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From Bureaucrats to Data Stewards: New Competency Models for the Digital Era

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Abstract: The procedural, paper-bound character of public administration is steadily giving way to a data centred mode of governance, and civil servants now occupy a working life in which knowledge work, rather than file-handling, predominates. Acquiring, curating, interpreting, and ethically deploying public-sector data assets has shifted from being a specialist concern to a routine expectation, and these obligations sit awkwardly alongside the competency profile that conventional bureaucratic training instils. The existing literature has tended to address this transition at the level of macro reform drivers or aggregate measures of digital-government maturity, leaving the day-to-day workplace experience of public employees who actually wield these tools comparatively under-examined. This paper turns the analytic lens toward that experiential dimension by proposing a construct we label the data stewardship competency gap (DSCG): an aversive cognitive-affective condition that arises when an employee perceives their bureaucratic skill repertoire to be inadequate for the data-stewardship demands embedded in their digitalised role. Drawing on expectation-disconfirmation theory and competency theory, we theorise DSCG as a product of two disconfirmation pathways one rooted in digital tools and the other in data governance. The paper then examines, empirically, how DSCG shapes whether public employees commit themselves more fully to a data-steward identity or retreat from digital reform. Theoretically, the contribution lies in framing DSCG as a workplace-induced negative state that competency-model evolution must explicitly accommodate. Practically, the paper argues that public organisations need to manage DSCG when they redesign competency frameworks for the digital age.

Keywords: *Data Stewardship; Public Administration; Competency Models; Digital Government; Expectation-Disconfirmation Theory; Switching Intention; Public Service Motivation.*

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I. INTRODUCTION

On any given working day, a civil servant navigates a stream of small but consequential choices. Should the morning be spent clearing the citizen-complaint inbox or attending the policy briefing? Is a particular file better escalated upward or resolved at the desk? And, increasingly, should a transaction be recorded in the legacy ledger that everyone in the office has used for years, or pushed into the analytics platform the agency rolled out last quarter? The cumulative effect of such micro-decisions has changed in character. Where bureaucrats were once trained primarily to follow rules, they are now also asked to judge which datasets deserve trust, whether an algorithmic recommendation should be acted upon, and how procedural fidelity ought to be balanced against responsive citizen service. A further decision has crept in over the last few years: whether to engage with the digital systems the agency has procured at all, or to fall back on the familiar paper-and-procedure routines (Mergel et al. 2023; OECD 2024).

We refer to the resulting hybrid arrangement part rule-driven, part data-driven as digital-era public administration (Dunleavy et al. 2006; Meijer 2018). It rests on two enabling developments: sustained progress in information and communication technologies (Janowski 2015) and the operational lessons that public agencies absorbed during the pandemic-era acceleration of e-government (Schmidthuber et al. 2023). Together, these have loosened the procedural and locational constraints that once defined public service. In practice, civil servants now move between analytic and procedural modes across the working week (Wilson and Mergel 2022; Bullock and Kim 2024), and there are stretches during which the digital workflow feels either entirely foreign

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or simply too dense to be navigated competently particularly where organisations have trimmed procedural training to capture the cost savings promised by digitalisation. The result is a workplace that, depending on the day, can resemble an abandoned filing room or a control panel one was never taught how to operate (Bannister and Connolly 2020).

Why a particular civil servant embraces or resists digital tools is not reducible to a single cause. Anticipated reductions in workplace stress (drawing on Gajendran and Harrison 2007, adapted for public-sector contexts), expected gains in analytic task performance (Mergel et al. 2019), broader job-performance considerations, and personal preference (Lember et al. 2019) all play a part. Demographic and career-history factors length of public-service tenure, generational cohort, and whether one's initial training was legal, managerial, or technical (Hammerschmid et al. 2016) further tilt employees toward or away from data-steward identities. Yet the bulk of this literature pays comparatively little attention to what employees actually experience inside their digital workplaces (Reis et al. 2019; Distel et al. 2024).

These experiences matter because employees enter the digital workplace with definite expectations: they expect it to be a site of professional efficacy and a means of generating public value (Meijer 2018; Schmidthuber et al. 2023; OECD 2024). Mergel et al. (2019, p. 5) capture this succinctly when they characterise digital-era public service as fundamentally competency-mediated, requiring data, judgement, and procedural knowledge in combination. When that expectation is frustrated when the workstation feels obsolete on one day and unintelligible the next the affected employee can begin to experience what the competency literature terms a competency gap: an uncomfortable awareness that the skills one possesses fall short of those the role now demands (Boyatzis 1982; Le Deist and Winterton 2005). The state is not abstract or academic. Lived inside a digital workplace, it tends to push employees toward one of two trajectories. Some retreat into procedural routines as a coping strategy; others mobilise toward reskilling. Either move, taken at scale, threatens the digital-era model itself, since the model depends on a working balance between procedural fidelity and data-driven judgement (Bullock and Kim 2024; Wilson and Mergel 2022; OECD 2024).

The argument advanced here is that the experiences employees accumulate within their digital workplaces meaningfully shape their willingness to take on or to abandon data-steward roles. To make this argument tractable, we treat competency gap as a cognitive-affective state that informs decision-making under uncertainty (Boyatzis 1982; Le Deist and Winterton 2005; Bell 1982) and we introduce a construct tailored to the present setting: data stewardship competency gap (DSCG). DSCG is grounded in competency theory and incorporates three dimensions perceived skill deficit, role-identity strain, and motivational shortfall (Boyatzis 1982; Spencer and Spencer 1993; Le Deist and Winterton 2005). Drawing on expectation-disconfirmation theory (Oliver 1997; Bhattacherjee 2001), we argue that DSCG arises when employees' expectations about the digital workplace are disconfirmed. Two antecedents take centre stage: digital tool disconfirmation (DTD), which surfaces when the usability, reliability, or interoperability promised by digital tools fails to match what is encountered in practice, and data governance disconfirmation (DGD), which appears when expected clarity around accountability, privacy, classification, and data-sharing rules proves elusive for instance, where mandates overlap or where local operating procedures contradict statutory data-protection guidance.

The paper offers three contributions. First, it introduces DSCG as a cognitive-affective construct of consequence within the digital-era public-administration discussion. Competency gap, broadly construed, can produce reform fatigue, withdrawal, and street-level dysfunction (Lipsky 1980; Tummers et al. 2015), and the same pattern, we argue, can be observed where employees' expectations regarding data tools and data governance go unmet. The framing thus contributes to a growing strand of work concerned with the lived realities of civil servants in virtualised public-service settings (Bullock and Kim 2024; Distel et al. 2024). Second, by privileging workplace experience, the paper extends the long-running discussion of what propels public employees from rule-bound bureaucrat to data steward or, conversely, what sends them back to procedural safety (drawing in adapted form on Bailey and Kurland 2002; Mergel et al. 2019; Hammerschmid et al. 2016; OECD 2024). Third, the paper responds to recent calls to take workplace artefacts seriously (Reis et al. 2019; Distel et al. 2024). Public employees inhabit two overlapping spaces a procedural-administrative one organised around codified rules of coordination and accountability, and a digital-analytical one organised around dashboards, data flows, and decision-support tools. Both demand investment from public organisations (Distel et al. 2024). Neglect of either invites disconfirmation. The implication is straightforward: competency frameworks for the digital era must be both technologically and pedagogically resourced, because untreated DSCG carries the risk of pushing employees out of reform or out of the public sector altogether.

II. THEORETICAL BACKGROUND

Across post-pandemic public sectors, digital-era public administration has become the dominant operating paradigm (Schmidthuber et al. 2023; OECD 2024). Under this paradigm, civil servants are expected and progressively required to mobilise a heterogeneous set of data assets in their daily routines: traditional case files, transactional databases, sensor feeds, and the outputs of algorithmic decision-support systems (Mergel et al. 2019; Janowski 2015). Terminology in this space remains unsettled, with definitions of digital-era public administration, e-government, and related forms of digitally mediated state action overlapping in ways that often obscure analytic distinctions (Dunleavy et al. 2006; Meijer 2018; Janowski 2015). Two delineations are therefore necessary one at the level of the individual, the other at the level of the work form.

At the individual level, we use data steward to denote a public employee whose principal professional responsibility involves acquiring, quality-assuring, ethically curating, and

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substantively interpreting data assets in pursuit of public value. By stipulation, the role sits within or under contract to a public organisation. It is not, however, restricted to those who carry formal titles such as chief data officer or data scientist; a growing share of data-related responsibility is now distributed across employees who continue to identify primarily as traditional bureaucrats (van Ooijen et al. 2019). Many such employees perform data stewardship only partially, alongside their established procedural obligations.

At the level of the work form, we treat digital-era public administration as an organisational arrangement rather than a technology. More precisely:

Digital-era public administration is an arrangement in which civil servants—functioning at least partly as data stewards engage across a defined working period, typically a five-day week, in both procedural-bureaucratic and data-stewardship work, with at least one core activity each day requiring deliberate engagement with data assets.

The arrangement's two extremes are therefore four days of data-driven work paired with a single procedural day, or its mirror image. Because digital-era public administration relies on ICTs to enable information exchange and storage across employees who are not co-located (Janowski 2015), it depends operationally on robust platforms case-management systems, cloud-based analytics environments, and similar infrastructures that hold dispersed teams together and preserve accountability (Mergel et al. 2019). Enterprise communication technologies such as Microsoft Teams, Slack, and government-grade collaboration platforms (Leonardi et al. 2013) sit alongside these.

A growing empirical consensus suggests that this hybrid mode is, on balance, beneficial for both public organisations and the citizens they serve (Mergel et al. 2019; Schmidthuber et al. 2023; OECD 2024). Studies indicate that allocating roughly half of the working week to data-driven tasks tends to outperform more extreme variants either of which can compromise job satisfaction or degrade street-level performance (Bullock and Kim 2024). Wholesale digitalisation of every interaction is generally discouraged (Wilson and Mergel 2022), and many agencies therefore extend employees considerable discretion over how deeply they engage with data tools, on the assumption that autonomy will yield better outcomes (OECD 2024). The same autonomy, however, has a second face: it gives employees a real option to disengage. Where engagement falters, the analytic and collaborative texture of the workplace deteriorates for those who continue investing in data-stewardship skills. Understanding what draws employees toward or pushes them away from data stewardship is therefore both a theoretical and a practical priority.

- *Drivers of Public Employees' Engagement with Data Stewardship*

The literature converges on several recurring factors that shape whether civil servants gravitate toward data-steward or traditional-bureaucrat roles. Demographic patterns are persistent (Hammerschmid et al. 2016): younger cohorts and digitally native employees (Bullock and Kim 2024) tend to show greater openness toward data tools than long-tenured procedural specialists. Initial professional training matters too staff socialised in legalist or finance disciplines (Hammerschmid et al. 2016) often exhibit caution toward algorithmic decision-support, whereas those with broader digital exposure are more inclined to engage. Work-related circumstances the design of tasks, supervisory style, and the analytic infrastructure available exert their own pull (Mergel et al. 2019; Lember et al. 2019), as does the broader question of work-life balance (drawing in adapted form on Sardeshmukh et al. 2012). Role conflict, arising from the dual obligation to deliver outcomes and to respect procedure, is itself a driver of identity choice (Tummers et al. 2015), and although the empirical record is mixed (Distel et al. 2024) and methodological caveats persist (Reis et al. 2019), data-driven work has been shown in some contexts to relieve role conflict and reduce role stress (Mergel et al. 2019).

Other forces operate in the same direction. Reduced procedural overhead fewer redundant approvals and a thinner load of meeting-derived stress (Bullock and Kim 2024) tends to make the data-steward role more attractive. Perceived gains in autonomy in data-driven environments (Mergel et al. 2019) reinforce this pull by giving employees a sense of control over their tasks and contributing to satisfaction.

Two limitations follow from this body of work. The first is its concentration on personal attributes and idealised reform contexts. The second is its relative inattention to what employee's experience inside their digital workplaces. Workplace interruptions and unread compliance memos appear as occasional exceptions, but more generally the literature does not interrogate how lived digital-workplace experience shapes the inclination to adopt a data-steward identity. The present paper takes that experiential dimension as its starting point, asking how it can trigger the cognitive-affective condition of competency gap and, through that condition, push employees toward either reskilling or disengagement.

- *Data Stewardship Competency Gap*

Competency gap is best understood as a negative, counterfactual cognitive-affective state produced by comparison processes (Boyatzis 1982; Spencer and Spencer 1993; Le Deist and Winterton 2005). It surfaces when an individual recognises that the competencies the present role requires exceed those, they currently command (Mulder 2014). In the digital-era context, the comparison takes a specific form: the civil servant juxtaposes "what I can do" with "what this role now demands of me" in respect of data stewardship.

The state intensifies where the individual feels accountable for the shortfall (Le Deist and Winterton 2005). For analytic precision we treat competency gap as a discrete cognitive-affective construct, distinct from neighbouring states such as anxiety, frustration, shame, embarrassment, or generalised overload, and distinct also from undifferentiated negative affect. This delineation is consistent with established treatments of the construct (Mulder 2014; Boyatzis 1982).

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What separates competency gap from these adjacent states is its dual reliance on self-assessment and an awareness of evolving role expectations, together with a sense of personal agency over future skill development (Le Deist and Winterton 2005). An individual experiences competency gap only when they could plausibly have acquired, at some earlier point, the very competency whose absence now produces the discomfort (paraphrased from Mulder 2014). In its experiential texture, the state manifests as a sinking awareness, ruminations about forgone professional opportunities, an impulse either to upskill or to retreat to familiar routines, and the wish for a second chance at training (Spencer and Spencer 1993).

Competency gap is unsurprisingly common where institutions change (Mulder 2014). It is often anchored in earlier career decisions a training opportunity once declined, a specialism not pursued or in reforms imposed from above. The advent of digital-era public administration places civil servants in precisely such a moment of choice, with expectations forming around where they can effectively complete their work and meet citizen-service obligations. We argue that the cognitive and emotional dynamics described in the competency-gap literature carry over into the public-sector setting and, in particular, into data stewardship. Examining that carry-over requires a more specific formulation: a competency gap construct that puts the digital workplace at its centre.

We define data stewardship competency gap (DSCG) as the uncomfortable cognitive and affective awareness of being unable to discharge the data-related obligations of one's public-service role at the level one expects of oneself, given a recognition that a different training or career choice would have closed the gap. Consistent with competency theory, DSCG is not solely cognitive, affective, or motivational, but integrates all three into a single psychological experience (Boyatzis 1982; Spencer and Spencer 1993). The entity to which DSCG attaches is the public employee in an organisational context (MacKenzie et al. 2011).

Prior work treats competency-related constructs as multidimensional, comprising affective tension, evaluative cognition, motivational goals, action tendencies, and actions (Boyatzis 1982; Le Deist and Winterton 2005; Mulder 2014). Where attention is on individual-level behaviour, however, action tendencies and actions are commonly dropped on grounds of measurement overlap with behavioural intention. We follow that convention (Le Deist and Winterton 2005). The conceptual domain of DSCG (Sartori 1984) is accordingly built from three dimensions: negative feelings about being under-skilled at the digital workplace (NF); thoughts about a missed opportunity to acquire data-stewardship competencies earlier (T); and motivational goals to obtain a second chance to acquire those competencies (G).

Table 1 summarises the dimensions and their definitions; each is elaborated below.

Table 1 Three Dimensions of Data Stewardship Competency Gap

Dimension	Conceptual content	Definition
Negative feelings about being under-skilled at the digital workplace (NF)	Affective tension when reflecting on one's data-stewardship preparedness	Unpleasant feelings produced by the perceived inadequacy of one's current data-related competencies relative to the demands of the role.
Thoughts about a missed opportunity to acquire data competencies (T)	Counterfactual cognition comparing past training or career options	A counterfactual review of past educational or career choices that, if made differently, would have closed the gap.
Motivational goals for a second chance (G)	Forward-looking, action-oriented intent to remediate the gap	A goal to secure a second chance to acquire the competencies needed for data-stewardship work.

First, DSCG involves negative feelings a sinking sense of inadequacy, embarrassment, frustration, or anxiety as the employee weighs their preparedness against the demands of digital-era work. Personal responsibility deepens the feeling; given their current latitude over role choice, employees often attribute the shortfall to earlier decisions of their own (Le Deist and Winterton 2005).

Second, DSCG involves counterfactual thoughts. Employees compare their present competency profile against the alternative of having pursued data-relevant training in the past (drawing in adapted form on Inman et al. 1997). The cognitive content of competency gap, in this dimension, is the recognition that earlier investment in data-relevant credentials would have produced a better current situation.

Third, DSCG entails motivational goals for a second chance the forward-looking, action-oriented component. This dimension warrants particular emphasis because it is the impulse that emerges from competency gap and propels individuals toward either remediation or escape. Where DSCG is felt, individuals do not merely brood over training histories or engage in counterfactual rumination; they form specific goals to reverse the situation or to prevent its recurrence (Spencer and Spencer 1993). This goal-directed quality distinguishes competency gap from cynicism or resignation, which tend to produce withdrawal rather than corrective effort (Tummers et al. 2015). Motivational goals function as the bridge between feeling the gap and forming intentions to alter workplace behaviour. Without this component, DSCG would remain a retrospective state with limited predictive value. With it, DSCG yields the intentional pull toward regulation strategies (Le Deist and Winterton 2005) including, notably, the strategy of switching one's primary work mode to forestall further episodes of the state.

DSCG is expected to fluctuate over time. Employees evaluate their decisions across relatively short reference windows often a single week and DSCG can flare on particular days, persist for a stretch, and then subside.

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Because the state is triggered by active engagement (logging into the analytics platform, attempting a data classification task), it is short-term in nature (Boyatzis 1982; Mulder 2014). Yet, given humans' general aversion to competency gap (Le Deist and Winterton 2005), repeated exposure tends to push individuals toward regulation strategies that head off chronic experience (drawing in adapted form on Park et al. 2016).

III. RESEARCH MODEL

This section develops the nomological network around DSCG (see Fig. 1). The antecedents are derived from expectation-disconfirmation theory (EDT) (Oliver 1997; Bhattacherjee 2001), with two work-related disconfirmation pathways digital tool and data governance identified as the principal triggers (drawing in adapted form on Inman et al. 1997). The consequences are derived from competency-regulation theory (Le Deist and Winterton 2005), with attention to the behavioural intention to switch one's primary professional identity toward data stewardship or, in the opposite direction, to disengage. Alternative explanations are addressed through a set of controls.

EDT (Oliver 1997) provides a serviceable rationale for the cognitive and affective state that civil servants may experience in relation to their digital workplaces (Bhattacherjee 2001; Lankton et al. 2014). The theory posits that individuals assess situations, products, or services by comparing performance against prior expectations (Lankton and McKnight 2012). Disconfirmation produces negative cognitive-affective states; confirmation produces positive ones (Hsu et al. 2016). Where outcomes exceed expectations, satisfaction tends to follow. Where they fall short, the resulting state can amount to dissatisfaction or, more pointedly, to competency gap (drawing in adapted form on Fan and Suh 2014; Zou et al. 2022). Disconfirmation also generates regret about the decision that led to it (Inman et al. 1997; Liao et al. 2017). The salience of competency gap rises in conditions of decision autonomy, since the state typically arises where the individual feels responsible for the outcome (van Dijk and Zeelenberg 2002; Le Deist and Winterton 2005).

This makes the design of public-sector digitalisation, and the degree of discretion it grants employees, central to the analysis. Some reform programmes specify fixed digital obligations. On such mandated digital days, a negative experience can yield dissatisfaction but typically not competency gap, since the underlying engagement was not the employee's own choice and the conditions for personal responsibility are absent (Le Deist and Winterton 2005). Many digital-era arrangements, however, leave the decision to engage with the data infrastructure to the employee, which makes investment in data-stewardship skills a voluntary act. Where this latitude exists and expectations go unmet, the conditions for DSCG are met. DSCG, then, is conceptually applicable to digital-era arrangements characterised by genuine employee autonomy.

- *Antecedents: Digital-Tool and Data-Governance Disconfirmation*

Civil servants commit to working in the digital mode on the expectation that engagement will outperform the procedural fallback. Three families of activity populate the digital workplace: tool-mediated work, governance-mediated work, and citizen-facing work (Distel et al. 2024; Janowski 2015). Tool-mediated activity covers case-management systems, dashboards, GIS platforms, and other ICT artefacts. Governance-mediated activity covers data classification, lawful-basis assessment, sharing protocols, and audit response. Citizen-facing activity covers service delivery through digital channels. We focus on the tool and governance dimensions, since citizen-facing work is largely derivative of both, and we follow related research in concentrating attention there (Mergel et al. 2019; Schmidthuber et al. 2023).

The digital-tool dimension captures the technological side of digital-era work usability, reliability, interoperability, analytic affordances. Tool reliability has emerged as a defining concern across both procedural and modern public-sector settings (Mergel et al. 2019). When the tools work well at the workstation, employees develop a sense of professional efficacy and the work itself becomes more engaging (van Ooijen et al. 2019). Tools that retrieve records instantly, dashboards that aggregate cases meaningfully, and well-documented APIs encourage throughput, knowledge sharing, and the formation of a recognisable analytic culture (Wilson and Mergel 2022). Through repeated tool-mediated work, employees internalise the routines needed to navigate both straightforward and complex case types (Bullock and Kim 2024).

DTD occurs when these tool-related expectations are disappointed in practice. Civil servants who commit to a data-driven week may anticipate seamless single-sign-on, responsive help-desks, and stable system uptime (van Ooijen et al. 2019). The reality given that engagement is voluntary does not always cooperate. Single-sign-on fails. Systems run slowly. Colleagues quietly bypass the official platform and keep working in local spreadsheets. In such moments, employees can come to regret their decision to commit to data work and to wish for a route back to the procedural lane. We therefore propose:

- H1 *Disconfirmation of Digital-Tool Work-Related Expectations Produces Data Stewardship Competency Gap.*

Commitment to data work also carries governance-related expectations (Mergel et al. 2019). The digital workplace is anticipated to deliver clear data-protection rules, identifiable accountability lines, and high-quality metadata sufficient for the employee to discharge their responsibilities. Civil servants treat the data-governance environment as the setting in which they complete assigned duties, satisfy formal accountability requirements, and meet their statutory obligations (van Ooijen et al. 2019), and as a setting that supports ethical, lawful, and effective work (Janowski 2015). As digital-era reforms gather pace, however, many public organisations have trimmed their legacy compliance training, weakening the desk-level capacity for governance

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clarification (Tummers et al. 2015). The governance scaffolding that employees expect is therefore not guaranteed. Successful task completion can be obstructed by overlapping data-sharing mandates or by an absence of authoritative interpretations of statutory data protection (Mergel et al. 2019). The mismatch between governance expectations and governance reality DGD exposes employees to the experience of competency gap in respect of their professional discharge in data-driven mode. Hence:

- H2 *Disconfirmation of data-governance work-related expectations produces data stewardship competency gap.*

➢ *Consequence: Switching Intention Toward a Full Data-Steward Role*

The argument here is that DSCG nudges civil servants toward a decisive shift in their primary work mode: either full commitment to data stewardship through reskilling, or full withdrawal back to procedural duties. Within digital-era public administration, employees engage with the data side of the work only on certain days of the week (Wilson and Mergel 2022). Their daily reflection on work-mode allocation (Wilson and Mergel 2022; Mergel et al. 2019) is where DSCG exerts its influence. Because competency gap is both anticipated and experienced (Mulder 2014), and because individuals find it aversive both at the moment and in recollection (drawing in adapted form on Saffrey et al. 2008), it tends to prompt regulation strategies. These come in three forms: decision-focused, alternative-focused, and feeling-focused (Le Deist and Winterton 2005). Decision-focused strategies aim to improve the quality, justifiability, or responsibility associated with the choice, or to promote avoidance. Alternative-focused strategies emphasise reversibility, or the avoidance of feedback about forgone alternatives. Feeling-focused strategies anticipate future episodes of competency gap and act pre-emptively.

For the case at hand, a decision-focused strategy aimed at increased justifiability fits the empirical record. Since deepening data-stewardship skills allows employees to discharge their jobs more fully (Mergel et al. 2019), the competency-regulation strategy operates on workplace identity itself: it points toward abandoning the procedural identity as the locus of work. Grounded in competency-regulation theory (Le Deist and Winterton 2005), this strategy raises decision justifiability because employees opt for "normal" choices that are easy to defend (drawing in adapted form on Connolly and Zeelenberg 2002). Default options generate less competency gap, and employees who lean on a choosing rather than a switching intention pay a smaller regret penalty (in adapted form, Inman and Zeelenberg 2002). Over the longer term, employees can institutionalise data-steward work as their default. We therefore argue that the psychological state of DSCG translates into behavioural intentions to switch one's mode of public-administration work toward full data stewardship (in adapted form, Chang et al. 2014; Park et al. 2016). DSCG furnishes a powerful predictor for why civil servants might stop attending to procedural routines: when data-driven work seems superior to procedural drudgery, DSCG tips the choice in its favour. By switching to a data-steward identity, the employee pursues a regulation strategy that closes the recurring decision dilemma altogether. Data stewardship becomes the easy-to-justify default, and motivational goals serve as the psychological mechanism that converts the negative state of DSCG into concrete intentions to change workplace behaviour. Hence:

- *H3 Data Stewardship Competency Gap Produces Public Employees' Switching Intentions Toward a Full Data-Steward Role.*

The model is deliberately limited to direct effects. Plausible moderators personality traits, organisational culture, characteristics of the deployed technology could refine these relationships, but, given that DSCG is a newly conceptualised construct, the foundational direct effects need to be established first. Following the principle of theoretical parsimony (MacKenzie et al. 2011), we therefore prioritise an unobstructed view of the disconfirmation-DSCG-switching pathway before importing the complications of moderation. The approach is consistent with prior competency-gap research, which has likewise tended to demonstrate direct effects before turning to boundary conditions (Le Deist and Winterton 2005; Mulder 2014).

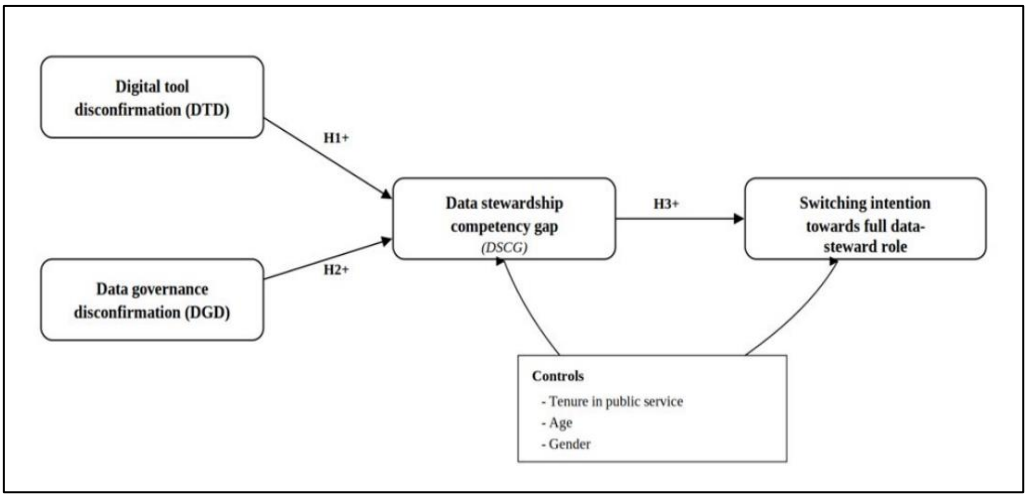

Fig 1 Data Stewardship Competency Gap within its Nomological Network

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➢ *Controls*

Two alternative theoretical explanations are accommodated through controls. The first is reversibility (in adapted form, van Dijk and Zeelenberg 2002). The intuition is that decisions whose outcomes can be reversed produce less acute competency gap, and that irreversibility yields more elaborated decision processes (in adapted form, McAllister et al. 1979). In the DSCG context, reversibility refers to the possibility of undoing the choice to engage with digital tools. As a proxy, we control for tenure in public service: short-tenured employees are less likely to have over-invested in legacy procedural skills and therefore retain greater reversibility regardless of which mode they choose. Age and gender enter as additional controls on switching intention. Persistent gender-typical stereotypes may make women more inclined toward full data-steward identities (in adapted form, Trauth et al. 2016), and older individuals are typically more reluctant to switch settled behaviours (in adapted form, Shin and Kim 2008).

IV. RESEARCH METHOD

To establish why civil servants opt into, or out of, a data-steward work mode, we first conceptualised the DSCG construct and validated its measurement (Appendix A). We then drew on a sequence of survey waves to test the research model in Fig. 1. All data are deposited in a public repository that permits authorial updates of metadata but locks the data files themselves once submitted.

➢ *Data Collection*

We administered online surveys through a professional platform. Participants were drawn from a federal-level civil service, two state ministries, and one large local-government council, using institutional email lists supplemented by a vetted online panel platform suitable for behavioural-survey data. The instrument was administered in English. Screening was used to ensure that respondents (a) worked under a digital-era public administration arrangement, (b) used ICTs at work, (c) held full-time positions, (d) had full autonomy over their primary work mode, and (e) had exercised that autonomy to engage in data-driven work at least once in the preceding week.

Survey invitations were issued on Friday afternoons, with a brief explanatory text framing the questionnaire as a retrospective on the week just completed. The text reiterated that participation was conditional on having worked in data-driven mode at least once during the past working week and on possessing full autonomy over work-mode allocation. We informed potential participants that responses would be fully anonymised and used solely, in aggregate, for scientific purposes. To filter out inattentive responses, the questionnaire embedded one further screening question asking respondents whether they were free to choose engagement with data tools and one attention check, in which respondents were instructed to select 'Disagree' from five options (Shamon and Berning 2020). Respondents failing either were excluded.

Data collection proceeded in a pretest plus four waves. After each wave, we paused to evaluate the results. The mean completion time across waves was 6 minutes 18 seconds. A pretest on the first Friday of December (n = 30) confirmed instrument functionality, with no major flaws detected. On the following Friday, we collected 150 responses; combining these with the pretest yielded an initial wave of 180 responses. A second wave at the end of January gathered 200 responses; the gap reflected the late-December and early-January vacation period. The third wave ran on the second Friday in March (200 responses) and the fourth in mid-June (198 responses). Eight respondents who failed to complete the survey or who failed a screener were excluded, leaving 770 complete responses.

To improve data quality, we additionally excluded respondents below the 10th percentile of survey duration, leaving 692 usable observations (Pre + Wave 1: n = 156; Wave 2: n = 169; Wave 3: n = 176; Wave 4: n = 191). Required sample size was estimated post hoc using the inverse square root method (Kock and Hadaya 2018), assuming $\alpha = 0.05$, power = 0.80, and a minimum significant path coefficient of 0.375 (corresponding to the DGD pathway in Wave 4). Each wave exceeded the resulting threshold of 44. The pooled sample had a mean age of 39.3 years (min = 18, max = 69, SD = 10.8); 351 respondents identified as male, 326 as female, and 15 declined to disclose. Table 2 reports the demographic profile.

Table 2 Sample Demographics

	Pre + Wave 1 (n=156)	Wave 2 (n=169)	Wave 3 (n=176)	Wave 4 (n=191)
Male	72	82	89	108
Female	75	84	87	80
Undisclosed	9	3	0	3
Age 18–29	34	30	38	43
Age 30–39	51	58	66	64
Age 40–49	25	37	38	52
Age 50–59	25	27	27	26
Age 60–69	12	14	7	6
Undisclosed	9	3	0	0

➢ *Measures*

Where validated instruments existed, we drew on them. DTD, DGD, and DSCG were operationalised as multidimensional, mixed-indicator constructs (MacKenzie et al. 2005; Petter et al. 2007); each higher-order construct relates formatively to its sub-constructs, and each sub-construct is measured reflectively (MacKenzie et al. 2005). For DTD, we deployed two sub-constructs: usability

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disconfirmation, captured with four items adapted from Lankton and McKnight (2012), and reliability disconfirmation, captured with five items adapted from van Ooijen et al. (2019). For DGD, the two sub-constructs were accountability-clarity disconfirmation (six items adapted from Sykes 2020, covering the quantity and quality of governance signals) and rule-clarity disconfirmation (six items adapted from Zhou 2003 and from Mergel et al. 2019). For both DTD and DGD, the questionnaire opened with a cognitive prompt asking respondents to recall the expectations they had carried into the week. Items were then rated on a 7-point Likert scale anchored from 'Much worse than expected' to 'Much better than expected. Because no prior instrument existed for DSCG, items were developed afresh, drawing on prior work in public administration, organisational psychology, and information systems (Boyatzis 1982; Spencer and Spencer 1993; Mulder 2014). DSCG is operationalised as a second-order formative construct with three first-order reflective dimensions: NF, T, and G. Instrument development followed established procedures for measurement development (Chin et al. 1997; MacKenzie et al. 2011; Salisbury et al. 2002): construct conceptualisation, initial item generation, q-sort, exploratory and confirmatory factor analysis, and construct-reliability and discriminant-validity tests. Details are provided in Appendix A.

The dependent construct switching intention toward a full data-steward role was operationalised using four items grounded in general behavioural-intention scales (Ajzen 1991). Both DSCG and switching intention were measured on 7-point Likert scales anchored from 'Strongly disagree' to 'Strongly agree'. Tenure in public service was captured in five intervals, from less than two years to more than twenty years. The full item set and descriptive statistics appear in Appendix C. Because the study uses cross-sectional, self-reported data, common method bias is a potential concern; the procedures used to address it are reported in Appendix B.

➢ *Analytical Approach*

Given the formative structure of DTD, DGD, and DSCG, the model was estimated using partial least squares structural equation modelling (PLS-SEM) (Hair et al. 2019). Disconfirmation variables were recoded following the negative-disconfirmation rules proposed by Sun (2013) and Sun et al. (2016), aligning the antecedent variables with prior competency-regulation work (in adapted form for IS settings, Le Deist and Winterton 2005). The recoded series are reported in Appendix C. Among the 692 respondents, 236 (34 per cent) reported negative DTD during their reference week and 282 (40 per cent) reported negative DGD values of the respective disconfirmation measures greater than one.

We followed the two-stage procedure recommended for models combining first-order reflective and second-order formative constructs (Becker et al. 2012; Wetzels et al. 2009). The first-order reflective measurement model was validated through confirmatory factor analysis, with convergent and discriminant validity assessed (Appendix D and section 5). We then formed the second-order formative model using latent variable scores as indicators. Analyses were performed both on the pooled sample and separately for each wave. Computations were executed in SmartPLS 4.1.0.1, with 95 per cent bias-corrected confidence intervals reported throughout.

V. RESULTS

➢ *Measurement Model Validation*

Internal consistency, reliability, convergent validity, and discriminant validity were each assessed. Table 3 reports means, standard deviations, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) for the first-order constructs.

Table 3 Measurement-Model Summary

First-order construct	Mean	SD	CA	CR	AVE
Usability disconfirmation (USA-D)*	0.704	0.541	0.842	0.851	0.612
Reliability disconfirmation (REL-D)*	0.829	0.711	0.879	0.881	0.738
Accountability-clarity disconfirmation (AC-D)*	0.641	0.567	0.831	0.860	0.661
Rule-clarity disconfirmation (RC-D)*	1.069	0.748	0.861	0.866	0.604
Negative feelings (NF)	2.554	1.510	0.901	0.939	0.847
Thoughts about a missed opportunity (T)	3.598	1.549	0.896	0.911	0.776
Motivational goals (G)	3.741	1.701	0.928	0.931	0.871
Switching intention (SWI)	3.408	1.539	0.890	0.892	0.749

*Note. * = values after recoding. SD = standard deviation; CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted.*

Every latent construct meets or exceeds the AVE benchmark of 0.6, which is acceptable (Fornell and Larcker 1981). Individual factor loadings range between 0.694 and 0.952 (Appendix C). Cronbach's alpha values fall between 0.832 and 0.929. Because each indicator's loading and each construct's CA, CR, and AVE surpass the recommended thresholds—0.7 for CA and CR and 0.4 for AVE (Fornell and Larcker 1981; MacKenzie et al. 2011)—we retain the full item set. Construct reliability and convergent validity are therefore satisfactory.

Discriminant validity was assessed using cross-loadings (Appendix D, Table 4), which were at least 0.2 below each item's primary loading itself above 0.7 (Hair et al. 2019). The square root of AVE for each construct exceeded its highest correlation with any other (Fornell and Larcker 1981). The

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heterotrait-monotrait ratio of correlations (Henseler et al. 2015) remained below 0.85 throughout (Appendix D, Table 6). Multicollinearity, examined through variance inflation factors, sat between 1.031 and 2.736 across the formative DSCG construct (Appendix D, Table 7), well within the 3.3 threshold (Petter et al. 2007). Overall model fit, finally, was evaluated using PLS-SEM-appropriate indices (Hair et al. 2019): SRMR was 0.046 (below the 0.08 threshold) and NFI was 0.914 (above 0.90), indicating that the model fits the data adequately.

➢ *Structural Model*

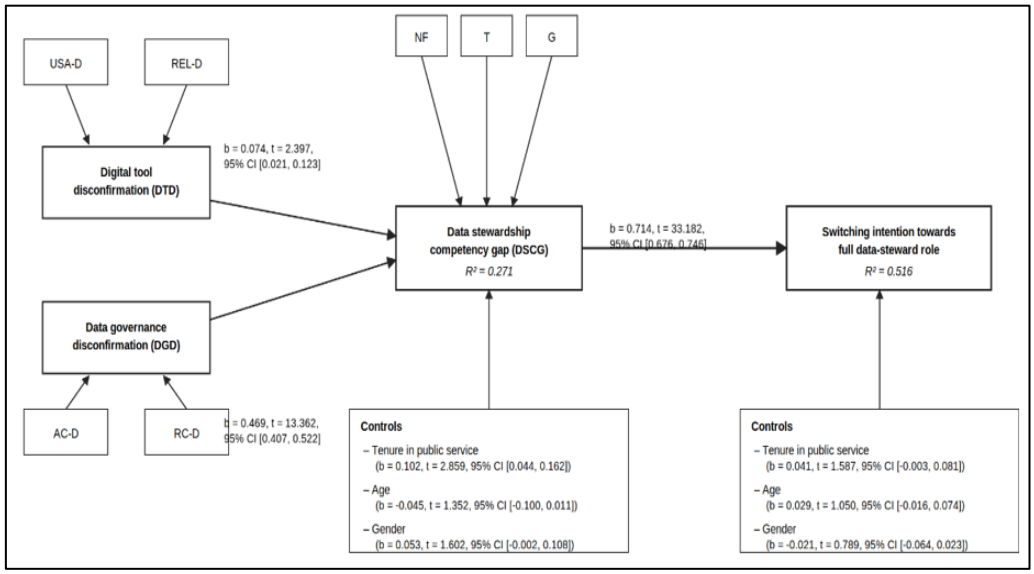

Fig 2 Structural Model Validation (n = 692)

Figure 2 reports the formative second-order structural model with latent indicators substituted by variable scores; the analysis pools the four waves (n = 692). Hypotheses H1 and H2 address the DTD-to-DSCG and DGD-to-DSCG pathways in autonomous digital-era settings. DGD emerges as a strong, deterministic predictor of DSCG (H2: b = 0.469, t = 13.362, 95 per cent CI [0.407, 0.522]). The DTD-to-DSCG relationship (H1) is also positive but considerably weaker (b = 0.074, t = 2.397, 95 per cent CI [0.021, 0.123]) and fails to reach significance in any individual wave. Effect magnitudes for both H1 and H2 are broadly consistent across waves (Table 4). DSCG, acting as a full mediator, exerts a strong positive effect on the intention to switch to a full data-steward role (H3: b = 0.714, t = 33.182, 95 per cent CI [0.676, 0.746]), and this effect is stable across waves. Among the controls, tenure in public service has a significant direct effect on DSCG (b = 0.102, t = 2.859, 95 per cent CI [0.044, 0.162]) but only a weak, non-significant effect on switching intention (b = 0.041, t = 1.587, 95 per cent CI [–0.003, 0.081]). Age and gender did not produce sizeable or significant effects. The model accounts for 27.1 per cent of the variance in DSCG and 51.6 per cent of the variance in switching intention.

Table 4 Structural Model by Wave

H	Relationship	Wave	b (t-value)	95% CI	f²
H1	DTD → DSCG	Pre + Wave 1	0.071 (1.147) ns	[-0.046, 0.160]	0.008
		Wave 2	0.086 (1.077) ns	[-0.040, 0.213]	0.010
		Wave 3	0.089 (1.268) ns	[-0.050, 0.182]	0.009
		Wave 4	0.104 (1.788) ns	[-0.012, 0.183]	0.013
H2	DGD → DSCG	Pre + Wave 1	0.572 (9.221) **	[0.458, 0.662]	0.498
		Wave 2	0.507 (7.625) **	[0.385, 0.608]	0.341
		Wave 3	0.406 (6.191) **	[0.290, 0.506]	0.184
		Wave 4	0.375 (4.314) **	[0.211, 0.502]	0.162
H3	DSCG → Switching intention	Pre + Wave 1	0.717 (16.144) **	[0.637, 0.784]	1.035
		Wave 2	0.783 (23.261) **	[0.717, 0.830]	1.412
		Wave 3	0.646 (11.664) **	[0.544, 0.725]	0.715
		Wave 4	0.734 (18.764) **	[0.657, 0.788]	1.122

*Note. ns = not significant; ** = significant at p < 0.01.*

Mediation was tested using the Zhao, Lynch, and Chen (2010) procedure. With DSCG included in the model, the direct DTD-to-switching-intention effect was small but significant (b = 0.063, t = 2.156, 95 per cent CI [0.013, 0.110]), while the direct DGD-to-switching-intention effect became non-significant (b = –0.034, t = 0.969, 95 per cent CI [–0.090, 0.026]). DSCG thus operates as a full mediator on the DGD pathway. With DSCG removed, both direct effects

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were significant (DTD → switching intention: b = 0.114, t = 3.224, 95 per cent CI [0.052, 0.170]; DGD → switching intention: b = 0.303, t = 7.914, 95 per cent CI [0.237, 0.363]); however, explained variance in switching intention collapsed from $R^2 = 0.516$ to $R^2 = 0.144$, underscoring the mediating role of DSCG. Effect sizes (Cohen 1988) confirm the asymmetry: DTD has a small effect on DSCG ($f^2 = 0.007$); DGD has a moderate effect ($f^2 = 0.273$); and DSCG has a substantial effect on switching intention ($f^2 = 1.022$).

VI. DISCUSSION

➢ *Major Findings*

- *DGD Drives DSCG, Which in Turn Drives Switching Intentions*

Civil servants approach the digital workplace with definite professional expectations: that case-specific obligations can be discharged there, that formal accountability requirements can be met, and that statutory responsibilities can be fulfilled (Mergel et al. 2019). They also expect the workplace to support work that is lawful, ethical, and effective (Janowski 2015). Our data show that DGD is more prevalent than DTD measured by the count of negative disconfirmation values (see section 4.3). The pattern is consistent with the broader observation that legacy compliance training has been pared back across reforming agencies, leaving less governance-clarification capacity at the desk (Tummers et al. 2015). When governance signals become ambiguous and accountability lines blur, the workplace can appear inhospitable to data-driven work. The result is that employees struggle to meet the data-related expectations they set themselves, with task discharge obstructed by an under-specified governance environment (Mergel et al. 2019). The empirical results substantiate the proposition that negative DGD leads to DSCG (H2) an outcome explicable through negative EDT (Oliver 1997). DSCG, in turn, propels the desire to switch one's primary work mode toward a full data-steward identity (H3). The result is stable across waves: DSCG is a distinctive cognitive-affective state and a substantively important driver of the choice to abandon procedural identities in favour of fully data-driven work.

- *Virtual Collaboration Technologies May Temper the Role of Digital-Tool Disconfirmation*

Civil servants are widely expected to use the digital workplace as a venue for collaborative analysis (van Ooijen et al. 2019), interacting with peers through digital tools and forming instrumental relationships (Mergel et al. 2019). The workplace functions, in this view, as a setting for working groups that foster a sense of analytic belonging (Wilson and Mergel 2022). Our data do confirm the presence of negative DTD. Yet the relationship between DTD and DSCG (H1) is weak and largely non-significant across waves, suggesting that the digital-tool axis of disconfirmation is either not centrally constitutive of DSCG or is moderated by factors we have not modelled. One plausible reading draws on social network theory (Granovetter 1973) and recent work on virtualisation in public-sector work (Bullock and Kim 2024; Janowski 2015). Within any organisational context, employees maintain both strong and weak ties (in adapted form, Katz and Williams 1997). Strong ties form a tightly knit social structure, and individuals tend to privilege them over weak-tie networks. ICTs have been found to be increasingly used for high-frequency interaction with strong ties. In a digital-era public-administration setting, then, employees may use the available ICTs to reconcile their digital-tool expectations with their strong-tie connections: even where tools disappoint, ICTs can still serve as the channel through which collaborative interaction with valued colleagues is sustained, blunting the otherwise expected effect of DTD on DSCG.

➢ *Theoretical Implications*

The paper contributes to the digital-era public-administration and competency-gap literatures in three ways. First, drawing on competency theory (Boyatzis 1982; Le Deist and Winterton 2005) and building on prior work (Mulder 2014; in adapted form, Tummers et al. 2015), it introduces DSCG as a multi-faceted construct integrating emotional, cognitive, and motivational dimensions. The presence of negative cognitive-affective states among employees in digital reform environments is already established (Distel et al. 2024). The novelty here lies in identifying a specific dark side of digital-era public administration: a form of competency gap that surfaces under conditions in which the procedural fallback remains genuinely available. By making DSCG a designable object, the construct provides a way of attending technologically and pedagogically to the lived experience of digital reform.

Digital-era public administration is widely promoted for its potential to combine procedural fidelity with analytic responsiveness (Mergel et al. 2019; Schmidthuber et al. 2023), and some treatments cast it as the optimal operating mode (Bullock and Kim 2024; Wilson and Mergel 2022; OECD 2024). Our findings introduce a counterweight: DSCG shapes whether public employees will commit to a full data-steward role while operating in the hybrid mode. By doing so, the paper proposes a strong predictor of why employees may abandon procedural identities. The underlying logic that competency gap is both anticipated and experienced, and that individuals act to regulate it (Le Deist and Winterton 2005) is what gives switching intention its predictive purchase. Importantly, that intention is long-horizon rather than day-to-day, distinguishing it from the daily engagement decisions studied in prior research (Mergel et al. 2019).

Second, the paper extends the literature on what draws public employees toward the data-steward identity (Lember et al. 2019; Bullock and Kim 2024). Previous work has emphasised factors that often function as both antecedents and consequences productivity gains that reinforce continued engagement, for instance and demographic variables such as tenure and educational background (Hammerschmid et al. 2016). The contribution here is to introduce DSCG as a mediating cognitive-affective state shaped by workplace experience, in effect inserting competency gap as the emotional bridge between conditions and identity choice.

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Third, the paper contributes to understanding the relationship between disconfirmation and competency gap, contextualised within digital-era public administration. The relevance of disconfirmation to satisfaction in IT-adoption settings is well established (Sun 2013; Bhattacherjee 2001). Our results extend that finding by showing how DGD, in particular, produces DSCG. We do not claim DGD as the sole pathway; rather, we propose that work-related disconfirmation in the digital workplace produces DSCG, which in turn yields the intention to switch toward a full data-steward setting. This integration also calls for care in reading prior antecedent-consequence findings, given that conceptualisations of digital-era public administration and its cognate concepts remain somewhat ambiguous (Janowski 2015; Distel et al. 2024). We anchor the analysis in digital-era public administration for two reasons: employees in such arrangements have direct experience of both modes and can therefore appraise both sides; and they enjoy genuine autonomy in scheduling, which is what makes regulation strategies meaningful as a unit of analysis.

➢ *Practical Implications*

The findings carry concrete implications for public organisations and reform managers operating under digital-era conditions. Modern public-service environments confront employers with a balancing problem: employee autonomy must be preserved, yet mandated procedural attendance the traditional alternative tends to provoke resistance (Tummers et al. 2015; Lipsky 1980). Digital-era public administration emerged as a way of preserving autonomy while keeping employees connected to the procedural fabric of public service. Our results indicate, however, that the arrangement requires deliberate attention to competency-development pathways. Employers should give particular priority to ensuring that digital workplaces meet employees' expectations around governance clarity and analytic productivity designing environments that are free from rule ambiguity wherever possible and to equipping the workforce with reliable ICTs so that seamless communication and collaboration are sustained, reducing the risk of DTD-induced DSCG.

Earlier work has stressed that digital-era policies should support both procedural and data-driven working, but also that work must be allowed to find its own organic boundaries (Mergel et al. 2019; Wilson and Mergel 2022). Rigid policy can prevent employees from translating autonomy into professional growth.

Reducing DSCG, then, depends on meeting employees' professional expectations of the digital workplace. Investment in IT and learning tools that clarify governance expectations governance-decision dashboards, role-clarity micro-trainings, continuous-learning platforms can help employees move fluently between collaborative and individual workspaces, improving organisational efficiency and, in parallel, employee satisfaction. The broader point is straightforward: public organisations that wish to retain a stable and productive workforce should invest in mechanisms that take the edge off competency gap.

VII. LIMITATIONS

The study carries the limitations characteristic of its design. Online surveys were chosen because they fit the goal of identifying, conceptualising, and validating DSCG, together with its disconfirmation antecedents and its effect on switching intention. The reliance on weekly retrospective reporting, while appropriate to the present aims, leaves open the question of when, precisely, within the week DSCG arises a question that diary methods would be better placed to answer.

Continuance intention with respect to digital-era public administration as a mode was not modelled, in line with the focus of the study. A comparable simplification was adopted by Chang et al. (2014) in their work on switching intention on social media. Our investigation specifically targets settings in which public organisations exercise minimal supervision over in-person attendance; the model is therefore likely to be less applicable to rigid arrangements involving fixed procedural days.

We also did not control for personal preference regarding data-driven versus procedural work. Employees who already prefer to work fully in data-driven mode may experience DSCG very differently when forming their switching intentions out of digital-era public administration. Self-report data were used to capture behavioural intention, without subsequent observation of actual behaviour; the well-known intention-behaviour gap (Awad and Krishnan 2006) should therefore be borne in mind when interpreting the results.

VIII. FUTURE RESEARCH

Several directions deserve further attention. One is the shape that social ties take within digital-era public administration as employees rely on ICTs to stay aware of their strong ties and their activities. How and for what purpose public employees use digital channels to communicate, collaborate, and coordinate with strongly connected colleagues warrants closer empirical scrutiny. Social network theory (Granovetter 1983) offers a productive lens, particularly for understanding the changing role of weak ties: how does a civil servant's network structure shift between digital-era and fully procedural arrangements, and what roles do ICTs and physical co-presence play when employees meet only occasionally, sometimes by chance?

A complementary line of work concerns procedural-work competency gap. Examining the negative cognitive-affective states associated with choosing not to engage with data tools would round out a more holistic theory of workplace competency gap. Civil servants in digital-era arrangements face daily decisions about where to invest their effort, and a workplace competency-gap theory could illuminate both how such decisions are made and how organisations might pre-empt their costs. Because procedural and data-driven work increasingly blend, and because both have social components, such a theory would need to integrate procedural and data-related expectations technical

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and governance and their disconfirmation. Examining the effect of procedural-work competency gap on default strategies could, in turn, yield meaningful inputs for organisational policy and for the design of decision-support IT aimed at competency-gap-averse employees.

We hope these results will help motivate further investigation across the still-developing field of digital-era public administration. Such work promises both theoretical refinement and practical purchase for the organisations and the employees who are jointly negotiating this shift.

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