Information Systems Journal

WILEY

SPECIAL ISSUE ARTICLE OPEN ACCESS

Navigating Flexibility and Standardisation in Low-Code/No-Code Development

Altus Viljoen[1] | Benedikt Stelzl[2] | Maoying Yang[3] | John Nguyen[1] | Andreas Hein[4] | Edona Elshan[5] | Helmut Krcmar[1]

[1]Technical University of Munich, Garching bei München, Germany | [2]Enterprise Software Firm, Garching bei München, Germany | [3]Semiconductor Manufacturing Firm, Neubiberg, Germany | [4]University of St. Gallen, St.Gallen, Switzerland | [5]Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

Correspondence: Altus Viljoen (altus.viljoen@tum.de)

Received: 5 July 2024 | **Revised:** 17 May 2025 | **Accepted:** 2 June 2025

Keywords: citizen development | flexibility | IT governance | low-code development platform | no-code | paradoxical tension | ServiceNow | standardisation

ABSTRACT

Low-code/no-code (LCNC) platforms, such as ServiceNow and Microsoft Power Platform, enable employees without formal IT training to build applications and automate workflows, thus driving agility and reducing dependence on traditional IT teams. However, LCNC platforms also pose a persistent challenge for organisations: while they offer *flexibility* and freedom by enabling decentralised development, they also require *standardisation* and control to manage risks that can be exacerbated by these platforms, such as shadow IT and technical debt. Striking the right balance is difficult—too much flexibility can compromise stability, while too much standardisation can stifle the autonomy and creativity that make LCNC platforms valuable in the first place. This study explores flexibility–standardisation tensions in LCNC development through an investigation of two multinational technology firms with differing LCNC maturity levels, both using ServiceNow. Drawing from 57 interviews, we identify three types of flexibility-standardisation tensions shaped by three key elements of LCNC development: the *platform* itself, the *people* using the platform and the organisational *processes* targeted for improvement. We derive six guidelines used to navigate flexibility–standardisation tensions and demonstrate how these are applied across different stages of LCNC maturity. Building on these insights, we provide concrete, context-sensitive recommendations to help organisations adapt the guidelines to their specific environments. We conclude with forward-looking reflections on how firms can dynamically make sense of these tensions as LCNC platforms and practices evolve. Overall, our findings show that effective LCNC governance requires a dynamic approach—one that balances flexibility and standardisation simultaneously rather than treating them as opposing choices.

1 | Introduction

Low-code/no-code (LCNC) development platforms, such as ServiceNow, Microsoft Power Platform and Mendix, are increasingly recognised as essential tools for advancing digital transformation, as 80% of companies identify LCNC platforms as relevant for accelerating software development (Gonçalves et al. 2024). These platforms enable non-technical employees, often referred to as 'citizen developers' (Hoogsteen and Borgman 2022), to create applications or workflows independently through user-friendly interfaces and pre-configured features (Bock and Frank 2021). By reducing reliance on traditional IT functions, LCNC platforms promise to streamline development processes and foster bottom-up innovation in organisations.

However, the adoption of LCNC platforms in organisations presents an interesting tension: balancing the flexibility that drives LCNC platforms' value with the need for standardisation and control to mitigate their associated risks. *Flexibility* empowers citizen developers to use LCNC platforms to build applications without having to involve IT as an intermediary and enables organisations to address diverse and evolving

business needs (Hoogsteen and Borgman 2022). Nonetheless, while this flexibility enhances innovative potential within organisations, it can also lead to issues such as poor code quality, shadow IT and technical debt, particularly, when non-technical employees take on development responsibilities (Elshan et al. 2023; Lethbridge 2021; Viljoen et al. 2024). To mitigate these risks, organisations implement *standardised* governance measures, such as quality assurance processes and oversight structures (Binzer et al. 2024; Prinz et al. 2024). Yet, excessive standardisation risks undermining LCNC platforms' core purpose—empowering users with autonomy and flexibility—creating a tension that organisations must carefully navigate.

While some contemporary research explicitly acknowledges these opposing demands—for example, Binzer et al. (2024, 260) observe that 'effective low-code/no-code governance approaches often combine self-responsibility with formalized processes'—most studies address them only implicitly. Flexibility is regarded as a key advantage of LCNC development (Kandaurova et al. 2024), whereas standardisation is viewed as essential for mitigating LCNC-related risks (Viljoen et al. 2024) and enabling integration and interoperability across system components (Biedova et al. 2024). Thus, despite its recurring presence as an underlying theme, there is limited insight into the *interplay* between flexibility and standardisation, leaving organisations with little concrete guidance on how to manage this tension. This study addresses this gap by *exploring how organisations can maximise flexibility in LCNC development while simultaneously establishing the standardisation needed to mitigate associated challenges*.

To explore this phenomenon, we examined how two large multinational technology organisations that have implemented ServiceNow—a leading LCNC platform (Matvitskyy et al. 2023)—have developed practices to navigate the tension between flexibility and standardisation. We conducted interviews with 57 stakeholders, including IT professionals, citizen developers, managers and a variety of platform experts directly involved in the platform's implementation. By analysing both shared and organisation-specific practices, we identified explicit strategies and implicit factors that shape how the organisations manage flexibility and standardisation in LCNC development.

Our study offers several contributions for organisations seeking to implement LCNC platforms and initiatives. First, we identify that *flexibility–standardisation tensions manifest in multiple forms*, shaped by three key elements: the LCNC platform, its users and the organisational processes targeted for improvement. We demonstrate how these tensions arise at the intersections of these elements. Second, for each identified tension, we *present guidelines derived from our case partners*, illustrating how they address the dual demands of flexibility and standardisation. Our analysis also highlights how the two organisations approach these challenges differently, based on their respective LCNC maturity levels. Finally, we demonstrate *how these guidelines can be adapted to varying organisational contexts and offer actionable recommendations* to help practitioners more effectively navigate and manage flexibility–standardisation tensions. We conclude with *forward-looking reflections on how organisations can dynamically make sense of these tensions* as LCNC platforms and initiatives evolve.

While flexibility–standardisation tensions may never be fully 'resolved', our findings provide valuable insights into navigating this complexity and establishing a foundation for achieving the 'sweet spot' between these two competing sides of the LCNC spectrum.

2 | Background

As a foundation, we provide an overview of key concepts and terminologies related to the LCNC domain: the tools, development approaches, platform stakeholders and outputs created with LCNC platforms. Next, based on contemporary LCNC research, we examine tensions between flexibility and standardisation in LCNC development and note their implications. Finally, we outline the underlying causes and potential responses to the tensions and we highlight that further research is needed to understand how firms navigate them effectively.

2.1 | Related Concepts and Terminologies

2.1.1 | Tools

LCNC development platforms are software tools that provide a graphical user interface for creating applications with minimal or no coding. It typically includes features such as drag-and-drop or click-through components, templates, prebuilt integrations supporting business processes and data services and one-step deployments (Bock and Frank 2021; Richardson and Rymer 2014; Vincent et al. 2020). While platforms categorised as *low-code* still require some level of coding, typically customising prebuilt components or templates, *no-code* platforms strive to eliminate coding altogether. Prominent low-code development platforms[1] include Mendix, OutSystems, Microsoft Power Platform and ServiceNow (Matvitskyy et al. 2023), while no-code development platforms include Airtable, Zapier and Bubble. In practice, the term *LCNC platforms* is a collective term for these platforms (Kirvan and Pratt 2024).

2.1.2 | Users

There are specific terminologies relating to the users of LCNC platforms; most prominently, *citizen developers*. While it is challenging to define the term 'citizen developer' definitively, it can be generally understood as follows: 'An employee who creates application capabilities for consumption by themselves or others, using tools not actively forbidden by IT or business units. A citizen developer is a persona, not a title or targeted role. They report to a business unit or function other than IT' (Gartner 2024). The term *business unit developer* has also been used to describe this role (Li et al. 2022; Scharpf et al. 2024). In addition to citizen developers, LCNC development can also involve other stakeholders, for example, stakeholders from traditional IT units (e.g., professional developers, platform architects, etc.) who can use these platforms or be involved in their organisational implementation (Binzer et al. 2024, 2025; Bruhin et al. 2024; Viljoen et al. 2024).

2.1.3 | Development Approach

While LCNC platforms refer to the technology itself, the terms *low-code* and *no-code development* refer to the simplified software development approach enabled by these platforms.[2] This approach aims to minimise or eliminate the need for traditional hand-coding, especially by using prebuilt modules and templates to create applications or workflows (Bock and Frank 2021). Additionally, the concept of *citizen development* is frequently associated with LCNC platforms. Compared to LCNC development, which refers to the 'type' of development done on LCNC platforms that require less/no code (i.e., independent of the user's technical proficiency), citizen development refers rather to the 'inclusion and empowerment' aspect that these platforms offer, that is, the practice of non-professionals—often business users with no formal coding experience—creating applications and workflows (Hoogsteen and Borgman 2022).[3] Going forward in this study, we use *LCNC development* as the collective term for the approach/practice of developing with LCNC platforms.[4]

2.1.4 | Software Outputs

Finally, there are terminologies that describe the outputs generated on LCNC platforms, that is, what users build on these platforms. Due to the variance in generative capabilities of LCNC platforms, such outputs vary significantly in scope and complexity. For instance, platforms such as Mendix and OutSystems enable the creation of comprehensive, 'open-ended' web or mobile applications, whereas platforms like Airtable, Zapier and Celonis are more focused on workflow or robotic process automation. Some providers, such as ServiceNow and Microsoft Power Platform, offer a combination of these functionalities. Nevertheless, the common denominator is that LCNC applications are not complex, comprehensive software systems, but rather 'scoped' or targeted applications or workflows. Examples include a bottling company using Microsoft's Power Platform to automate back-end processes for managing vending machines (Microsoft 2020) and a healthcare provider using ServiceNow's Now Platform to create an application that manages the administration of flu vaccines (ServiceNow 2024c).

2.2 | Flexibility Versus Standardisation in LCNC Development: A Paradoxical Tension

This study explores tensions between flexibility and standardisation in LCNC development. *Flexibility* in LCNC development aligns strongly with LCNC platforms' overall goal: providing any tech-savvy user the ability to quickly adapt, innovate and create tailored software solutions that address their own specific business needs without the need for traditional IT experts. In contrast, *standardisation* focuses on ensuring consistency, governance and alignment with the use of these platforms. However, while both flexibility and standardisation can deliver benefits, both aspects can also lead to challenges. Table 1 summarises the benefits and challenges of flexibility and standardisation in LCNC development.

TABLE 1 | Benefits and Challenges of Flexibility and Standardisation in LCNC Development.

Flexibility	Benefits	*Empowerment*: LCNC development empowers non-technical users to actively participate in application development and to automate processes, reducing reliance on traditional IT experts (Biedova et al. 2024; Binzer et al. 2024; Viljoen et al. 2024).
		Experimentation: Development on LCNC platforms facilitates rapid prototyping, encourages experimentation with new ideas and concepts and promotes innovation and creativity in solution design (Binzer et al. 2024; Grashoff and Recker 2024; Kandaurova et al. 2024).
	Challenges	*Shadow IT*: Non-IT employees independently developing applications means they can bypass established governance and protocols, making it difficult for the organisation to monitor software efforts and ensure quality (Davison et al. 2024; Elshan et al. 2023; Viljoen et al. 2024).
		Technical debt: Sub-par or fragmented applications developed by non-IT employees may require extensive and costly maintenance and optimization, undermining LCNC platforms' intention of reducing development overhead (Elshan et al. 2023; Viljoen et al. 2024).
Standardisation	Benefits	*Integration and Interoperability*: Choosing LCNC platforms from established providers like Microsoft or Oracle simplifies integration and ensures interoperability across various company system components (Biedova et al. 2024).
		LCNC initiatives' scalability: LCNC applications and initiatives are easier to maintain and scale when developed according to predefined guidelines or guardrails (Binzer et al. 2024; Binzer and Winkler 2024).
	Challenges	*Need for traditional development*: LCNC platforms that lack sufficient customization capabilities are unsuitable for addressing complex business processes, requiring organisations to still rely on traditional development (Elshan et al. 2023).
		Demotivation of citizen developers: Over-regulation and excessive control of citizen developers can demotivate these individuals, particularly, as citizen development is often voluntary and driven by intrinsic motivation (Biedova et al. 2024; Viljoen et al. 2023).

As is visible from the above benefits and challenges, the relationship between flexibility and standardisation in LCNC development inhibits *paradoxical* attributes. A paradox can be understood as a set of contradictory yet interdependent forces that coexist and persist over time, creating an ongoing tension between opposing sides (Lewis 2000; Smith and Lewis 2011). Managing a paradox requires continuously navigating the competing demands of both sides, as such a tension can never be fully 'resolved'. As noted, in the context of LCNC development, flexibility empowers users and fosters experimentation, but simultaneously creates risks like shadow IT and technical debt, requiring standardisation to mitigate these challenges. However, while standardisation ensures more seamless integration and scalability of LCNC initiatives, it can limit the adaptability and creativity that flexibility enables. Accordingly, the opposing forces of flexibility and standardisation are persistent, contradictory—yet interdependent—and require ongoing navigation. Finding the 'sweet spot' is difficult, as Hoogsteen and Borgman (2022) noted: 'Designing the [LCNC] guardrails is not an easy task, as a balance must be struck between autonomy and control.'

2.3 | Understanding and Navigating Flexibility-Standardisation Tensions

While flexibility-standardisation tensions in LCNC development have not been addressed in a dedicated manner, contemporary studies on LCNC development provide a foundation for how it can be studied. Particularly, three overarching elements are considered when talking about the benefits, challenges and opportunities of LCNC (Carroll et al. 2024): the *people* (citizen developers), the *processes* (company processes impacted by LCNC) and the *technology* (the LCNC platform).[5] As shown below, these three elements have implicitly or partially addressed flexibility and standardisation in LCNC development.

First, concerning *people*, striking a balance between supporting citizen developers and avoiding excessive oversight is crucial (Biedova et al. 2024). This involves legitimising the citizen developer role within organisations (Viljoen et al. 2024) and offering standardised education and training programmes (Elshan et al. 2025; Prinz et al. 2024). Such programmes range from platform-specific instruction to broader upskilling initiatives that incorporate traditional software development principles (Binzer et al. 2024). Second, regarding *processes*, the tension between standardisation and flexibility becomes particularly evident when scaling LCNC applications. For instance, Biedova et al. (2024) describe how one company used LCNC to flexibly develop an insurance solution, but faced significant challenges scaling it due to siloed IT initiatives across departments. This lack of integration left system compatibility and process alignment as an 'afterthought'. To address such challenges, a deeper understanding of processes and their alignment with LCNC platform capabilities has thus been identified as a key recommendation for successful platform implementation (Kandaurova et al. 2024). Third, the interplay between flexibility and standardisation is also evident at the *platform* level. Binzer et al. (2024) explore the trade-off between single-platform strategies, which impose uniformity, and multi-platform approaches, which offer greater flexibility for teams across an organisation. Additionally, the standardisation of data structures and formats to align with platform requirements has been highlighted as a fundamental prerequisite for effectively implementing LCNC platforms (Kandaurova et al. 2024).

Accordingly, our study uses these three elements—people, processes and the LCNC platform—as the foundation to further investigate flexibility-standardisation tensions in LCNC development.

3 | Study Design and Case Partners

3.1 | Study Design

We investigated how two large multinational technology organisations with experience in LCNC development have developed practices to navigate tensions between flexibility and standardisation. Both organisations (each with over 10 000 employees) use the same LCNC platform, ServiceNow, to optimise internal processes and digital workflows. One organisation has a more mature LCNC landscape, characterised by a longer history with the platform and a broader implementation of its offerings. The other is at a relatively earlier stage, with a narrower set of deployed functionalities, yet it has already established clear LCNC governance practices. Examining these two organisations together enabled us to explore how LCNC practices emerge under differing conditions of maturity and deployed functionalities. While the organisations share many practices, we observed notable differences in implementation and organisational routines that took shape based on their organisational contexts and what works in practice. In total, we conducted 57 interviews across the two organisations and derived six guidelines for practitioners that are both generalizable and actionable. Appendix A provides a detailed overview of the interviewees and data collection.

3.2 | ServiceNow

Founded in 2004, ServiceNow (2025e) is a cloud-based LCNC platform designed to streamline organisational workflows and optimise business processes. At its core is the *Now Platform*, a unified technology stack with a single architecture that integrates data across applications, departments and systems with the aim to automate and modernise workflows. Initially focused on IT Service Management (ITSM), ServiceNow has expanded to offer solutions across various functions, including IT Operations Management (ITOM), Customer Service Management (CSM), HR Service Delivery (HRSD), Security Operations (SecOps), Governance, Risk and Compliance (GRC) and Finance and Supply Chain Management. These solutions support organisations in managing IT infrastructure, enhancing customer experiences, automating workflows and addressing compliance and security challenges. By enabling organisations to digitise and standardise processes across diverse functions, ServiceNow facilitates improved operational efficiency, reduced complexity and enhanced busines-s-IT alignment. ServiceNow follows

a biannual release cycle, introducing major software updates every 6 months to enhance platform functionality and address evolving customer needs. These regular releases ensure that organisations can continuously leverage ServiceNow's latest features and further optimise their workflows and operations.

3.3 | Case Partner I ('SoftCo')

Our first case partner is an organisation operating in over 70 countries with a workforce of more than 10 000 employees. The company specialises in enterprise software solutions and provides a comprehensive suite of products that enable organisations to manage critical business functions such as finance and supply chain operations. To streamline its internal processes across various 'Lines-of-Business', the organisation began using ServiceNow in 2018, initially focusing on ITSM and CSM. Over time, the organisation expanded its use of ServiceNow to include SecOps and ITOM. By the time of data collection, SoftCo had accumulated multiple years of experience with ServiceNow and had implemented advanced structures and guidelines for governing development on the platform. Notably, SoftCo also operates a well-established *Center of Excellence*, involving over 250 employees actively engaged in advancing LCNC initiatives and 'best practices' for using ServiceNow.

3.4 | Case Partner II ('TechCo')

Our second case partner is an organisation operating in over 35 countries, also with a workforce exceeding 10 000 employees. The company specialises in electronics manufacturing, with a particular focus on the semiconductor industry. Like SoftCo, TechCo implemented ServiceNow to optimise internal processes. However, unlike SoftCo, TechCo initially adopted ServiceNow to enhance its human resources functions by implementing the HRSD offering. This initiative—called 'EasyHR'—was launched in 2021 with the goal of streamlining and automating HR processes. The EasyHR initiative spans six key HR functions: hiring, onboarding new employees, internal transfers, employee exits, talent development and remote work management. While the EasyHR project was successfully implemented company-wide, some of TechCo's LCNC governance practices were still in the early stages, reflecting a contrasting maturity level compared to SoftCo's more advanced and established practices. TechCo aims to expand its use of ServiceNow to additional domains in the future.

4 | Types of Flexibility-Standardisation Tensions in LCNC Development

At both SoftCo and TechCo, we identified multiple types of flexibility-standardisation tensions. We provide examples from our case partners, illustrating how the opposing forces of flexibility and standardisation in LCNC development contribute to these tensions. We categorise these tensions according to the three elements of LCNC development (platform, process and people).

4.1 | Platform-Process Tension

This tension type addresses the relationship between the platform's functionalities and the organisation's processes and workflows that may be improved through LCNC development. The platform must offer enough versatility to address diverse and complex organisational processes, but must simultaneously promote efficiencies (i.e., standard functionalities) that can be scaled. A SoftCo product owner emphasised this 'mismatch' between the platform's capabilities and the company's processes: 'We sometimes write a lot of code on the Now Platform because of our complex customer requirements. As we're a large organization with intricate business processes, low-code solutions alone sometimes cannot fulfil our requirements'. A TechCo training and change manager also summarised this platform-process tension: 'The platform is quite extensive and offers many built-in functionalities that we could use out of the box. The downside, however, is that we often run up against the platform's limitations, where further improvement isn't possible'.

4.2 | People-Platform Tension

This type of tension revolves around balancing user autonomy to build applications or improve workflows while ensuring there are technical safeguards in place. On the one hand, a great deal of the value of LCNC development lies in the empowerment aspect of citizen developers, as one citizen developer at TechCo explained: 'Now I feel like I'm part of the magic—I can do a lot on my own without needing much scripting knowledge. In EasyHR, I'm now able to do things that are quite similar to what my colleagues in IT can do. It really feels like we're on the same level and can collaborate as equals'. However, a lack of guardrails for citizen developers can lead to issues such as poorly designed applications, data breaches, or other inefficiencies. A SoftCo developer noted: 'If people with little or no programming experience start developing applications and have unrestricted access to company data—without fully understanding what they're doing or how the tools work—it can quickly become a serious problem. For example, sensitive data might be unintentionally exposed externally, which is obviously something you want to avoid'.

4.3 | Process-People Tension

While this tension type is highly relevant to LCNC development, it also extends beyond LCNC development to the broader organisational domain, as it deals with the balancing act of providing autonomy to employees to customise and improve organisational workflows without excessive oversight. On the one hand, as domain experts often know their workflows best, allowing them flexibility can provide both operational efficiencies and a sense of empowerment. One of TechCo's project managers noted: 'We don't need programmers with deep coding expertise. What we need are process experts who understand the system well enough to configure it effectively and ensure it serves its intended purpose. It's a fundamentally different approach from what we had in the past'. Nevertheless, this must be balanced with the need for standardised procedures that ensure consistency, compliance and interoperability across teams and departments, as a TechCo product owner highlighted: 'The exchange between the Epics[6]

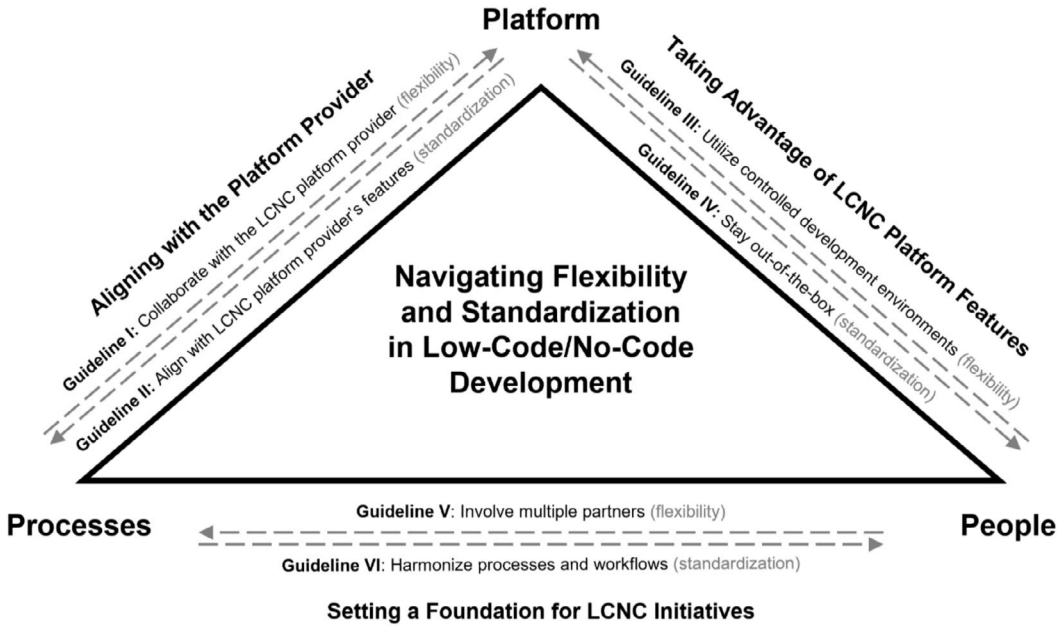

FIGURE 1 | Guidelines for Navigating Flexibility–Tensions in LCNC Development.

themselves is something we sometimes lack, so we have to be careful not to fall into working in silos'.

5 | Guidelines for Navigating Flexibility-Standardisation Tensions in LCNC Development

The interviewees from SoftCo and TechCo noted several practices that their organisations employ to simultaneously navigate the flexibility and standardisation tensions between the LCNC platform, organisational processes and people using the platform. Drawing from these practices, we derived three sets of guidelines, each comprising two actionable measures to reinforce both flexibility and standardisation. While the six guidelines could be found in both SoftCo and TechCo, there were also notable differences in the degree or extent of their implementation within each organisation. Figure 1 shows a synthesis of the six guidelines.

5.1 | Platform-Processes Guidelines: Aligning With the Platform Provider

As development is centred on or around the LCNC platform, the functionalities the platform offers strongly impact its usefulness to the organisation. Accordingly, we found that organisations take measures to have a say over which functionalities would fit their internal processes while simultaneously adjusting their own processes to what the platform offers.

5.1.1 | Guideline I—Collaborate with the LCNC Platform Provider (Flexibility)

Given ServiceNow's biannual release cycle, both SoftCo and TechCo interviewees noted how they align with the platform provider to ensure that new releases include features that fit the organisation's needs. Both companies emphasised the importance of their frequent interactions with ServiceNow, highlighting their proactive approach to providing feedback to the platform provider to improve platform utility. For instance, the organisations leverage ServiceNow's Idea Portal (ServiceNow 2024d) to submit, curate and integrate valuable feedback based on their development experiences. As a SoftCo product owner explained, 'ServiceNow generally accepts feedback through ideas submitted on its Idea Portal. If an idea receives enough votes, it may be implemented'. However, as the volume of submissions on the Idea Portal often exceeds what can realistically be addressed, interviewees also highlighted the importance of complementary mechanisms to participate in the platform's evolution. These particularly include ServiceNow's active user community (ServiceNow 2025d), where customers can exchange ideas, share enhancements and support one another in resolving platform-related challenges.

Additionally, differences in the level of collaboration with ServiceNow were apparent between SoftCo and TechCo, primarily due to the varying maturity of their ServiceNow implementations. Having utilised the LCNC platform for a longer period and deployed it across multiple organisational domains, SoftCo has established a 'design partnership' with ServiceNow. This partnership provides the company with greater flexibility in influencing platform features. Such collaborations often take place during 'preview sessions', where the customer can provide feedback before new functionalities are officially launched. As a SoftCo product manager explained, 'We're part of a design partnership where we engage directly with ServiceNow product managers to raise questions and provide input. We have access to special, specific resources from ServiceNow, who listens to our challenges and supports us directly'.

5.1.2 | Guideline II—Align with the LCNC Platform Provider's Features (Standardisation)

While Guideline I involves the organisation taking steps to influence the LCNC platform, Guideline II focuses on

adapting internal development processes to align with the platform. Interestingly, this alignment can occur both proactively and retroactively. *Proactive alignment* entails deliberately considering the features that the LCNC provider plans to include in future releases before investing resources in building custom solutions where the LCNC platform may currently fall short. As a SoftCo developer noted, 'We can develop a solution ourselves, but often ServiceNow releases something similar. So, we always have to ask ourselves: Is it worth building now? Or will ServiceNow deliver it in the next release?'

Conversely, *retroactive alignment* involves adjusting existing processes to ensure compatibility with the LCNC platform provider's future capabilities and was especially emphasised by SoftCo due to their longer experience with the platform. This approach, often referred to as 'going back to baseline', allows the organisation to reduce complexity and enhance maintainability. A solution architect at SoftCo elaborated: 'Over time, ServiceNow listened to our input and introduced new functionalities in response. As architects, our clear intention has become to return custom developments back to the platform baseline whenever possible. Doing so improves product alignment and supportability, making upgrades, maintenance, and issue resolution significantly easier'.

5.2 | Platform-People Guidelines: Taking Advantage of LCNC Platform Features

The second set of guidelines addresses how the LCNC platform can both empower and constrain citizen developers, granting them the freedom to build applications and leverage the platform's powerful capabilities while ensuring that robust technical safeguards remain in place.

5.2.1 | Guideline III—Utilise Controlled Development Environments (Flexibility)

Both organisations emphasised the value of using the LCNC platform's controlled development environments to enable citizen developers to experiment freely and develop their technical skills, while mitigating the risks associated with such developers making unauthorised or unwanted changes in live environments. A TechCo project owner remarked, 'It's really impressive—and I think it's fundamentally changed how we work in HR—that we can now take ownership of what we build. We're able to develop technical knowledge and no longer feel hesitant to make changes. The sandbox environment plays a key role in this; it allows us to prototype, experiment and explore freely. That's something I didn't have with other tools'. Similarly, a SoftCo product manager highlighted the value of sandbox environments for rapid experimentation and feature exploration: 'When I'm working in a dedicated sandbox environment, proof-of-concepts are always developed really quickly. Even for simple requests—like demonstrating what a Virtual Agent[7] looks like—it's a very fast process'.

Moreover, both organisations emphasised that ServiceNow's controlled environments, such as testing and production, play a vital role in supporting stages of the software development lifecycle that go well beyond initial prototyping in personal development instances. A TechCo project owner remarked: 'We have a comprehensive, controlled environment setup—sandbox, development, test, pre-production, and production. This structure helps ensure quality and prevents changes from being made without fully understanding their impact or interdependencies, and has been a key factor in mitigating risk'.

5.2.2 | Guideline IV—Stay Out-of-the-Box (Standardisation)

While organisations strongly advocate for freedom and flexibility for citizen developers on the platform (Guideline III), they also emphasise the importance of leveraging as many out-of-the-box platform features as possible. This practice of staying 'out-of-the-box' aligns with Guideline II (aligning with the platform's features), though the two differ in focus. Guideline II primarily involves 'strategic' considerations related to the platform's future releases, whereas Guideline IV has more operational implications, centering on advocating for effective selection and use of features already available on the platform. A process lead at SoftCo shared how staying close to the out-of-the-box configuration enabled a quick resolution of an urgent issue: 'It really paid off to stick as closely to the standard as possible: once, we had to implement a hotfix on a Sunday, but we were able to resolve it that same day. Everything went smoothly afterward, and the remaining issues were either fixed later or weren't critical'.

Both SoftCo and TechCo have already established robust practices to promote an out-of-the-box or 'low-code first' approach. For example, one SoftCo product owner explained: 'We have our Developer Guidelines, which are the primary reference on how to implement something. They clearly state that we should use as little code as possible—no complex logic, just one or two lines in Business Rules—and always prioritise using the Flow Designer.[8] Most implementation scenarios are covered by these guidelines'.

5.3 | Process-People Guidelines: Setting a Foundation for LCNC Initiatives

Like the second set of guidelines, the final set also focuses on empowering non-technical domain experts to improve processes while ensuring their contributions are regulated. However, unlike Guidelines III and IV, Guidelines V and VI are not centred on or reliant upon the LCNC platform; instead, they emphasise organisational governance measures that can be implemented independently. Implementing these measures contributes to effectively 'setting the foundation' for successful LCNC initiatives.

5.3.1 | Guideline V—Involve Multiple Partners (Flexibility)

Both case partners highlighted the importance of avoiding the 'siloing' of citizen developers from traditional IT functions. Instead, they advocated for establishing a symbiotic and cooperative development model where domain experts and IT professionals align and collaborate using the LCNC platform.

For traditional IT, delegating or offloading development work brings clear advantages, as a SoftCo project manager explained, 'By enabling Lines-of-Business to build solutions themselves, we can scale more effectively. The key question for us is always whether our size is sufficient or if additional developers would increase delivery capacity, as we're constantly facing time constraints and an overwhelming demand for delivery'. For domain experts, collaboration with IT experts offers benefits such as proactive expectation management for LCNC initiatives, as a TechCo project manager noted, 'That's why close collaboration between the domain experts and IT is so important. You want to understand what's technically possible before designing a process—otherwise, you may end up having to redo steps'.

Consequently, implementing LCNC development platforms within an organisation may not always align with the traditional notion of 'citizen development', where *only* non-programmers build applications with LCNC platforms. Instead, it can reflect a more flexible development approach involving contributions from multiple stakeholders. As a SoftCo solution architect observed: 'In my experience, it's not called citizen development—it's called *co-development*'. Moreover, at both organisations, interviewees noted that there is not only collaboration between internal citizen developers and IT experts, but that external consultants from IT consulting firms also assist with LCNC initiatives. A ServiceNow representative for SoftCo noted: 'The Harmonized Customer Service Management program was set up together with the external consultants in such a way that each stream is staffed with a senior architect—someone with several years of experience in ServiceNow development and architecture'.

However, we observed a notable difference in maturity between the two case partners with respect to Guideline V—namely, the role of a centralised LCNC governance structure. At SoftCo, this function is fulfilled by a dedicated *Center of Excellence* comprising more than 250 employees, which serves as a central coordinating body for stakeholder engagement and collaboration. The Center of Excellence consists of a wide range of technical and non-technical stakeholders, such as platform, solution and enterprise architects, developers, SCRUM masters, engagement and customer success managers as well as personnel responsible for testing and release management. It includes both internal staff and external experts, such as dedicated ServiceNow representatives and consultants with deep experience in LCNC platforms. Establishing a Center of Excellence has been widely recommended as a governance mechanism for LCNC development (Carroll and Maher 2023; Eggers et al. 2023; Viljoen et al. 2024).

Importantly, the Center of Excellence at SoftCo does not directly implement LCNC initiatives. Instead, it acts as a central reference point for Lines-of-Business, as these organisational units can approach the Center of Excellence when they require support with LCNC implementations. Depending on the type of support, the Center of Excellences can offer recommendations for specific ServiceNow modules to be implemented, but can also promote 'general' LCNC best practices to ensure that LCNC solutions are implemented in a scalable, secure and effective manner across the organisation. A member of the SoftCo Center of Excellence summarised this supportive role as follows: 'My role is situated within the ServiceNow Center of Excellence. While the teams don't report to me directly in terms of scope, planning, or delivery—since they are not formally under my supervision—we collaborate closely. Much of the work is coordinated through what we call 'portfolio guidance', which, as part of the development roadmap, ultimately comes across my desk.'

5.3.2 | Guideline VI—Harmonise Processes and Workflows (Standardisation)

The final guideline focuses on ensuring that internal organisational processes and workflows are harmonised and aligned to maximise the utility of the LCNC platform. Given SoftCo's broader deployment of ServiceNow across more organisational domains compared to TechCo, this practice was particularly prevalent in SoftCo. SoftCo interviewees noted that the organisation has implemented a so-called 'Golden Standard' for processes that all newly incorporated Lines-of-Business must adhere to. For example, SoftCo's foundation for ITSM is based on the Information Technology Infrastructure Library (ITIL), a framework of standardised best practices for ITSM that helps organisations align their IT services with business needs (Susnjara and Smalley 2024). A SoftCo solution architect explained such LCNC-independent harmonisation, 'The intention is to start harmonizing Lines-of-Business' work with our guidelines and overall strategies. At this stage, however, we're still not really talking about low-code. We're operating at a much higher level—focused on defining the *what*. Once that is clarified, we deflect or reshape certain requirements and normalize them as much as possible through harmonization'.

Table 2 presents a synthesis of the three paradoxical tension types in LCNC development, along with corresponding guidelines that support either flexibility or standardisation. It also includes illustrative examples of how each guideline can be applied in practice. Additionally, the table highlights differences between basic and advanced levels of implementation, reflecting the varying maturity of LCNC development implementation at SoftCo and TechCo.

6 | Adapting Flexibility-Standardisation Guidelines to Organisations' Contexts

While the six guidelines provide generalisable insights into how firms can manage paradoxical tensions between flexibility and standardisation in LCNC development, a range of factors must be considered to adapt them to an organisation's specific contextual needs. Depending on these factors, firms may at times lean more towards flexibility-oriented guidelines, in other cases towards standardisation and in some instances—aligning with the nature of paradoxical tensions—pursue both simultaneously. Below, we illustrate how different contextual considerations can impact the relevance and implementation of the proposed guidelines.

6.1 | Tailoring Platform–Process Guidelines to Organisational Contexts

The first set of guidelines, collaborating with the LCNC platform provider (Guideline I) and aligning with its features (Guideline

TABLE 2 | Synthesis of guidelines to address flexibility-standardisation tensions in LCNC development.

	Paradoxical tension		Guideline	Basic implementation of guideline (TechCo and SoftCo)	Advanced implementation of guideline (SoftCo)
Platform-process	Ensure the LCNC platform offers functionalities that can be tailored to organisational processes, while also relying on standard platform features that enable rapid and scalable LCNC implementation	Flexibility	*Guideline I. Collaborate with the LCNC platform provider*	• Align with the LCNC platform provider to request that the provider incorporate features that match the organisation's needs • Can be done through idea portals and user communities	• Establish 'design partnership' with the platform provider to actively influence platform functionalities through regular, dedicated contact sessions
		Standardisation	*Guideline II. Align with the LCNC platform provider's features*	• Consider upcoming platform features before building custom solutions with the LCNC platform (proactive alignment)	• Go 'back-to-baseline,' i.e., revert customizations to match the LCNC platform provider's out-of-the-box offerings, thereby ensuring compatibility with the platform's future capabilities (retroactive alignment)
Platform-people	Empower (non-technical) users to freely experiment, while ensuring technical safeguards and adherence to best practices are maintained	Flexibility	*Guideline III. Utilise controlled development environments*	• Use sandbox environments to allow citizen developers to safely experiment with the LCNC platform • Use controlled development environments beyond personal development (e.g., testing, pre-production, etc.)	• No discernible difference
		Standardisation	*Guideline IV. Stay out-of-the-box*	• Advocate for using out-of-the-box LCNC platform functionalities during development • Develop standard 'Developer Guidelines' as a point of reference for (most) implementation scenarios	• No discernible difference
Process-people	Provide autonomy to domain experts to improve their own processes and workflows while maintaining cross-unit consistency, compliance and interoperability	Flexibility	*Guideline V. Involve multiple partners*	• Establish a cooperative development model where domain experts (citizen developers) and IT professionals align and collaborate using the LCNC platform • Include external stakeholders such as IT consultants for quick(er) rollout of LCNC initiatives	• Establish a formal Centre of Excellence to facilitate the cooperation between LCNC stakeholders
		Standardisation	*Guideline VI. Harmonise processes and workflows*	• Align processes and workflows across organisational units to ease LCNC adoption and increase its utility	• Follow structured LCNC-independent frameworks to harmonise processes (e.g., Information Technology Infrastructure Library)

II), offers valuable mechanisms for balancing flexibility and standardisation. However, the effectiveness and feasibility of these approaches depend strongly on two factors: the type of LCNC platform being implemented and the organisation's level of LCNC maturity.

6.1.1 | Type of LCNC Platform: Does the LCNC Platform Favour Standardisation or Customization?

LCNC platforms differ widely in scope and configurability. Some platforms, like ServiceNow, are optimised for automating standard enterprise-wide processes such as ITSM or HR workflows. These tools thus deliver the most value when organisations adopt standardised workflows and rely on prebuilt modules, thus inherently favouring standardisation (Guideline II). In such cases, flexibility must be negotiated through proactive engagement with the platform vendor to shape future features (Guideline I). This is particularly relevant for firms with complex or specific process needs.

By contrast, more open-ended platforms like Mendix, OutSystems or Power Apps are designed to support the development of open-ended, customised applications. These tools allow organisations to tailor LCNC platform offerings more freely to their internal needs. As such, the need for collaboration with the platform provider becomes less relevant.
Practical organizational implication: Before committing to a LCNC platform, organisations should carefully assess how well the platform's design philosophy aligns with their process needs. If extensive customization is required but the platform favours standardisation, organisations should be prepared to invest in vendor engagement or consider adopting a multi-platform strategy (Binzer et al. 2024) to balance diverse requirements across the company. Since not all organisations—particularly smaller firms or start-ups—would have the leverage to influence platform providers to incorporate the flexibility they require, it becomes even more critical to evaluate the platform's suitability in advance.

6.1.2 | LCNC Maturity: Is the Organisation Early or Advanced in Its LCNC Journey?

The maturity of an organisation's LCNC implementation also affects how platform–process tensions should be managed. In early adoption phases, most organisations would benefit from aligning closely with out-of-the-box features (Guideline II). This approach accelerates implementation, reduces complexity and helps build foundational competencies in LCNC development. At this stage, collaboration with the platform provider would be limited.

However, as LCNC development initiatives scale across business units and become embedded in more complex, mission-critical workflows, the limitations of standard platform features would become more apparent. At this point, collaboration with the platform provider (Guideline I) becomes increasingly important. Thus, mature organisations can leverage their scale, user feedback and technical expertise to actively shape the provider's roadmap through design partnerships or beta testing programmes. SoftCo's long-term collaboration with ServiceNow illustrates this progression: after building initial capabilities through standard implementations, the firm evolved into a strategic partner able to proactively maintain alignment between organisational needs and platform capabilities.
Practical organizational implication: LCNC governance should evolve alongside platform implementation. In the early stages, simplification and platform alignment should be the focus. As maturity increases, the organisation can invest in formalised vendor engagement strategies that allow it to influence platform development and reduce the burden of customization over time.

6.2 | Tailoring Platform–People Guidelines to Organisational Contexts

The second set of guidelines, encouraging experimentation in controlled environments (Guideline III) and promoting out-of-the-box feature usage (Guideline IV), helps firms empower non-technical developers while retaining technical oversight. However, their implementation is shaped by two key contextual factors: the LCNC platform's capabilities and the composition of the developer base.

6.2.1 | LCNC Platform Capabilities: What Governance Support Does the Tool Provide?

LCNC platforms vary in their built-in capabilities for managing and governing development lifecycles. Enterprise-grade platforms such as ServiceNow, Mendix and OutSystems typically offer robust environment separation (e.g., sandbox, development, testing, production) and version control. These features enable structured experimentation and allow organisations to implement Guideline III without the need to build custom governance layers. Additionally, the combination of separated environments, visual programming standards, reusable components and template libraries makes it easier to encourage non-technical users to adhere to default features (Guideline IV).

In contrast, lightweight platforms such as Airtable, Power Automate or Zapier often lack such structured, separated environments. While these tools support rapid automation, they offer limited capabilities for staged deployment or integrated testing. This increases the risk of uncoordinated releases or logic errors, particularly, when used by citizen developers.
Practical organizational implication: Organisations must evaluate whether the chosen LCNC platform offers sufficient built-in safeguards. If not, firms must implement complementary governance mechanisms—such as development guidelines, access controls and review gates—to compensate for the platform's limitations and ensure safe experimentation.

6.2.2 | Developer Base: Who is building—Technical Staff or Non-Expert Business Users?

Organisations may adopt LCNC platforms for various reasons: some aim to empower non-experts (citizen developers) to independently build and automate workflows, while others seek to scale their IT delivery capacity by equipping technically trained

staff with LCNC tools. This distinction matters. When LCNC development is driven by citizen developers, organisations must manage risk more carefully and the use of controlled environments (Guideline III) becomes essential to safeguard systems and provide safe spaces for learning. Likewise, adhering to platform defaults (Guideline IV) is critical to prevent the introduction of unmaintainable logic or the circumvention of best practices.

In contrast, when LCNC users are technically trained or embedded within IT units, custom development may be feasible without compromising system stability. These users are better equipped to document, test and maintain customisations and can more reliably judge when deviations from default features are warranted.
Practical organisational implication: Organisations must tailor governance to the user profile. Citizen developers require clear guardrails and simplified options to prevent the introduction of technical debt. More advanced developers can be granted greater autonomy, but should still operate within standardised frameworks to ensure interoperability and minimise 'technical redundancy' across the organisation.

6.3 | Tailoring Process–People Guidelines to Organisational Contexts

The third set of guidelines, encouraging co-development across stakeholder groups (Guideline V) and harmonising organisational processes (Guideline VI), is concerned with setting the foundation for LCNC initiatives and ensuring that LCNC development creates value beyond isolated use cases. Their successful implementation depends on two contextual factors: the role of the IT unit and the nature of the processes targeted by LCNC development.

6.3.1 | Role of the IT Unit: What Role Does IT Play in LCNC Development?

Citizen development is rarely effective when citizen developers operate in isolation (Bruhin et al. 2024). Our case findings and prior research (Binzer et al. 2025, Viljoen et al. 2024) show that co-development between business and IT is critical for scaling LCNC initiatives (Guideline V). However, the mode of collaboration depends on the organisation's structure and the role of the traditional IT unit (Binzer et al. 2024).

Some firms may position IT in an advisory role, providing lightweight support, supervising citizen developers and helping them navigate technical and governance requirements. In more hands-on roles, IT may co-develop or even lead LCNC initiatives—particularly, when applications involve complex integrations, must comply with enterprise standards, or demand technical expertise.
Practical organisational implication: Organisations must decide early how the traditional IT unit should engage with LCNC initiatives. Will it enable, oversee, or actively co-develop? This decision will have downstream implications for staffing, governance and resource allocation and will shape how effectively LCNC initiatives can scale across business units.

6.3.2 | Nature of Targeted Processes: Is LCNC Supporting Isolated Tasks or Enterprise-Critical Functions?

The complexity and criticality of the processes targeted by LCNC development can influence the degree of process standardisation required (Guideline VI). For low-risk or individual-use cases—such as automating routine tasks like sending emails—there is greater room for flexibility and experimentation. In contrast, mission-critical or cross-functional processes (e.g., organisation-wide knowledge management or ticketing systems) require harmonised and consistent logic, data models and workflows to ensure interoperability and compliance.

For instance, SoftCo's use of ITIL-based reference processes for ITSM enabled it to standardise across business units and align with ServiceNow's modular capabilities. In contrast, TechCo focused only on HR automation, where certain process variations and discretion were more acceptable.
Practical organizational implication: Governance rigidity should be aligned with the criticality of the targeted process. Not every LCNC use case requires organisation-wide standardisation, but some do. LCNC initiatives should be segmented based on their risk and strategic relevance to determine when to enforce harmonisation, when to support local experimentation and when a combination of both is appropriate.

Table 3 provides a summary of the contextual factors impacting the flexibility-standardisation guidelines.

7 | Concluding Reflections

This study examined the tensions between flexibility and standardisation in LCNC development, focusing on how these tensions manifest across the LCNC platform, its users and the organisational processes targeted for improvement. Drawing on the experiences of two organisations using ServiceNow, we derived six practical and adaptable guidelines to support practitioners in navigating these tensions. While the guidelines 'as-is' have broad relevance, we emphasised the importance of tailoring them to the specific needs and contexts of individual organisations. We conclude by offering forward-looking reflections on the broader implications of LCNC governance within the flexibility–standardisation dynamic.

First, we re-emphasise that addressing the tension between *flexibility and standardisation in LCNC development must not be seen as a 'trade-off' or an 'either-or' approach*. As these tensions would never be fully resolved given their paradoxical nature, navigating them must instead be viewed as dynamic 'both-and' or 'more-than' approaches, depending on the organisational context. We thus encourage organisations to consider LCNC governance not as a static framework, but as a dynamic capability that must evolve alongside organisational change and LCNC maturity.

Second, we encourage that *flexibility and standardisation in LCNC development must be considered as synergistic and mutually reinforcing*. As noted, enabling LCNC users to flexibly take ownership of process improvements requires a certain

TABLE 3 | Adapting LCNC governance guidelines to organisational contexts.

	Contextual factor	Key question	Implications for guideline application
Platform–process	Type of LCNC platform	Does the LCNC platform favour standardisation or customization?	• LCNC platforms that encourage standardisation (e.g., ServiceNow) require alignment with built-in features (Guideline II), unlike 'open-ended' platforms (e.g., Mendix) • If customization is needed, collaboration with the platform provider becomes essential (Guideline I)
	LCNC maturity	Is the organisation early or advanced in its LCNC journey?	• Early-stage: Adherence to platform standards should be emphasised to realize 'quick wins' and build foundational LCNC capabilities (Guideline II) • Advanced-stage: Organisations can shift towards proactive platform influence (Guideline I)
Platform–people	LCNC platform capabilities	What governance support does the tool provide?	• Enterprise-grade platforms (e.g., ServiceNow, Mendix) typically offer robust environment separation, unlike 'lightweight' LCNC platforms like Airtable or Zapier • If the tools don't offer sufficient built-in safeguards (Guideline III), firms must implement complementary governance mechanisms
	Developer base	Who is building – technical staff or non-expert business users?	• Citizen developers need controlled sandboxes and guardrails (Guideline III) and guidance to adhere to best practices and standard features (Guideline IV) • Technical users can manage exceptions more safely but must still operate within standardised frameworks (Guideline IV)
Process–people	Role of the IT unit	What role does IT play in LCNC development?	• IT can act in an advisory role (supports, reviews and educates citizen developers) or in a steering one (leads LCNC development initiatives) • Organisations must decide early how the traditional IT unit should engage with LCNC initiatives (Guideline V), as it will affect staffing, governance and resource allocation
	Nature of targeted processes	Is LCNC supporting isolated tasks or enterprise-critical functions?	• For individual or low-risk use cases, more experimentation and less standardisation may be permitted • For cross-functional, critical, or regulated processes, process harmonisation should be emphasised or mandated (Guideline VI)

degree of standardisation, such as having organisational processes that align with out-of-the-box platform features. When such alignment is lacking due to fragmented or outdated processes, the introduction of a LCNC platform can expose these gaps, prompting organisations to harmonise workflows and modernise legacy systems to ensure compatibility (Kandaurova et al. 2024). The implication is that the pursuit of flexibility through LCNC can actively drive standardisation, which in turn strengthens the foundation for sustained flexibility.

Third—aligning with the dynamic nature of LCNC governance—we encourage organisational stakeholders to *reflect on how perceptions of what constitutes 'flexible'* versus *'standard' can evolve over time*. As LCNC platform providers like ServiceNow regularly introduce new features based on user feedback, implementations viewed as 'custom today' may become embedded as 'standard tomorrow'. Thus, as organisations advance in their LCNC maturity, the accompanying governance practices initially considered flexible may gradually become institutionalised as standard practice.

Finally, as LCNC platforms like ServiceNow increasingly integrate generative AI (GenAI) functionalities, it must be considered *how GenAI may influence LCNC governance within the flexibility–standardisation context*. On the one hand, GenAI can enhance flexibility by enabling faster prototyping and workflow generation, particularly for non-technical users. However, due to the 'black box' nature of GenAI outputs, guardrails are needed to ensure the quality, compliance and maintainability of AI-generated artefacts. At the same time, GenAI can also support governance itself, for example by automatically reviewing code for adherence to standards,

recommending reusable components or aligning solutions with established practices. The implication is that organisations can embed 'governance-in-the-loop' mechanisms directly into LCNC workflows, allowing GenAI to serve both as an enabler of flexibility and a tool for pushing users to adhere to standard governance practices.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

[1] Low-code development platforms are also synonymously referred to as *low-code platforms* or *low-code application platforms* (Bock and Frank 2021).

[2] There have also been instances of LCNC development being done without LCNC platforms, for example, workers building workaround solutions with Excel (Davison et al. 2024). However, LCNC development is generally understood to take place on LCNC platforms.

[3] There are strong conceptual similarities between citizen development and older research streams such as *end-user development (EUD)* and *end-user computing (EUC)* (Lieberman et al. 2006). However, there are two distinct differences. (1) EUD and EUC preceded the 'cloud-based platform era'" that enables integrated end-to-end software lifecycle management, which is a key differentiating aspect of LCNC platforms (Di Ruscio et al. 2022). (2) EUD and EUC have traditionally involved individual users creating, modifying, or extending specific software artefacts, while citizen development emphasises enabling groups of non-IT users to collaboratively build applications using LCNC platforms (Hoogsteen and Borgman 2022).

[4] We use the term *LCNC development* for three reasons: (1) It captures the simplified development approach enabled by LCNC platforms, rather than the platforms themselves; (2) it allows us to refer to the development practice irrespective of user type or technical proficiency, thereby including both IT professionals and citizen developers; and (3) it provides a neutral term that encompasses both low-code and no-code use cases, which are often intertwined in practice but not always distinguished in the literature.

[5] This tripartite categorisation aligns conceptually with foundational frameworks in information systems research, such as Leavitt's (1958) diamond (task, structure, technology and actors), socio-technical systems thinking (Bostrom and Heinen 1977), and the Technology-Organisation-Environment (TOE) framework (Baker 2012). Our categorisation adapts and applies these conceptual insights to the context of LCNC development.

[6] In ServiceNow, an *Epic* is a high-level entity used within the Agile Development or Scaled Agile Framework (SAFe) module to organise and manage large pieces of work that are too big to be completed in a single sprint or iteration. It represents a business objective or initiative that is broken down into smaller, manageable pieces called *Features*, *Stories* or *Tasks*, which can then be prioritised, assigned and tracked (ServiceNow 2024a).

[7] A *Virtual Agent* in ServiceNow is a chatbot designed to assist users by automating common tasks, answering queries, and resolving issues within the platform. It integrates with ServiceNow workflows and services to provide conversational support (ServiceNow 2023).

[8] Flow Designer is a core feature of ServiceNow that enables process automation within a unified design environment. It allows users to configure approvals, tasks, notifications and record operations using natural language (ServiceNow 2024b).

Acknowledgments

Open Access funding enabled and organized by Projekt DEAL.

References

Baker, J. 2012. "The Technology–Organization–Environment Framework." In *Information Systems Theory. Integrated Series in Information Systems*, edited by Y. Dwivedi, M. Wade, and S. Schneberger, vol. 28. Springer.

Biedova, O., B. Ives, D. Male, and M. Moore. 2024. "Strategies for Managing Citizen Developers and No-Code Tools." *MIS Quarterly Executive* 23, no. 2: 165–183.

Binzer, B., and T. J. Winkler. 2024. "Die vier Phasen von Citizen Development-Initiativen: Treiber, Herausforderungen und Handlungsempfehlungen." *HMD Praxis der Wirtschaftsinformatik* 61: 1136–1158.

Binzer, B., D. Fürstenau, and T. J. Winkler. 2025. "Bridging Business and IT Through Low-Code/No-Code: Insights into Business-IT Collaboration in Enterprise Citizen Developer Programs." In *Hawaii International Conference on System Sciences (HICSS)*. University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press.

Binzer, B., E. Elshan, D. Fürstenau, and T. J. Winkler. 2024. "Establishing a Low-Code/no-Code-Enabled Citizen Development Strategy." *MIS Quarterly Executive* 23, no. 3: 253–273.

Bock, A. C., and U. Frank. 2021. "Low-Code Platform." *Business & Information Systems Engineering* 63, no. 6: 733–740.

Bostrom, R. P., and J. S. Heinen. 1977. "MIS Problems and Failures: A Socio-Technical Perspective. Part I: The Causes." *MIS Quarterly* 1, no. 3: 17–32.

Bruhin, O., P. Ebel, and E. Elshan. 2024. "Exploring the Paradoxical Relationship between Citizen and Professional Developers in Low Code Environments." In *International Conference on Information Systems (ICIS)*. Association for Information Systems (AIS).

Carroll, N., and M. Maher. 2023. "How Shell Fueled Digital Transformation by Establishing DIY Software Development." *MIS Quarterly Executive* 22, no. 2: 99–127.

Carroll, N., J. Holmström, and S. Matook. 2024. "Special Issue Editorial: Transforming Business With Low-Code and No-Code." *MIS Quarterly Executive* 23, no. 3: v–xiii.

Davison, R. M., L. H. Wong, and S. Alter. 2024. "Combining Low-Code/No-Code With Noncompliant Workarounds to Overcome a Corporate System's Limitations." *MIS Quarterly Executive* 23, no. 3: 291–304.

Di Ruscio, D., D. Kolovos, J. De Lara, A. Pierantonio, M. Tisi, and M. Wimmer. 2022. "Low-Code Development and Model-Driven Engineering: Two Sides of the Same Coin?" *Software and Systems Modeling* 21: 437–446.

Eggers, J., J. Wewerka, A. Viljoen, and H. Krcmar. 2023. "Supporting Subject Matter Experts as Developers: Towards a Framework for Decentralized Robotic Process Automation Development." In *Hawaii International Conference on System Sciences (HICSS)*. University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press.

Eisenhardt, K. M. 1989. "Building Theories From Case Study Research." *Academy of Management Review* 14, no. 4: 532–550.

Eisenhardt, K. M., and M. E. Graebner. 2007. "Theory Building From Cases: Opportunities and Challenges." *Academy of Management Journal* 50, no. 1: 25–32.

Elshan, E., B. Binzer, and T. J. Winkler. 2025. "From Software Users to Software Creators: An Exploration of the Core Characteristics of the Citizen Developer Role and the Related Re- and Upskilling Programs." *Business & Information Systems Engineering* 67, no. 1: 31–53.

Elshan, E., E. Dickhaut, and P. Ebel. 2023. "An Investigation of Why Low Code Platforms Provide Answers and New Challenges." In *Hawaii International Conference on System Sciences (HICSS)*. University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press.

Gartner. 2024. "Information Technology Glossary: Citizen Developer." Accessed February 27, 2024. https://www.gartner.com/en/information-technology/glossary/citizen-developer.

Gioia, D. A., K. G. Corley, and A. L. Hamilton. 2013. "Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology." *Organizational Research Methods* 16, no. 1: 15–31.

Gonçalves, R. R., B. Soni, B. Magnússon, et al., eds. 2024. *Low-Code Adoption as a Driver of Digital Transformation: A Comprehensive Market Overview of EMA, the United States of America and Asia Pacific Regions From a Large-Scale Survey*. KPMG. https://kpmg.com/xx/en/home/insights/2024/02/how-low-code-platforms-are-driving-digital-transformation.html.

Grashoff, I., and J. Recker. 2024. "How GuideCom Used the Cognigy. AI LowCode Platform to Develop an AI-Based Smart Assistant." *MIS Quarterly Executive* 23, no. 3: 325–344.

Hoogsteen, D., and H. Borgman. 2022. "Empower the Workforce, Empower the Company? Citizen Development Adoption." In *Hawaii International Conference on System Sciences (HICSS)*. University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press.

Kandaurova, M., D. A. Skog, and P. M. Bosch-Sijtsema. 2024. "The Promise and Perils of Low-Code AI Platforms." *MIS Quarterly Executive* 23, no. 3: 275–289.

Kirvan, P., and M. Pratt. 2024. "Low-Code and No-Code Development Platforms." Accessed June 7, 2024. https://www.techtarget.com/searchsoftwarequality/definition/low-code-no-code-development-platform.

Leavitt, H. J. 1958. *Managerial Psychology: An Introduction to Individuals, Pairs, and Groups in Organizations*. University of Chicago Press.

Lethbridge, T. C. 2021. "Low-Code Is Often High-Code, so we Must Design Low-Code Platforms to Enable Proper Software Engineering." In *Leveraging Applications of Formal Methods, Verification and Validation. ISoLA 2021. Lecture Notes in Computer Science*, edited by T. Margaria, and B. Steffen, vol. 13036. Springer, Cham.

Lewis, M. 2000. "Exploring Paradox: Toward a More Comprehensive Guide." *Academy of Management Review* 25, no. 4: 760–776.

Li, M. M., C. Peters, M. Poser, K. Eilers, and E. Elshan. 2022. "ICT-Enabled Job Crafting: How Business Unit Developers Use Low-Code Development Platforms to Craft Jobs." In *International Conference on Information Systems (ICIS)*. Association for Information Systems (AIS).

Lieberman, H., F. Paternò, M. Klann, and V. Wulf. 2006. "End-User Development: An Emerging Paradigm." In *End User Development*, edited by H. Lieberman, F. Paternò, and V. Wulf, 1–8. Springer.

Matvitskyy, O., K. Iijima, M. West, K. Davis, A. Jain, and P. Vincent. 2023. "Magic Quadrant for Enterprise Low-Code Application Platforms." https://www.mendix.com/resources/gartner-magic-quadrant-for-low-code-application-platforms/.

Microsoft. 2020. "Coca-Cola Bottling Company United Dispenses Streamlined Order Management With RPA in Microsoft Power Automate." Accessed June 6. https://customers.microsoft.com/en-us/story/845187-coca-cola-bottling-company-united-consumer-goods-power-automate.

Prinz, N., M. Huber, J. Leonhardt, and C. Riedinger. 2024. "Unleash the Power of Citizen Development: Leveraging Organizational Capabilities for Successful Low-Code Development Platform Adoption." In *Hawaii International Conference on System Sciences (HICSS)*. University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press.

Richardson, C., and J. R. Rymer. 2014. *New Development Platforms Emerge for Customer-Facing Applications*. Forrester.

Scharpf, D., A. Viljoen, A. Hein, and H. Krcmar. 2024. "Business Unit Development: Benefits and Challenges for Employees." In *HMD Praxis der Wirtschaftsinformatik*, vol. 61, 1159–1179. Springer.

ServiceNow. 2023. "Exploring Virtual Agent." Accessed January 17, 2025. https://www.servicenow.com/docs/bundle/vancouver-servicenow-platform/page/administer/virtual-agent/concept/exploring-virtual-agent.html.

ServiceNow. 2024a. "Create an Epic in Agile Development 2.0." Accessed January 17, 2025. https://www.servicenow.com/docs/bundle/xanadu-it-business-management/page/product/agile-development/task/create-an-epic.html.

ServiceNow. 2024b. "Flow Designer." Accessed January 17, 2025. https://www.servicenow.com/docs/bundle/xanadu-application-development/page/build/professional-developer-guide/concept/flow-designer.html.

ServiceNow. 2024c. "Novant Health Unlocks the Limitless Potential of People." Accessed January 17, 2025. https://www.servicenow.com/customers/novant-health-citizen-development.html.

ServiceNow. 2024d. "ServiceNow Idea Portal on Now Support." Accessed January 17, 2025. https://support.servicenow.com/kb?id=kb_article_view&sysparm_article=KB1156757.

ServiceNow. 2025d. "Welcome to the New ServiceNow Community." Accessed January 17, 2025. https://www.servicenow.com/community/.

ServiceNow. 2025e. "What is ServiceNow?" Accessed January 17, 2025. https://www.servicenow.com/what-is-servicenow.html.

Smith, W. K., and M. W. Lewis. 2011. "Toward A Theory of Paradox: A Dynamic Equilibrium Model of Organizing." *Academy of Management Review* 36, no. 2: 381–403.

Susnjara, S., and I. Smalley. 2024. *What Is the IT Infrastructure Library (ITIL)?* IBM. https://www.ibm.com/think/topics/it-infrastructure-library.

Viljoen, A., J. Nguyen, M. Kauschinger, and A. Hein. 2023. "Fostering Scalable Citizen Development in Organizations: Towards a Guiding Framework." In *Americas Conferences on Information Systems (AMCIS)*. Association for Information Systems (AIS).

Viljoen, A., M. Radić, A. Hein, J. Nguyen, and H. Krcmar. 2024. "Governing Citizen Development to Address Low-Code Platform Challenges." *MIS Quarterly Executive* 23, no. 3: 305–324.

Vincent, P., Y. Natis, K. Iijima, et al. 2020. *Gartner Magic Quadrant for Enterprise Low-Code Application Platforms*. Gartner.

Yin, R. K. 2018. *Case Study Research and Applications*. Sage.

Appendix A

Study Design and Research Methodology

We adopted a multiple-case study approach (Eisenhardt and Graebner 2007; Yin 2018) to investigate how organisations address challenges in LCNC development projects, particularly focusing on the tension between flexibility and standardisation in LCNC development. This approach is, particularly, well-suited for exploring complex, underexamined phenomena, as it enables an in-depth understanding of context-specific dynamics and the identification of actionable insights (Eisenhardt 1989; Eisenhardt and Graebner 2007).

We conducted 57 semi-structured interviews with various LCNC stakeholders across two organisations and in two rounds. First, we conducted 30 interviews at a multinational technology firm ('SoftCo') that implemented ServiceNow across various business units. Second, to triangulate our findings, we conducted another round of 27 interviews at another technology firm ('TechCo') that also implemented ServiceNow. The interview durations ranged from 32 min to 2 h, averaging 47 min per interview. All interviews were recorded and transcribed.

To ensure both comparability and variability between our sampled case partners, we considered several factors. First, we selected two organisations that use the same LCNC platform. Second, both organisations are multinational technology companies, each with more than 10 000 employees. We chose multinational companies under the assumption that such organisations are likely to have established LCNC governance measures and an active interest in company-wide standardisation—practices that smaller companies or start-ups may not necessarily prioritise. Third, to introduce variability, we selected organisations with differing levels of LCNC implementation maturity. This maturity was assessed based on two factors: the duration of each company's use of ServiceNow and the breadth of functionalities they currently utilise on the platform.

After collecting each dataset, we conducted multiple rounds of coding—open coding, axial coding and selective coding—following established qualitative data analysis methodologies (Gioia et al. 2013). Initially, open and axial coding were applied to identify overarching challenges and best practices within both firms. As the flexibility-standardisation theme emerged in both cases, we conducted an additional round of selective coding to explore the causes and responses to this tension and to triangulate findings between the cases. Table A1 presents an overview of the interviewees from each case partner.

TABLE A1 | Overview of interviewees at case partners.

SoftCo		TechCo	
Role/designation in firm	**Number of interviews**	**Role/designation in firm**	**Number of interviews**
Citizen developer	4	Project owner	1
Solution architect	3	HR subject expert	4
Success architect	4	IT project sponsor	1
Platform architect	2	IT architect (internal)	1
Enterprise architect	1	IT project manager	4
Product owners	4	Platform owner (internal)	1
Business process lead	3	HR subject expert	1
Platform vendor	2	HR project manager	4
Project manager	1	HR product owner	1
Domain expert	4	Citizen developer	1
Programme lead	1	External IT architect	1
Service expert	1	Developers (expert, external)	2
		Training & change manager	1
		HR customer	3
		SCRUM master	1
Total	30		27