciplinary research endeavor, we draw on an embedded two-case¹ longitudinal study of change agent programs in two German medium-sized municipalities ($\approx 100,000$ residents; $\approx 1,500$ employees). The two municipalities sought to accelerate digital transformation by introducing “change agents,” who were employees nominated across departments to foster peer-to-peer learning and support bottom-up innovation.

We became involved in the program through a longitudinal research design, with an agreement that in exchange for access to the program and participants, the researchers would provide ex-durante evaluations of the program based on ongoing data collection and an ex-post evaluation of the program after a pilot year. Hence, the research project is situated in the stages of evaluation and refinement from the perspective of design science. The researchers were given complete control in developing the data collection methods, with the goal of creating and collecting unbiased perspectives from both change agent programs, however, the researchers worked directly with both cities to establish the institutional and political context.

The original study’s data collection was an intensive longitudinal diary study (18 to 20 waves, 2022–2024) documenting change agents’ experiences in real time, while interviews provided deeper reflection and validation. In total, 68 of 76 change agents contributed 1,007 valid diary entries, complemented by 20 in-depth interviews (see Fischer & Breagh, 2025 for more details).

The diary study method is an intensive longitudinal method capturing workplace experience in detail over a longer timeframe (Soucek et al., 2023). Diaries can help create an empathic research design (Barboza-Wilkes & Le, 2024), which fits well with the idea of design science and transdisciplinary cooperation. Throughout the two-year program, the researchers provided three research reports to the program managers and in one case also the city council. Program managers further distributed the reports internally. In addition, presentations were organized once in each city to formally report interim results with the change agents directly. The researchers provided debriefings to the program managers on an ad hoc basis when issues noted in the diary study appeared to be very problematic, for example, strong criticisms that were consistent across different individuals. In other cases, the program managers were contacted to verify data and activities that were reported in the diary study. This provided much needed contextual information regarding the nuances of each program.

4.2 Transdisciplinary Reflection

The transdisciplinary character of the research was evident in the co-design of data collection and interpretation. However, in order to assess this aspect in greater depth, additional data was collected between September and November 2025, following established approaches in transdisciplinary research that emphasize reflexive and formative assessment of collaborative processes (e. g., van Drooge & Spaapen, 2022; Wiefek et al., 2024). Our analysis draws on two complementary data sources: (1) a reflexive writing exercise by the researchers at the end of

¹ Although the original study treated them as two cases, these two municipalities are studied as one case in this analysis, because the transdisciplinary approach did not differ.

the project (N=3), and (2) semi-structured interviews with program managers (N=2) and change agents (N=6) involved in the initiative. Both were collected in 2025.

To collect the interview data, we approached the two partner cities to assess our relationship with them. We interviewed the two program managers from our original study and sent a qualitative survey to the participants of the study (the change agents themselves). This was chosen, as change agents were not available for in-person interviews, but they were willing to answer these questions in a written way. In addition to data collected from the cities, the two principal investigators of the research project and the main research assistant completed a self-reflection, following the principles of reflexive writing (Cunliffe, 2004). The interview guide, survey, and researchers written reflection questions can be found in the appendix.

We analyzed the material in two steps. The initial analysis and coding were conducted by two assistants not involved in the initial project. This decision was made to minimize bias that might have emerged through our own immersive experiences. The first assistant coded the interviews and qualitative survey. Following the initial coding of the interviews and survey, we reviewed and revised the coding scheme following Gioia et al. (2013). That is, the initial codes that emerged through line-by-line coding were reorganized into different themes.

The second research assistant assessed our reflexive writing following the process outlined by Cunliffe (2004). To do so, the coder initially traced how researchers articulated broader insights about their identities, assumptions, and epistemic commitments as scientists (Cunliffe, 2004). The initial coding and reflection were then reviewed and refined by the research team. The final coding scheme can be found in the appendix.

This layered design allowed us to position practitioner narratives alongside researchers' reflexive interpretations and to explore how both groups made sense of the project's challenges and contributions. At the same time, several limitations of our research design should be acknowledged. First, the additional data collection in 2025 introduces a retrospective perspective, meaning that key dynamics of the interdisciplinary collaboration were not captured in real time but are instead based on reconstructive accounts and reflections. Second, the qualitative survey among change agents relied on self-selection from the full group of participants (76 in total), resulting in a small sample (N=6). While all change agents were invited to participate and theoretical saturation was reached during analysis, the findings are not statistically representative. As is typical for qualitative epistemology, results should be interpreted as exploratory. Third, the authors of this article are identical with the researchers who conducted the original project. While initial coding was carried out by research assistants not involved in the project to mitigate potential bias, the final interpretation and writing remain the responsibility of the authors. This may limit analytical distance but the reflective process and oversight provides in-depth contextual knowledge and enables a particularly nuanced reconstruction of the transdisciplinary process and a deeper understanding of our role in this process (Ide & Beddoe, 2024). We therefore use the reflexive methodological approach to reflect on our position as transdisciplinary researchers (Seggern et al., 2023).

5 Reflection Results

Our analysis revealed two clusters of findings. First, all sources of data identified positive and negative dynamics of the transdisciplinary research project. Second, the researchers' written reflections provided insights into broader reflexive themes, including how researchers made sense of their scientific roles, questioned their assumptions, and navigated their position within the project.

5.1 Positive Effects of Transdisciplinary Research

Program managers consistently emphasized that they viewed the research design as well conceived and valuable, even though the repeated, long-term data collection required sustained engagement. One interview partner explicitly highlighted that the structure of the project "ran well" and that they would willingly participate again under similar conditions. Another noted, *"That's not a question at all. Of course I would do it again at any time, and gladly in the same way it was done this time. It went well, that's how it should be"* (I-M-1). The longitudinal design allowed them to recognize and develop processes more clearly as the project unfolded, and to understand their own activities through the lens of the collected data. As one interviewee put it, *"we were able to learn about what we had initiated in this area from a completely different perspective through your data"* (I-M-1).

Being able to point to external scientific support provided an internal "selling point," particularly helpful when working within administrative structures (I-M-1). One of the program managers reflected on the scientific partnership: *"That gave the [digital change agent] concept an additional boost, because I could use it internally as a kind of promotional factor. In other words, I could say: we have a concept that is also being supported scientifically. That helped"* (I-M-2).

The research team also took on work that local staff would have struggled to execute alone due to limited methodological capacity or time. As one manager put it: *"You took an enormous amount of work off our hands. We wouldn't have been able to do it on our own in that form, let alone, with few exceptions, have the qualifications for it. Because something like this is not part of everyday work in the public service"* (I-M-2). The program managers also emphasized how crucial the neutral, external scientific viewpoint was for the project. The external perspective also offered new impulses and reinforced the decision to participate: *"So, basically to look at it again from a scientifically grounded perspective and then just give neutral feedback and provide some new impulses. I would do that again anytime"* (I-M-2).

Change agents likewise described the collaboration with the research team as professional, with transparent, supportive, and constructive interactions. They emphasized that the research design, and clarity in goals, procedures, and evaluative components of the research were clearly communicated from the start, which created clarity and trust in the process. As one change agent explained, *"[I liked the] support and evaluation. The procedure and the support from the researchers were explained to us right at the beginning. We were informed from the very start"* (I-C-3). The collaboration was experienced as flexible, curious, and oriented toward finding workable solutions in practice. This openness was described by one participant: *"An open-minded approach to the problem and a willingness to explore solutions"* (I-C-4). Finally, change agents highlighted the quality of interpersonal interaction

throughout the project, describing the contact with the researchers as both pleasant and helpful (I-C-6).

The researchers' reflective accounts revealed that immersion assisted in breaking down barriers between science and practice, and making a real-world impact. As one researcher reflected, *"Working on the digital change project showed me [...] the perspective of the civil servants [...] their motivation, initiatives, but also own frustration with the (lack of) progress"* (R1). R2 similarly noted that she came to see *"how many ambitious and creative people work in our city governments and how hard their job is – what I knew theoretically but not firsthand."* This engagement also provided rich contextual insight.

5.2 Critical Perspectives on Transdisciplinary Research

Several critical issues also emerged. A recurring concern was related to the time required for repeated reflections and surveys. Although the program managers understood and accepted the need for continuous data collection, both noted that frequent requests for written input could be burdensome, especially alongside day-to-day responsibilities. One manager explained: *"Whenever there are reflections, whether at day-long events or the famous feedback form, most people aren't exactly thrilled to have to fill them out. Now these [researchers] were here and stuck with you for a whole year and didn't just disappear, which is good, but it was just one of those moments where we said, yes, we consciously bought into this at that point, but I don't see it as a difficulty"* (I-M-1).

Compared to managers, change agents voiced more fundamental concerns about the purpose and usefulness of the research project. Several reported that they struggled to understand why the research component was needed or how it contributed to their work. As one participant stated, *"It wasn't entirely clear to me why the project was needed"* (I-C-5). The same person went on to say: *"Despite the explanation, I did not understand the purpose of the research project"* (I-C-5).

This seems to be a result of the perceived disconnect between research activities and practical realities of their daily work and work as a change agent. One participant articulated: *"I had the impression that the research project and the [change agent] project were not really running in sync. The questions to be answered were far removed from the [change agent] practice at the time and therefore were mostly not usable"* (I-C-2). Another emphasized the need for a stronger focus on applied experience: *"it must be more about practical application/experience"* (I-C-3), and more physical presence and direct contact to the researchers themselves.

The researchers also experienced considerable challenges related to time, relationship dynamics, and dependencies. The longitudinal research design required sustained effort over two years, prompting R3 to reflect that *"the main challenge for us was the time it took to do this project,"* while R2 described the process as *"a marathon [...] continuously delivering mini-surveys over 18 months is intense."* Maintaining engagement was equally demanding, and at times this created a sense of responsibility or guilt: *"I became more conscious of the time we were taking [...] and felt a stronger responsibility for producing something valuable with the data"* (R3). Relational dynamics further shaped the collaboration; as R3 put it, *"The management really dictated our access to participants [...] We needed them,"* a sentiment

echoed by R1, who noted that *“the relationship with the key contact person is quite important [...] you rely on their engagement.”*

5.3 Impact on Administrative Practice

Both managers and change agents described concrete ways in which the research collaboration influenced their work. The managers described how the data provided by the research team supported internal decision-making, lent credibility to the initiative, and helped anchor it more firmly within administrative structures. Both managers emphasized the importance of having a data-based foundation when presenting the project to municipal leaders: *“That was one thing that already had a massive impact during the project’s duration and was very important from the start for securing continuity toward decision-makers through the grounding provided by the data” (I-M-1)*. The managers also highlighted instances where feedback from the research team directly shaped internal conversations, such as discussions about unclear role expectations, which influenced subsequent team processes.

The researchers involved identified similar impacts of their work on the program and its progression. Their analyses clarified internal tensions, and in some cases directly contributed to resource allocation: R3 described the moment when *“our analysis resulted in the program being granted continuing funds”* as a project highlight. R2 likewise recalled *“presenting our results to the digitalization board [...] helping the department to get more resources [...]”. They trusted us so much that they wanted to use us for external legitimacy.”* Yet researchers also questioned the limits of their influence, highlighting the tension between academic rigor and real-world applicability.

5.4 Impact on Research(ers)

The researchers’ reflections reveal a deeper epistemic and methodological shift prompted by participating in a long-term, embedded partnership. The researchers became increasingly aware of how their presence and disciplinary habits actively shaped the research output. For example, the research results appeared to lend the change agent program additional influence in political and administrative contexts. By using clear scientific methods, the researchers were positioned as an authority to legitimate claims about program effectiveness, which in turn contributed to the program’s professionalization and, in one of the cities, its extension. R3, noted the realization that the constant feedback and reporting meant that the researchers were directly influencing management approaches of the program.

The project clearly showed that transdisciplinary scientific practice is an ongoing learning and negotiation process between the scientist and the practitioner. This was evident in securing survey approvals, participant recruitment, and communication. Researchers were, to a certain extent, completely depending on municipal partners’ skills and local knowledge. Over time, the formally defined researcher-practitioner relationship became more informal and routinized, granting access to internal perspectives that would rarely be available in more detached research settings.

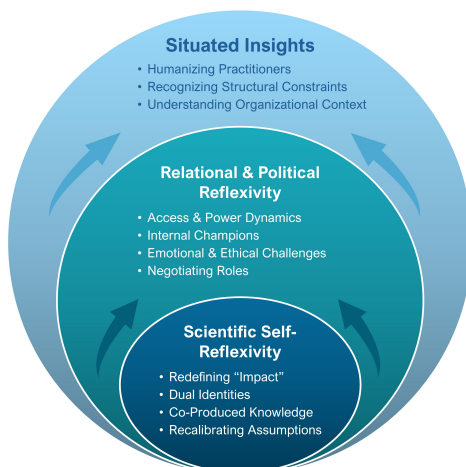
A central insight was the recognition that knowledge production in such settings is co-constructed, emerging through relationships developed over the research period. For example,

the researchers frequently found themselves adjusting their communications, timelines, and expectations in response to shifting access, political, and organizational dynamics. R3 noted that *“We are scientists, and we need to follow specific scientific protocols,”* but within the project she became aware of how these protocols collided with the temporal realities and relational conditions of municipal work. R2 described needing to *“talk the same language... how to ‘sell’ our ideas to them,”* illustrating how the scientific ideas needed to be adapted or aligned with the needs of the practice partners. These moments show that transdisciplinary scientific research included developing relational legitimacy as well as methodological rigor.

Another theme emerging from the data reveals the perceived limits of research influence in complex public-sector environments. While the team witnessed moments where their work contributed to internal decisions (R2 and R3), they also confronted the boundaries of what evidence can achieve in strong administrative systems. R1’s reflection that *“you often wonder how much the data you provide is actually used or helpful”* reveals this tension.

Finally, the researchers developed a more nuanced understanding of themselves as scientists in practice-oriented collaborations. In particular, how to balance both scientific methodological rigor and managing direct practitioner relationships. One, for example, noted guilt emerging from a passed deadline *“I became more conscious of the time we were taking, and even a stronger guilt/responsibility for producing something with the data we were collecting”* (R3). The research thus fostered an increased awareness that transdisciplinary research can be enriched by the recognition that researchers and practitioners manage scientific and relational dynamics. In this sense, the transdisciplinary collaboration transformed not only what the researchers knew about municipal digitalization but also how they understand the techniques and approaches of research itself. Figure 1 summarizes these findings.

Figure 1: Layers of Reflexive Scientific Learning



Source: Created by the authors.

6 Discussion and Conclusion

The purpose of this study was to explore how transdisciplinary collaborations unfold between scientists and public servants. Our findings suggest that such collaboration does not necessarily require a fundamental system change or the adoption of entirely new ways of working by practice partners to improve knowledge translation (Archibald et al., 2023). Transdisciplinary research can thus be enacted by deliberately leveraging practices that are already well established within administrative contexts. In this case, the *ex-durante* evaluation functioned as a shared entry point into practice as it is a familiar tool for practitioners that enabled researchers to access organizational processes, contribute analytical expertise, and jointly generate actionable knowledge. Evaluation thus operated as a boundary object that connected scientific rigor and practical relevance, allowing researchers to “enter” the practitioners’ world without requiring them to abandon their existing logics, routines, or responsibilities.

At the same time, entering practice through evaluation fundamentally reshaped the nature of the research itself. Rather than a linear project characterized by phases of data collection and analysis, the collaboration became longitudinal, iterative, and relational. Researchers did not “go in, collect data, and leave,” but instead had to build trust, sustain momentum, and continuously balance practitioner-oriented and academic outputs. This transformation introduced ongoing vulnerabilities and tensions. For researchers, this included a sustained workload, emotional and cognitive demands, dependence on access as well as maintaining funds. For practitioners, additional time burdens, questioning relevance and methods, and the challenge of confronting potentially negative information. These dynamics highlight that while design science and transdisciplinary research offer powerful avenues for generating impactful knowledge (Meijer, 2025), they require a fundamental shift in mindset and commitment from all actors involved. Based on these findings, three contributions emerge from this research.

The first implication of this study is that transdisciplinary research enacted through design-oriented, *ex-durante* evaluation requires substantial resources that extend beyond those of conventional research projects. These resources include not only time and methodological expertise, but also sustained cognitive, relational, and communicative effort to integrate diverse perspectives and maintain collaboration over an extended period. This puts a large burden on scientists, who tend to manage the data collection and processing components. From a cost–benefit perspective, this raises a fundamental question of justification: not all research questions or administrative contexts will warrant the high transaction costs associated with deeply embedded, longitudinal transdisciplinary designs. Decisions to pursue such approaches therefore need to carefully weigh expected scientific and practical value against the considerable investments required.

For the researchers, the sustained engagement required a very large amount of time, far longer than a traditionally funded research project. The project also constantly evolved, challenging traditional linear research designs. For the change agents, many agents expressed uncertainty about the purpose and practical relevance of the research, pointing to a knowledge gap that complicated their engagement. This gap is especially consequential given that public administration increasingly expects practitioners to act on scientific evidence (Maertens et al.,

2025; Pfeffer & Sutton, 2006). If practitioners lack a basic understanding of research goals and methods, misunderstandings and resistance are likely to emerge.

This challenge is partly shaped by structural characteristics of the German public sector, where many operational employees have legal or technical backgrounds and limited exposure to social science research, in contrast to managers who typically have higher academic training and greater familiarity with evaluation and evidence-based decision-making. At the same time, these operational actors bore a disproportionate share of the project's demands. Participation in a new change initiative already required substantial time and cognitive effort, and the parallel research participation added further strain through repeated surveys and reflection tasks. While such evaluations provided real-time feedback, they simultaneously intensified the workload of those responsible for implementation. These findings show that the features that make this type of research valuable for learning and adaptation, especially *ex-durante* evaluations, also increase the demands placed on practitioners, particularly at the operational level.

A second contribution of this study is that effective feedback loops do not emerge automatically in transdisciplinary, design-oriented research, even when interaction between researchers and practitioners is intensive. While this project involved frequent exchanges between researchers and municipal managers, including interim reports and ongoing dialogue, findings were not consistently conveyed to operational staff reducing their sensemaking ability and impact of the project necessary for change implementation (Sonenshein, 2010). Notably, this shortcoming became fully visible only after the project had concluded, revealing a structural blind spot in the design of the collaboration. An explanation for this disconnect may be that study outputs were not directly tied to the change agents' own decision-making or responsibilities. The results were aimed at the program managers and strategic program design. In the absence of clear relevance for their daily work, the purpose and value of the research study remained opaque for the change agents themselves.

This observation underscores that learning in transdisciplinary research cannot be confined to horizontal exchanges between researchers and managerial elites. In fact, to engage with the insights of design science, in particular, what Meijer (2025) describes as mutually reinforcing insights from practice to science and vice versa, it is necessary to deliberately construct vertical feedback loops. Such loops are particularly critical in projects that combine intervention design with *ex-durante* evaluation, where iterative learning is a central objective, and thus iterative refinement can be ascertained (Meijer, 2025). Without mechanisms to translate insights downward and upward across hierarchical levels, the learning function of evaluation remains partial and uneven, undermining its potential to inform both practice and theory, and the iterative process necessary for the design science approach (Romme & Meijer, 2020).

This challenge resonates with long-standing insights from organizational learning and knowledge management research, which highlight the difficulty of transferring, translating, and embedding knowledge across hierarchical boundaries (Ciborra & Andreu, 2001; Fischer, 2020). It also aligns with research in science communication showing that scientific knowledge rarely travels unaltered from producers to users and often requires intermediaries or mediators to enable interpretation and uptake (Fischhoff & Scheufele, 2013). However, our findings suggest that beyond the presence of intermediaries, a key challenge lies in the ambiguous allocation of responsibility for transforming evaluation results into actionable knowledge for practice. In the absence of explicit role clarification – who is responsible for

communicating research results to the frontline, managers or researchers – translation risks becoming implicitly assumed by both sides which may lead to knowledge vacuums between the strategy and implementation level (Choi & Chandler, 2020).

In the context of public administration, this suggests that feedback given by researchers must be inclusive, continuous, and deliberately structured across organizational levels to fulfill its critical learning function (Considine, 2025). Thus, without explicit attention to the design of communication and learning structures from the outset, transdisciplinary design science risks reproducing existing organizational silos. These unresolved translation and coordination demands were often absorbed by researchers themselves. As a result, transdisciplinary collaboration places researchers in expanded roles that go beyond methodological expertise, requiring sustained relational, communicative, and emotional labor to keep collaboration viable (Bergman Blix & Wettergren, 2015). Thus, sustaining high-quality transdisciplinary research requires awareness and management of the emotional and cognitive costs involved. Without this, there is a real risk of stress and burnout from naturally leveraging the proactivity of all partners involved (Bolino & Grant, 2016).

The third contribution of this study concerns the tension between scientific rigor and the practical constraints of transdisciplinary collaboration. While scientific studies offer substantial advantages for learning and adaptation (Dunlop & Radaelli, 2023, p. 82), they also require compromises that challenge conventional expectations of research independence, methodological control (Regeer et al., 2024). From the perspective of practice partners, the intensive demands of the project created time pressure and cognitive overload. From a scientific perspective, these same demands raise questions about feasibility, scope, and the extent to which rigorous methods can be sustained under real-world constraints. This is something that is not often discussed in the literature, which is problematic due to the impact that these tension resolutions may have on final outcomes for both the practical and scientific outcomes. We can see that there is a tension between the long-term nature of design-oriented science, and the often too short-term funding arrangements.

These trade-offs also raise a fundamental design question concerning the ethics of participation in transdisciplinary processes. If methods entail ongoing demands for reporting and reflection, then scientific rigor cannot be defined solely in methodological terms but must also account for how data collection practices distribute burden across participants (Barboza-Wilkes & Le, 2024). From this perspective, methodological choices such as the timing, intensity, and format of data collection must go beyond technical decisions to also include relational and ethical design choices. These choices can shape whether participation in an evaluation is experienced as a supportive learning process or as additional, uncompensated work.

These tensions are closely linked to the epistemological positioning of researchers in transdisciplinary, design-oriented settings. By providing interim feedback, facilitating reflection, and offering methodological guidance during implementation, researchers inevitably move beyond the role of detached observers and become active participants in the processes they study. While this challenges positivist assumptions of neutrality and distance, it is consistent with a Mode 2 understanding of knowledge production, in which knowledge is generated in context, co-produced with societal actors, and oriented toward practical application (Gibbons et al., 2010, p. 19). Within this framework, researcher influence becomes a constitutive feature of the research process. The central methodological challenge then lies in making this influence more explicit and transparent. This includes acknowledging how in-

terim findings shape practitioner sensemaking and decision-making, how feedback processes influence organizational dynamics, and how researchers' own interpretations evolve through sustained engagement. In this regard, insights from sensemaking research (Sonenshein, 2010) are particularly relevant, as they highlight that organizational changes, in which evaluations are focused upon, are interpreted, negotiated, and sometimes resisted as actors construct meaning in ambiguous and politically sensitive contexts.

Overall, this study demonstrates that public administration as a design science can be practically realized through transdisciplinary collaboration anchored in evaluative practices that are already embedded in administrative work. Ex-durante evaluations offer a powerful vehicle for bridging theory and practice by enabling co-production of knowledge without demanding wholesale changes to practitioners' routines. However, this approach comes at a cost as it is resource-intensive, relationally demanding, and marked by persistent tensions. Realizing the potential of design-oriented, transdisciplinary research therefore requires not only methodological sophistication, but also sustained commitment, carefully designed feedback infrastructures, and reflexive awareness of the emotional, cognitive, and institutional demands placed on both researchers and practitioners. Thus, while Christensen and Lægreid (2025) argue increased collaboration between scientist and practitioner has the potential for addressing complex problems facing governance systems, design science must become less about delivering discrete solutions and more about cultivating durable, evaluative relationships through which learning, adaptation, and evidence-informed governance processes and outcomes can emerge.

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