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Low-code/no-code platforms are powerful tools that enable "citizen developers"—employees with little or no IT background—to quickly create digital solutions. The success of citizen development requires addressing challenges like security, compliance and organizational change. Drawing on insights from 24 companies that have embarked on citizen-driven low-code/no-code journeys, we propose a framework for crafting a citizen development strategy, which includes making critical design choices, and provide recommendations to guide organizations in leveraging these platforms and empowering citizen developers to unleash their ingenuity and creativity.[1,2]

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Low-Code/No-Code Alleviates the Shortage of Professional Software Developers

The demand for digital solutions, workflow automation and digital innovation is skyrocketing, but the capability to create these solutions was, until recently, largely confined to a small pool of specialized IT professionals. The conventional approach to software development, led by IT departments with limited resources, far too often falls short of meeting demand, thus constraining innovation and timely problem solving.[3] This imbalance between development capabilities and application needs is a huge challenge for many businesses.

Many see low-code/no-code platforms as a game-changing remedy to this imbalance, but one that requires a paradigm shift in IT management. Designed to simplify and accelerate application development, low-code/no-code platforms are characterized by intuitive interfaces that minimize the need for traditional coding skills. Using features such as visual representations and drag-and-drop functionalities, they hide the complexity of programming, thus enabling so-called "citizen developers" to quickly meet the need for business functionality.

1 Sabine Matook is the senior accepting editor for this article.

2 The authors express their gratitude to Sabine Matook and the anonymous members of the review team for their insightful feedback, inspirational remarks and clear guidance throughout the entire review process.

3 Breaux, T. and Moritz, J. "The 2021 Software Developer Shortage Is Coming," *Communications of the ACM* (64:7), July 2021, pp. 39-41.

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As a consequence, the market for low-code/no-code tools is growing rapidly, driving its valuation to an anticipated $50 billion by 2028.[4] Growth in the further use of these tools is being fueled by advances in artificial intelligence and by large vendors like Microsoft and Google, as well as startups and established enterprise systems vendors integrating low-code/no-code tools into existing offerings.

Low-code/no-code platforms allow citizen developers to design, develop and deploy custom-tailored solutions with minimal or no reliance on the organization's IT department, thus significantly speeding up responses to emergent business challenges.[5] Moreover, low-code/no-code enables employees to address projects that might otherwise be deprioritized when resources are in short supply, thus reducing backlogs and ensuring that niche, yet critical, business problems and opportunities receive timely attention.[6] Citizen development therefore not only democratizes application development but also has the potential to accelerate innovation by harnessing diverse perspectives and the workforce's collective creativity and expertise[7] to cultivate a multitude of digital solutions. As a result, more and more organizations are recognizing the potential of citizen development.[8]

4 Bratincevic, J., Taylor, R. and Stone, Z., *The Low-Code Market Could Approach $50 Billion By 2028*, Forrester blog, January 2024, available at https://www.forrester.com/blogs/the-low-code-market-could-approach-50-billion-by-2028/.

5 Davenport, T. H., Barkin, I. and Tomak K. "We're All Programmers Now," *Harvard Business Review*, September-October 2023, available at https://hbr.org/2023/09/were-all-programmers-now.

6 For example, the digital "micro innovations" from citizen developers at Rolls-Royce created benefits valued between $9 and $12 million through 2022. For details, see Samuels, M. *Low-Code/No-Code at Rolls-Royce: Empowering All Employees to Deliver Digital Transformation*, June 22, 2023, available at https://www.engineering.com/story/low-code-no-code-at-rolls-royce-empowering-all-employees-to-deliver-digital-transformation.

7 For a comprehensive overview of citizen development, see Binzer, B. and Winkler, T. J. "Democratizing Software Development: A Systematic Multivocal Literature Review and Research Agenda on Citizen Development," *Proceedings of the 13th International Conference on Software Business*, October 2022, pp. 244-259.

8 Companies such as Shell, Volvo and BASF actively promote citizen development. BASF, for instance, has over 10,000 active citizen developers aiding its digital transformation, highlighting the strategy's crucial role in business innovation. See: "Learning and Development," BASF Report 2022, available at: https://report.basf.com/2022/en/managements-report/sustainability-along-the-value-chain/valuing-and-respecting-people/employees/learning-and-development.html.

The Need for a Strategy that Cultivates a Tech-Savvy Workforce

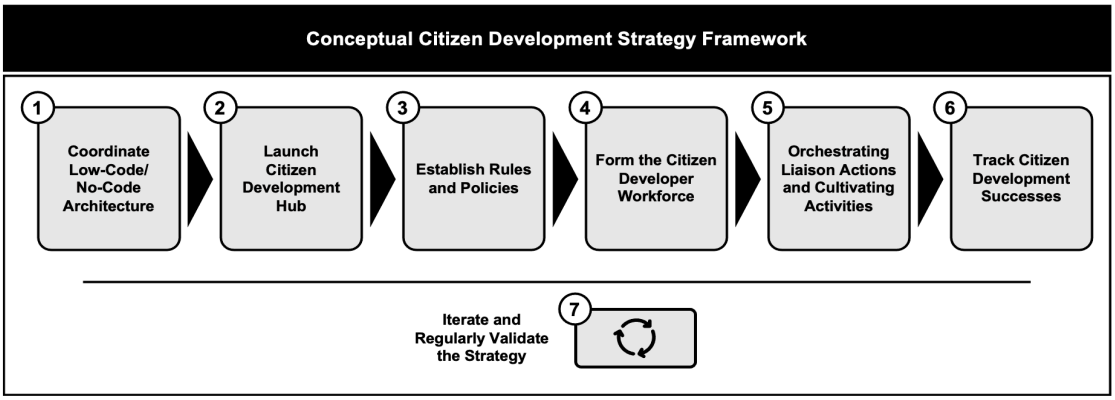
Successfully harnessing low-code/no-code-fueled citizen development requires avoiding several pitfalls. Often organizations venture into the low-code/no-code arena with a "build-it-and-they-will-come" mentality—only to painfully discover that merely installing a low-code/no-code platform does not automatically lead to success. Failing to think strategically about low-code/no-code can lead to inefficiencies, unmet objectives and squandered investments. Left to their own devices, citizen developers tend to migrate to grassroots or even adversarial approaches. An effective citizen development strategy requires a more holistic perspective and top-down guidance while orchestrating a blend of bottom-up and top-down initiatives. Many organizations lack the guidance to craft a strategy that can cultivate a tech-savvy workforce while balancing individual citizen developer autonomy with centralized governance.

In this article, we present a seven-step strategic framework that both senior IT leaders and senior business leaders can use to craft a low-code/no-code-enabled citizen development strategy. Choosing the right low-code/no-code platform is just one piece of the puzzle. Other pieces include a Citizen Development Hub, appropriate rules and policies, approaches to forming a citizen developer workforce, and collaboration activities that tie the central IT department to the citizen developer community. Going forward, organizations need to continuously monitor and refine their strategy to remain responsive to evolving needs and opportunities.

Our findings and recommendations derive from a study of low-code/no-code adoption at 24 case companies.[9] We highlight strategies, challenges and best practices selected from these 24 organizations as they sought to craft an effective citizen development strategy. Drawing on insights from these 24 journeys, we highlight the collective effort needed by all low-code/no-code stakeholders (e.g., business leaders, IT managers and citizen developers) to successfully

9 Our multiple case study approach is described in Appendix A.

Figure 1: Seven Steps for Crafting a Low-Code/No-Code-Enabled Citizen Development Strategy



integrate citizen development into their organizational frameworks.

A Seven-Step Framework for Crafting a Citizen Development Strategy

Figure 1 outlines our seven-step framework for crafting a citizen development strategy. Each step requires making key design choices that will differ depending on the company context.

Step 1. Coordinate an Organization-Wide Low-Code/No-Code Architecture

As low-code/no-code technology evolves, isolated initiatives led by departments or individuals need to be identified and guided toward a more holistic and strategic approach. The first step, therefore, is to ensure that low-code/no-code tools are adopted, integrated and managed organization-wide. This includes deciding whether to use a single platform or multiple platforms and determining whether low-code/no-code should be centralized in a single team or dispersed across multiple teams. Figure 2 illustrates the four key design choices for embedding low-code/no-code into an organization's IT architecture.

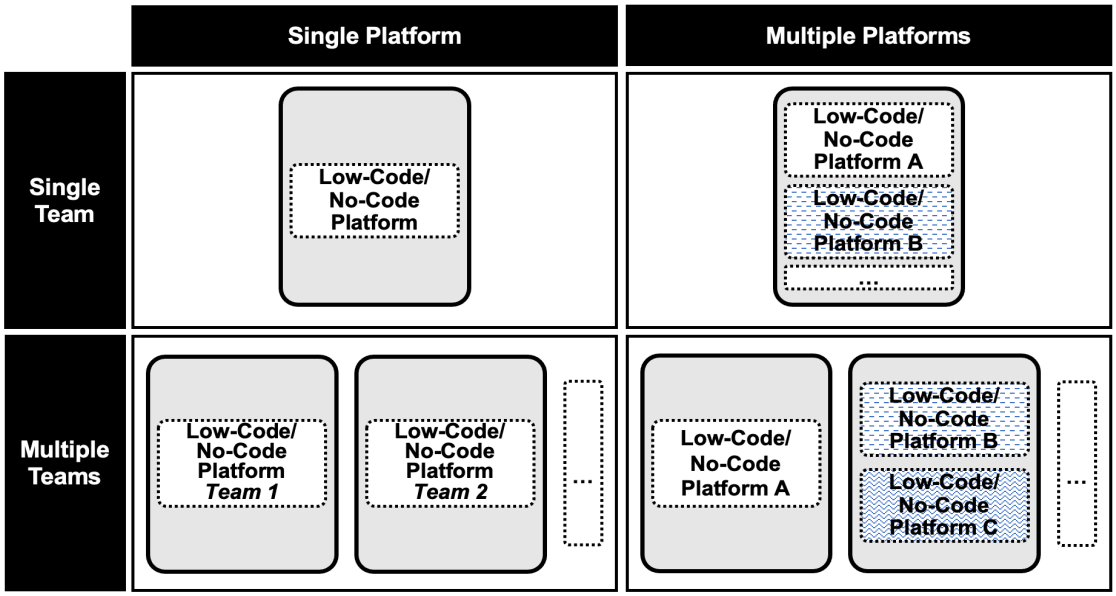
Many companies use a single-platform, single-team approach that emphasizes exclusivity because this approach mandates the use of a single low-code/no-code platform across the organization. Others choose a multi-platform, single-team setup, where a single team oversees several low-code/no-code platforms. The multiple-teams, single-platform approach involves multiple teams managing a single low-code/no-code platform. This approach may seem unusual but applies when a large platform is structurally divided into several teams that manage certain subcomponents. The fourth approach (bottom right in the figure) is where multiple teams oversee multiple low-code/no-code platforms. On average, the 24 organizations in our study operated two or three low-code/no-code platforms and as many as six (see Appendix B, which also lists all the design choices made by the 24 case companies).[10]

Finding the right platform is crucial, either when an organization is installing its first platform or when additional or more suitable ones are required. To do this, organizations should carefully assess the nature of candidate low-code/no-code platforms.[11] Though there is a tendency to consider multiple low-code/

10 Interviewees in the 24 case companies mentioned the following platforms (in alphabetical order): Abbyy, Alteryx, BettyBlocks, Bizagi, cplace, Google AppSheets, KNIME, Mendix, Microsoft Power Platform, Neptune, OutSystems, Palantir Foundry, Pega, Salesforce, ServiceNow, Simplifier, smapOne and UiPath. Python had also become part of the toolkit and training curriculum for citizen development in one company.

11 For an article focused on identifying suitable low-code/no-code platforms, see Novales, A. and Mancha, R. "Fueling Digital Transformation with Citizen Developers and Low-Code Development," *MIS Quarterly Executive* (22:3), September 2023, pp. 221-234.

Figure 2: Low-Code/No-Code Platform Architecture and Team Setup



no-code platforms to address varying use cases, organizations need to make a trade-off between functionality coverage and cost benefits. Each additional platform may offer incremental functionality, but it will increase license and learning costs. Organizations may therefore choose a single-platform strategy to reduce costs, as highlighted by the low-code product owner in Case 6: "It's always one of those things: You must buy licenses, [expend] resources ... and that for just a few additional functionalities." The central IT department's involvement is essential for taking over admin responsibilities such as performing maintenance tasks and managing licenses for low-code/no-code platforms.

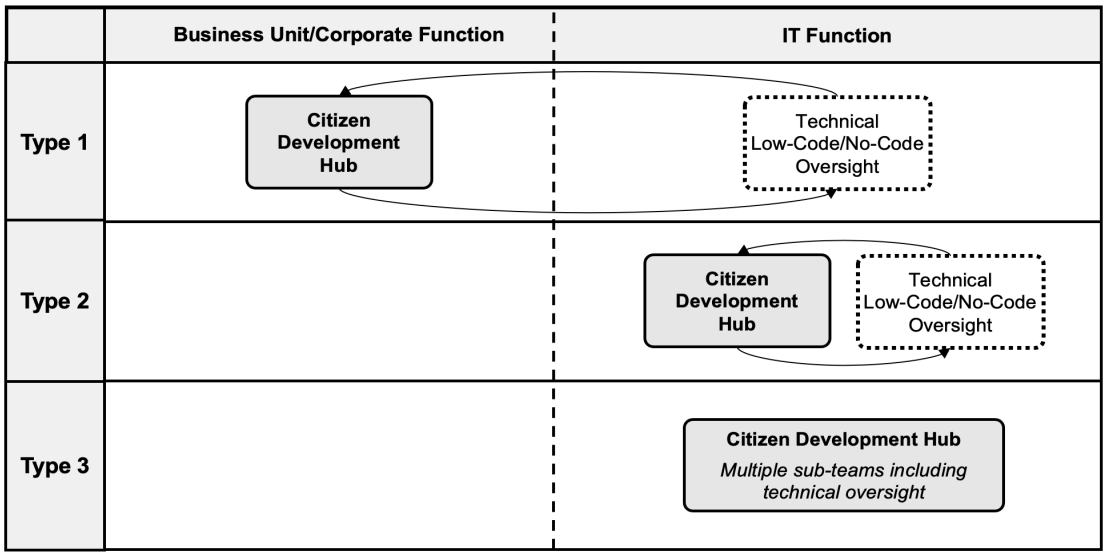
Those organizations adopting a multi-platform approach do so to provide citizen developers with a broader range of capabilities and possibilities. For example, the technical lead for citizen development in Case 13 affirmed that "there are special [low-code/no-code] tools for special areas of application." The multi-platform approach enhances flexibility because employees can choose the most suitable platform for their individual use cases.

Our research shows that some organizations clearly distinguish between no-code and low-code, forming teams for each. For instance, in Case 10, the organization positions the no-code tool smapOne for empowering nontechnical business users and the low-code platform Mendix for IT professionals, positioning it as a "low-code catalyst" to accelerate development and enhance time-to-market. In this organization, synergies emerged across the two platforms:

> *"Anyone who wants to digitize can do so in our no-code platform. We then pinpoint high-impact topics for implementation, thus already having tested prototypes for realization in the low-code platform or maybe even in a core system. ... Thus, we already have something that is thoroughly conceived and tested."* Head of Digital Services, Case 10

When deciding whether to adopt a single-platform or a multi-platform approach, organizations need to consider two crucial factors. The first is to ensure that the chosen approach can be smoothly integrated with the current IT landscape. Insights drawn from the cases highlight the significant role of aligning low-code/no-code technology choices with

Figure 3: Three Types of Citizen Development Hubs



existing IT architecture. For example, Microsoft's Power Platform may be a strategic match for organizations deeply ingrained in the Microsoft ecosystem but may not be suitable for those reliant on a different IT infrastructure, such as Salesforce or Google's software ecosystem.

The second factor is to consider the consolidation opportunities offered by the low-code/no-code architecture. As organizations and their IT infrastructures evolve, low-code/no-code platforms might be used to fulfill the same or similar business requirements. For example, in Case 12, the company leveraged its citizen development program as an "IT infrastructure harmonizer" and as a cost-saving driver. Before embarking on its digital transformation journey, several decentralized IT organizations were fulfilling dedicated tasks for specific business areas. With the introduction of the citizen development program, the aim was to consolidate the low-code/no-code technologies into a harmonized ecosystem:

> *"Previously, each business unit had its own IT organization, leading to duplicated platforms and tools without coordination. With the reorganization, we eliminated these embedded IT units and consolidated [the duplicated platforms] into Power Platform. [We did this] mostly from a cost and citizen-developer-friendly perspective."* Product Owner for Citizen Development Governance, Case 12

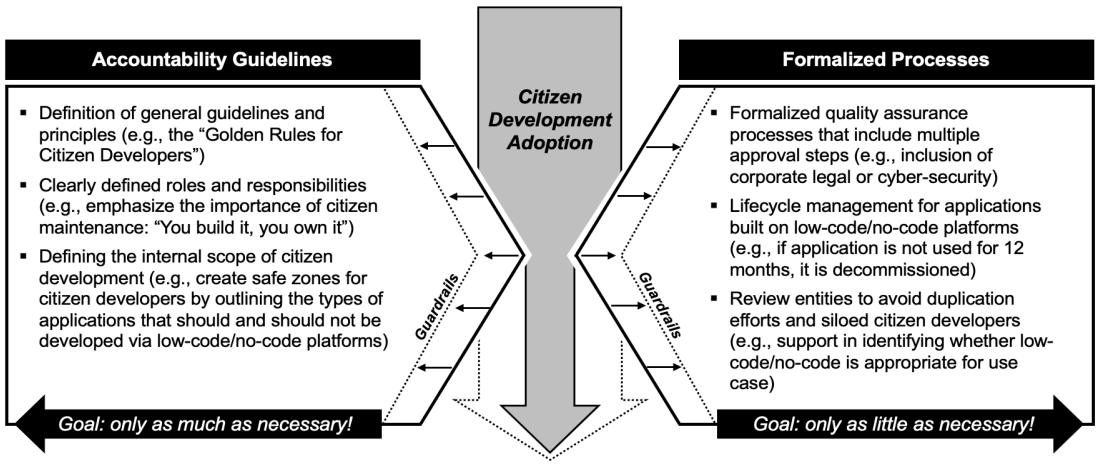
Step 2. Launch a Citizen Development Hub

A low-code/no-code-enabled citizen development strategy requires a "Citizen Development Hub" (referred to below as the "Hub") that formulates and promotes the organization's distinct vision, provides a technical repository and serves as the primary point of contact for citizen developers. The Hub, which can comprise individual contributors or a dedicated team,[12] establishes guidelines, conducts training and offers consulting services, thus ensuring that low-code/no-code initiatives align with the needs of the organization, as highlighted by one of our interviewees:

> *"Support is an important process that begins when the low-code/no-code initiative is launched. We [have implemented] a hyper-care phase [arrangement that] … closely monitors users, [and] provides support and guidance as needed. It's also critical*

12 The Hubs in the 24 case companies had up to 25 members, most of whom were full-time.

Figure 4: Governance Guardrails for Citizen Development



> *to have an organizational unit to collect and disseminate knowledge and ensure its retention within the company, [rather like] a center of excellence."* Lead for Low Code, Case 24

The Hub should be centrally positioned with high visibility and have the mandate to effectively bridge the gap between the business and IT units. Our cases revealed three design choices for Citizen Development Hubs, as illustrated in Figure 3.

The Type 1 Hub is located in a business unit or corporate function, with central IT teams overseeing the technical provisioning, administration and maintenance of low-code/no-code tools. In contrast, the Type 2 and 3 Hubs are embedded in the IT function. Type 2 Hubs rely on IT oversight teams outside the Hub that are responsible for the technical aspects of low-code/no-code platforms. Type 3 Hubs are usually subdivided into multiple subteams. Some of these subteams are tasked with the technical aspects, while others focus on citizen development activities, including governance, training and community management. As shown in Appendix B, most of our case companies had established Type 2 Hubs.

Step 3. Establish Rules and Policies

Uncontrolled citizen development poses a range of potential risks, including security vulnerabilities, quality issues, data privacy violations, technical integration hurdles, inconsistent standards and compliance risks.[13] To mitigate these risks, it is necessary to establish rules and policies before scaling the citizen development program. Seeking a balance between central control and individual autonomy,[14] the low-code/no-code product owner in one of the case companies described this trade-off by highlighting the critical need for low entry barriers and easy-to-follow rules:

> *"[Governance] is a make-or-break in terms of platform adoption. We find it extremely difficult to make the barriers as low as possible for citizen developers. And of course, that makes the idea of the platform absurd. That's why we're working hard to ensure that the regulatory workload for individual citizen developers is as low as possible."* Product Owner Power Platform, Case 7

13 Some of our interviewees reported that citizen development carries the risk of uncontrolled growth in the creation of digital solutions, resulting in "chaos" after its introduction. For example, citizen developers at the companies in Cases 5 and 16 created more than 10,000 applications in just a few months.

14 Winkler and Kettunen identified the tension between program control and project autonomy as one of the six dimensions in transformation programs. For more information, see Winkler, T. J. and Kettunen, P. "Five Principles of Industrialized Transformation for Successfully Building an Operational Backbone," *MIS Quarterly Executive* (17:2), June 2018, pp. 121-138.

Organizations should consider two perspectives for citizen development governance. The first is a tool-specific perspective, which is concerned with establishing policies tailored to individual low-code/no-code platforms to ensure that each platform is used optimally and securely. A prominent example is platform-specific terms of use, often crafted by the IT teams responsible for overseeing those platforms.[15] The second is an overarching low-code/no-code program perspective, which focuses on providing holistic rules and policies that guide the organization's entire citizen development program. Together, these two perspectives strike a balance between fine-tuning low-code/no-code tools and ensuring that the citizen development program remains efficient.

The rules and policies we observed in the case companies can be classified into two distinct types: 1) accountability guidelines; and 2) formalized processes. As illustrated in Figure 4, both types provide guardrails for citizen developers. On the other hand, over-regulation can lead to a failed citizen development program.[16] Thus, the principle of "as much as necessary, as little as possible" applies to rules and policies for citizen development.

Accountability guidelines: Rather than a detailed set of mandates, most citizen-driven low-code/no-code strategies provide guardrails that give citizen developers greater levels of freedom. Among our case companies, guidelines and policies that focus on self-responsibility were common. For example, in Case 5, the company created the following 10 "Golden Rules for Citizen Developers:"

1. App creators bear full responsibility for their apps
2. App creators should inform themselves about low-code/no-code concepts and important regulations
3. App creators should join the citizen development community
4. App creators should provide documentation and support for their app users
5. App creators may only use the centrally managed low-code/no-code platforms
6. App creators must respect the authorization and protection concepts of the central platforms
7. App creators must register their app in the internal app store
8. App creators should check with preexisting solutions available within the app store
9. App creators should only consider use cases that add value to the individual/organization
10. App creators are fully responsible for the maintenance

Citizen maintenance is a key concern.[17] The product owner of citizen development in Case 13 addressed this concern with the philosophy of "You build it, you own it!" Citizen developers must also be made aware of data protection and security standards. National legislation may also shape citizen development. German labor laws, for instance, require citizen developers to consult with their company's works council if their app processes personal data.

Formalized processes: Workflows for citizen development frequently include mandatory approval, application procedures and checklists. Citizen developers may need permission to access certain low-code/no-code environments, use specific datasets or rely on advanced features of low-code/no-code platforms.

Some case companies have also mandated the pre-review of use cases, where the Hub, for example, evaluates intended use cases prior to development. These reviews serve multiple purposes: they prevent duplication, ensure the

15 Platform terms of use serve as a collection of standards and guidelines that are relevant to the specific platform. One example is: "Consider the requirements of the European Accessibility Act for the development of accessible applications. See the PowerApps Accessibility Standards and Guidelines."

16 Stakeholders commented that too strict rules and guidelines lead to shadow IT and the bypassing of the central portfolio of low-code/no-code tools. Similarly, The Project Management Institute's citizen development handbook states that "When too many controls are put into place, the business community will see the [citizen development] center as a compliance function and will aim to avoid collaboration and engagement, undermining the success," in *Citizen Development: The Handbook for Creators and Change Makers*, Project Management Institute, 2021.

17 Multiple interviewees highlighted the potential consequences if a citizen-developed app fails or breaks. As a result, citizen developers are often advised to focus on non-critical applications. For example, Shell has established a risk zoning model to manage and mitigate risks. See Carroll, N. and Maher, M. "How Shell Fueled Digital Transformation by Establishing DIY Software Development," *MIS Quarterly Executive* (22:2), June 2023, pp. 99-127.

appropriate use of low-code/no-code tools, ensure conformance with standards and enhance the visibility of citizen development. The lead architect for low-code/no-code platforms at the company in Case 16 said that the aim of the assessment processes was to "ensure that there is a good outcome and good value in what's being built by citizen developers."

Such formalized processes do not necessarily impose a burden on citizen developers. In Case 10, the company retrospectively recognized that its strict data privacy regulations, while serving as a mechanism for ensuring compliance, also disseminated awareness and fostered education. Formalized processes can also help to limit the emergence of dysfunctional shadow IT organizations, as the head of R&D at the Case 19 company explained:

> *"We established strict governance processes to avoid any issues with shadow IT. This included user management, data management and best practices compliance. Everyone needed to understand their role and responsibilities."*

With increasing awareness of the rules and policies, several of the case companies were able to loosen their approach over time, as mentioned by a low-code digital transformation consultant at the Case 1 company:

> *"There is a [positive] change over time and … professionalization of the quality and data privacy standards [within business units]. In the beginning, there was a lot of regulation, because an extremely large number of applications were created, and the low-code/no-code knowledge was not yet there."*

Effective low-code/no-code governance approaches often combine self-responsibility with formalized processes. For instance, those responsible for citizen development at the company in Case 16 chose to implement a nuanced governance approach through a platform-specific perspective:

> *"[On one side] there's Salesforce, which is super tightly controlled. Nothing goes to production without us knowing [about] it. On the other side is [Microsoft] Power Platform. [There,] we educate and publish our rules of the road, and our governance principles, and expect people to adhere to them. We have also started enforcing registration processes. Within a certain period, people have to tell us what they've built. If they ignore us, we archive the app."*

The head of citizen development at the Case 7 company highlighted the governance challenges in low-code/no-code-enabled citizen development, stressing the need for balance:

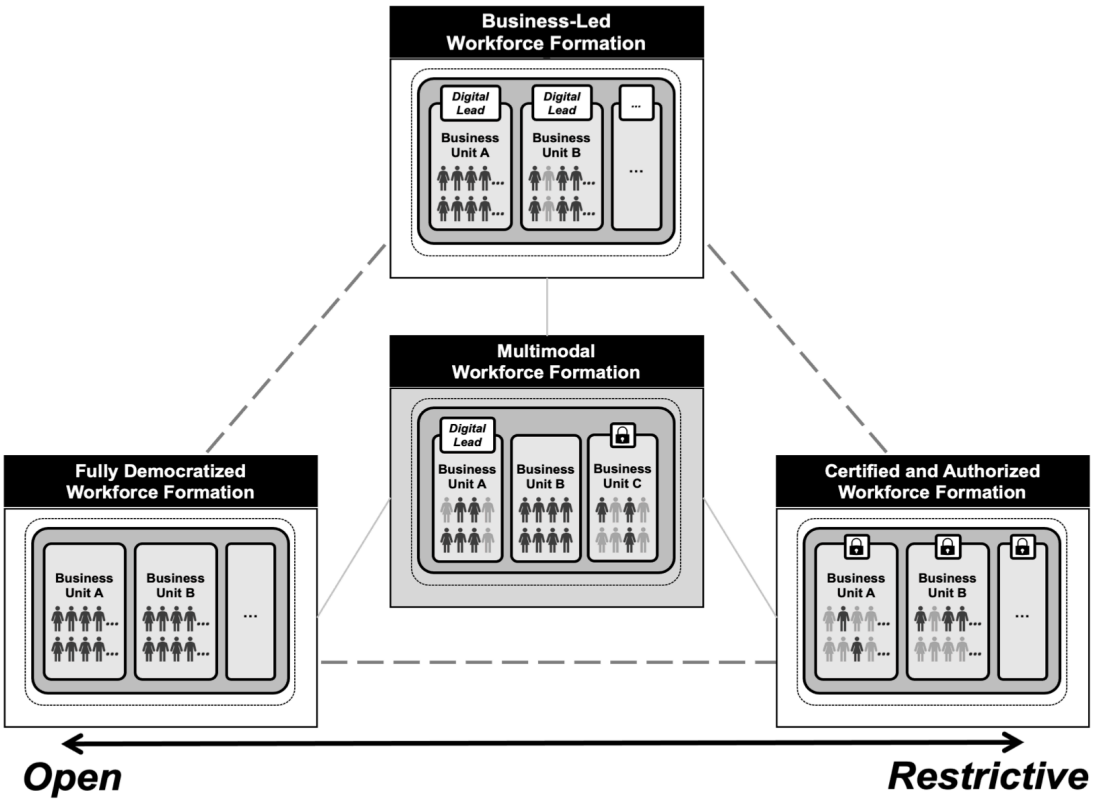
> *"In the end, [governance provides] guardrails. Anyone who stays within these guardrails is safe. But if the guardrails are only 50 centimeters apart, I can only ride through with a bicycle, not a truck. Ultimately, we want to achieve that at least cars can drive through."*

Step 4. Form the Citizen Developer Workforce

With rules and policies in place, the next step is to get potential citizen developers on board. Our research suggests that organizations have the three choices for forming the citizen developer workforce shown in Figure 5 but often choose the middle ground in the center of the triangle.

Depending on their chosen governance model, most organizations adopt an open or restrictive approach to forming the citizen developer workforce. If the organization uses a single low-code/no-code platform, the approach chosen is typically determined by the central IT department and shaped by licensing costs and risk appetite considerations. With the open approach, software development is fully democratized because employees have the freedom to jump on the citizen development bandwagon and start experimenting. Many organizations adopting the open approach establish safe low-code/no-code "playground" environments in which initial access is unrestricted and advanced features can be activated only on request. The more restrictive alternative is to require certified and authorized citizen developers to have an "entry ticket," commonly implemented through subscription-based mechanisms. In this situation, formal requests for accessing low-code/no-code tools

Figure 5: The Triangle of Approaches to Forming the Citizen Developer Workforce



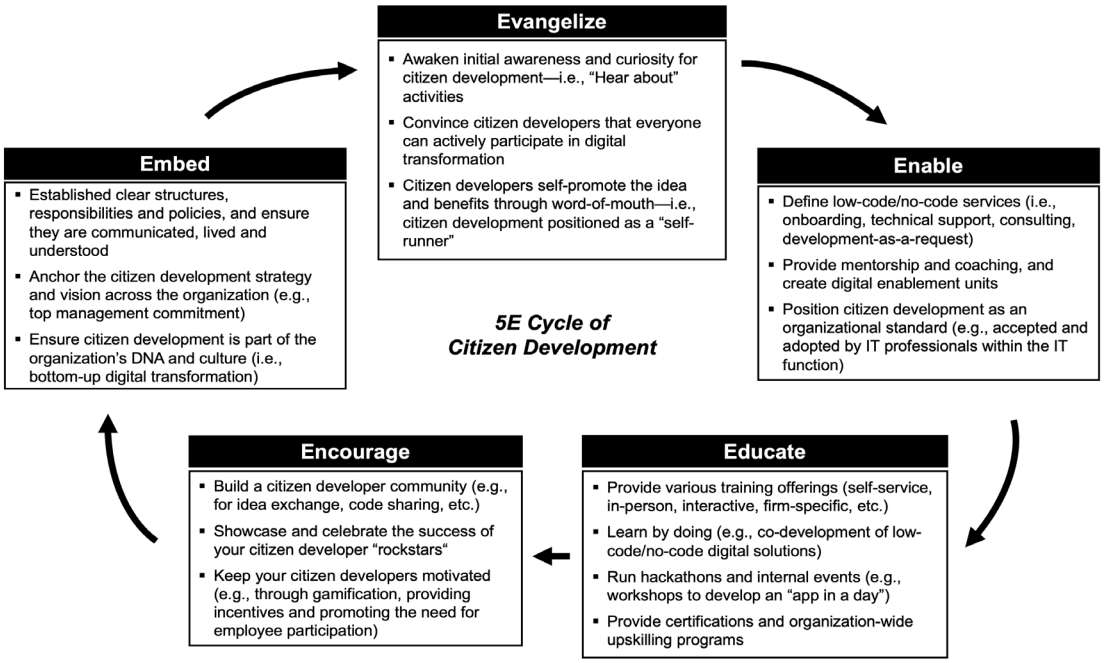
are mandatory and may require training or demonstrated evidence of expertise.

Though less common, a midway alternative is a business-led approach, reflecting a business unit's ambition to proactively drive digital initiatives. With this approach, citizen development champions (i.e., business users well-versed in low-code/no-code) become the digital leads in their areas, serving as primary contacts for local citizen developers. These champions might offer tailor-made services, establish streamlined processes and cultivate a local community of citizen developers. Business-led citizen development promotes the uptake and acceptance of the low-code/no-code program. Nevertheless, maintaining a direct communication line between these business-situated digital champions and the centralized Hub team can be mutually advantageous, as explained by the lead architect for low-code/no-code at the Case 16 company:

> *"Business-led citizen development is the 'refinery' business [i.e., where a more abstract top-level strategy is refined and detailed at a lower level, in this case, at the business unit level]. They've got their own process for reviewing use cases before they start on them, ... [i.e.,] an ideation mechanism, and there are stakeholders from the business side. We aim to ensure that we get the right products and licenses so that they can innovate."*

Five of the 24 case companies reported following the business-led citizen development approach—but limited to specific business units rather than the entire organization. However, most companies with a multi-platform low-code/no-code architecture had adopted the approach

Figure 6: The 5E Cycle of Citizen Development



in the center of the triangle illustrated in Figure 5 and had formed what we call a "multimodal citizen developer workforce"—a structure that encapsulates the adaptive, multifaceted and demand-specific nature of a citizen developer workforce.[18]

Step 5. Orchestrating Liaison Actions and Cultivating Activities

Via the Hub, organizations need to delineate and orchestrate the scope of interaction and collaboration among the various stakeholders. These activities must be accompanied by aggressive change management efforts, with strong management support. We envisage the activities in this step as the "5E cycle of citizen development" (see Figure 6). The five Es (Evangelize, Enable, Educate, Encourage and Embed) represent the five core processes for scaling a low-code/no-code-enabled citizen development strategy. Each process is described in detail below.

Evangelize: Awakening curiosity for citizen development and low-code/no-code requires an open and inquisitive mindset among prospective citizen developers and their managers. They must be inspired to explore new possibilities, embrace digital ideas and address day-to-day productivity challenges. Evangelizing also involves arousing an interest in problem solving and innovation and nurturing a sense of astonishment about the potential of low-code/no-code platforms. By fostering curiosity, organizations can motivate their workforce to question existing processes, introduce novel approaches and ultimately contribute to advancing the organization's overall digital capabilities. The goal of evangelization is to cultivate a culture of exploration and experimentation. One interviewee provided a perspective on his experience as an evangelizer:

> *"It is critical to communicate the platform's added value and to keep users engaged with additional resources and support. Overall, it is critical to continuously promote the benefits of low-code/no-code and encourage organizational adoption."* Lead for Citizen Development, Case 22

18 Appendix B lists the workforce arrangements adopted by the 24 case companies.

Many of the case companies were driving their awareness campaigns using tactics such as informative newsletters, pages on the intranet and town hall presentations. The company in Case 5 introduced an ingenious interactive element by enabling employees to "playfully" create applications. The citizen development team built an advent calendar app that offers employees the chance to develop a personalized quiz app. Each window of the calendar hides a distinct tutorial that carefully guides participants through a step-by-step development journey. Once participants have successfully created an app, their journey into the low-code/no-code world begins.

Enable: The above example also illustrates that organizations need processes for enabling citizen development. Overarching mechanisms include regular onboarding sessions to familiarize citizen developers with the relevant low-code/no-code platforms. IT teams need to offer assistance and support sessions when citizen developers encounter technical, security or similar hurdles. Enabling also includes consultancy and coaching sessions that provide citizen developers with customized support and mentorship. Many of the case companies have established "enabling intermediary" roles to provide low-code/no-code orientation for citizen developers. In general, enabling intermediaries' activities involves proactive guidance by sharing advice and providing best practices and also reviewing the practicality of proposed use cases. These enabling activities help to maximize the potential for leveraging low-code/no-code platforms.

In addition, a formalized liaison between intermediary enablers and citizen developers can help standardize processes and ensure governance compliance. For instance, in Case 16, once a use case for the Salesforce platform has been approved, a coach from the Hub is assigned to share their experience, ensure governance and support citizen developers.[19] In Case 9, dedicated enablers are located throughout the entire organization, with business units having their own enablers.

Another enabling approach is to adopt "development-as-a-service" for low-code/no-code tools. With this approach, business users first specify requirements and professional developers and then develop and deploy the app using low-code/no-code tools, possibly involving iterations to fine-tune the app.

Educate: Case company interviewees highlighted the essential role of training programs in equipping employees with knowledge, using self-paced learning videos, in-person training, case studies and practical hands-on sessions. The transition between education and the other 5E processes is often fluid, with activities like hackathons having both educational and evangelistic elements. Similarly, internal workshops and co-development approaches combine enabling with educational elements, exemplified by "app-in-a-day" workshops where participants rapidly develop their own low-code/no-code solutions.

Organizations must tailor training to suit organization-specific requirements. For instance, the company in Case 11 recognized the need for comprehensive app documentation and therefore initiated best-practice training focused on effectively documenting citizen-developed apps. The purpose of this training is to ensure easy comprehension and seamless adoption of low-code/no-code apps by nontechnical colleagues. In the Case 6 company, a former citizen developer transitioned to a content creator who creates customized training videos.

Citizen development education initiatives can also embrace larger upskilling programs relating to agile principles, including design-thinking and the concept of minimum viable products. For instance, the citizen development lead at the Case 9 company recognized the importance of data as a starting point: "You're not doing anything without data. Data is the lifeblood. … You've got to enable your underlying data for the organization and then put your tools on top." Several organizations provided targeted data courses as part of their curricula for citizen developers, as one interviewee described:

> *"We have the data workshop because people often get tripped up there. … So, identifying the data they need to use, whether it exists or not [is essential]. Many [citizen developers] want to connect into larger systems, so we kick it off with a three- to four-day workshop. It's about understanding your*

19 The company in Case 16 has a dual enabling concept: Coaches are both exclusive and obligatory for Salesforce use cases, but not for use cases on other low-code/no-code platform technologies.

data and how you connect, store and secure it." Product Owner for Citizen Development Governance, Case 12

Encourage: This component of the 5E cycle of citizen development encourages active participation, ensures continuous commitment, fosters community spirit and helps maintain the motivation and enthusiasm of citizen developers. Through communities of practice, citizen developers connect with peers, find like-minded colleagues who share similar challenges and exchange use cases and novel ideas.[20]

Organizations often invest significant efforts in moderating encouragement. The more mature of our case companies reported the emergence of self-sustaining communities that often act as the first level of support for citizen developers. The low-code/no-code team provides support only when inquiries remain unresolved. Multiple communities may emerge, perhaps with a primary community for the overall citizen development program, complemented by several subcommunities dedicated to specific tools or business groups.

Regular community meetings will further motivate and encourage citizen developers. For example, low-code/no-code "rockstars" (i.e., high performers) can showcase their solutions at informal lunchtime sessions, outlining the use case, the challenges faced and the benefits achieved. Gamification techniques offer additional mechanisms for rewarding outstanding achievements, such as the "app/citizen developer of the month." Against this backdrop, a citizen development leader described the relevance of certifications, not only for encouraging citizen developers but for their career development:

"We provide people with self-paced learning and certifications because people like and deserve to have a certificate at the end. And for some people, we've seen many career changes. I know several people who worked in the business who now work in IT." Lead for Citizen Development, Case 9

Embed: The final 5E process anchors the low-code/no-code strategy within the organization. Citizen developers must be regularly informed about responsibilities, structures and policy changes. Organizations must communicate the vision of their citizen-driven low-code/no-code strategy so that citizen developers can identify with and work toward a common goal. To successfully embed the strategy, leadership—from executives to middle managers—must support the low-code/no-code program. Supervisory management must also buy into the strategy and support it. Managers must be willing to release their employees for citizen development activities or recognize the work their citizen developers do above and beyond their usual responsibilities.

To embed the low-code/no-code strategy, organizations must foster a culture that supports openness, intrapreneurial courage and experimentation. Our research shows that such a culture is a prerequisite for nurturing a flourishing citizen development environment. Citizen development must become part of an organization's DNA so that every employee feels empowered.

Step 6. Track Citizen Development Successes

Our research indicates that organizations adopting a low-code/no-code-enabled citizen development strategy significantly shortened their application development cycles (Case 21) and cultivated a secure space for business innovation while sharply reducing the dangers of shadow IT (Case 7). These benefits are partly due to an increasing number of trained citizen developers. Some organizations reported having thousands of active citizen developers (3,000 in Case 12), contributing to innovation and a rise in digital solution rollouts. In Case 19, democratized development led to a 25% increase in business-specific applications and improved process efficiencies. This was measured by the number of new applications deployed and a reduction in process completion time. A low-code/no-code product owner assessed the impact of time invested in training citizen developers:

"One hour in development support indirectly generates 30 times more digitization than I

20 For a good in-depth primer on communities of practice and their business implications, see Wenger, E. C. and Snyder, W. M. "Communities of Practice: The Organizational Frontier," *Harvard Business Review*, January-February 2000, available at: https://hbr.org/2000/01/communities-of-practice-the-organizational-frontier.

> *could achieve as a professional developer over two years, not to mention the long-term benefits as individuals use this knowledge for decades, inspiring others and building more expertise.*" Product Owner Power Platform, Case 3

Citizen development can alleviate IT bottlenecks because it can significantly reduce IT project backlogs (by nearly 30% in Case 21). Moreover, the company in Case 16 achieved an annual cost saving of $250,000 by eliminating a platform's license fees, and the company in Case 10 transitioned from paper-based to digital processes through low-code/no-code citizen development.

Measuring the success of a citizen development program can be complex, but our discussions with practitioners suggest a three-pronged approach for effective tracking of successes:

Use standard key performance indicators: Key performance indicators include metrics such as the number of citizen developers, the number of developed applications and the frequency of application launches. These metrics provide a tangible measure of the program's value.

Classify use cases: Classifying citizen development use cases and solutions into distinct categories such as workflow modernization, personal workload reduction, legacy system replacement and cost avoidance will enable a thorough post-implementation analysis, which can facilitate strategic decision-making and lead to a deeper understanding of the diverse outcomes from the program.

Conduct qualitative assessments: The organization should conduct surveys and interviews to gather insights into stakeholders' perceptions and experiences so that it can assess the effects of citizen development on daily operations, satisfaction with low-code/no-code tools and overall sentiment toward the program. These surveys and interviewees can enable the organization to evaluate the program's broader impact (including how well it meets citizen developer needs) and use success stories as motivational tools that mobilize other individuals. A leader at the Case 12 company emphasized the significance of this qualitative perspective in assessing success:

> *"I bristle a bit when people say there's no value to these apps—because there is! … It is hard to put a dollar amount on it and that's what leadership always wants. I'm hoping that we can improve in the future, but the way I measure success is personally. I talk with people who use it; I see their excitement and hear their stories. One of the comments I liked, and thought was perfect, was: 'for the last decade I've been hearing about digital transformation, and I never knew what that meant. Now [I'm signed up to the citizen development] program, I understand what digital transformation looks like and I see all the possibilities in my work processes.'"*

Step 7. Iterate and Regularly Validate the Strategy

Establishing a citizen development strategy is an ongoing process, especially given the fast-paced evolution of low-code/no-code technologies. Thus, it is vital to continuously monitor the low-code/no-code market and stay aware of new preferences and recommendations from business units. In addition, some of our case companies reported they were evolving to "citizen development 2.0." This next phase of citizen development involves proactively engaging with business units on a continuous basis to highlight the benefits of cloud-based solutions and stimulating larger migrations from older systems such as Excel-based solutions and macros to newer IT-regulated and IT-sanctioned ones.

Recommendations for a Successful Citizen Development Strategy

Those responsible for an organization's citizen development strategy will need to make appropriate design choices in the seven-stage strategy framework described above. To guide them in making these choices, we provide the following five recommendations derived from the lessons uncovered in our research.

1. Envision Citizen Development as a Catalyst for Digital Innovation

Purely top-down digital initiatives are often unsuccessful,[21] but citizen development acts as a bottom-up catalyst for digital innovation, merging grassroots efforts with strategic top-down elements. By using low-code/no-code tools, citizen developers can breathe life into their ideas for digital innovation. Moreover, citizen development addresses the widespread need for digital upskilling, because it enables business users to collectively lead and actively engage in digital initiatives. As highlighted by the IT lead for citizen development at the Case 13 company, organizations should prioritize the cultivation of trust among employees, which will lead to management support for citizen development:

> *"It's about trusting employees to make decisions. While management support is vital for change, listening to employees sparks real innovation, not top-down mandates. Employee-generated solutions address real problems, provide real benefits and, in the end, bolster management support."*

In addition to ensuring management support, citizen development program leaders should focus on the activities of the 5E cycle of citizen development (see Figure 6). For instance, the low-code lead in the company in Case 6 highlighted the relevance of the evangelization process:

> *"Motivating people unfamiliar with low-code/no-code is difficult. You must proactively go to departments where you know that no one has done anything yet. Then you have a 50/50 chance. You can't force everyone; it's enough to plant a seed in that department and make just one person happy."*

To boost workforce skills and training program effectiveness, organizations should combine platform-specific training with broader, platform-independent curricula, covering topics like agile principles and data management.[22] It's crucial to prioritize the most essential resource materials, as highlighted by one of our interviewees:

> *"We make extensive use of existing online resources. Within our curricula, we explore the vendor's [Microsoft's] learning platform and resources like LinkedIn Learning and Udemy. It's less about a lack of options and more about ensuring content is easily digestible and tailored to our citizen developers' needs."* Product Owner Power Platform, Case 7

Subsequently, as citizen developers gain more experience, they may eventually move into IT roles. Organizations might perceive this as an opportunity to grow a new cohort of IT professionals with both IT knowledge and deep business knowledge.

2. Automate Citizen Development Governance

Effective governance is one of the main challenges for citizen development, and there is huge potential for automating standard governance tasks.[23] Interviewees accountable for overseeing citizen development programs stressed the importance of supplementary control and monitoring mechanisms such as telemetry. Many low-code/no-code platforms already offer built-in capabilities that provide oversight.

Other technical means—often built with low-code/no-code capabilities—for automating governance tasks such as the production of various reports are worth noting. For instance, in the Case 10 company, the Hub receives daily emails summarizing applications moved to production the previous day. In the Case 5 company, automated updates track application usage, flagging those inactive for three months with a warning, quarantining them after nine

21 Wade, M. and Shan, J. "Covid-19 Has Accelerated Digital Transformation, but May Have Made It Harder Not Easier," *MIS Quarterly Executive* (19:3), September 2020, pp. 213-220.

22 By making use of freely available resources, organizations can supplement training and provide access to a wide range of expertise at minimal cost. This approach conserves resources while keeping the workforce updated on current practices and industry standards. These resources include LinkedIn Learning and Udemy, and the YouTube "I Love Automation" channel, available at https://www.youtube.com/@ILoveAutomation.

23 For an article arguing that advances in machine learning and artificial intelligence will increasingly automate the management and governance of citizen development, see Davenport, T. H., Barkin, I. and Tomak, K., op. cit., September-October 2023.

months of inactivity and archiving them after a year. Several interviewees described other governance automation, such as sending an email that welcomes new citizen developers when their first application is released and provides details of the policies that need to be adhered to and the training opportunities available.

The most sophisticated approach to governance automation was reported by the Case 12 company. This organization leveraged the automation tool UiPath to create a tool that automatically opens and reviews Microsoft Power Platform applications. This tool facilitates swift evaluation of a citizen-developed app's compliance (e.g., with security role setups) and the app's approval or rejection, with the findings communicated to the relevant citizen developer. The product owner for citizen development governance at the Case 12 company outlined the organization's mission as follows:

> *"Our goal as [the] central low-code team is to ensure that people use low-code in accordance with our standards, without needing to be software engineers. We aim to automate … the complicated stuff and establish guardrails subtly."*

3. Promote Business-Led Citizen Development

Business leaders should establish roles and responsibilities such as "digital leads" focused on citizen development. These leads can guide each business unit's unique trajectories and develop tailored frameworks that better match their respective contexts. As the leader of citizen development at the Case 9 company emphasized:

> *"What we're seeing, and I'm delighted to see this, is that the business [units are] developing their own [citizen development] management structures. Our coaches work directly with them, adapting our vanilla framework to meet their specific needs."*

Similarly, the company in Case 12 introduced a franchise-as-a-service model to facilitate the adoption of citizen development. The central citizen development team provided a "playbook" (a standard framework) that enables business leaders to become citizen development leaders themselves. This company's product owner of citizen development explained that the goal is to disseminate good practices across the organization:

> *"Our playbook includes all the best practices that need to be taught, including template presentation materials. [Business units] can generate their own, but our requirements are—here's the playbook; in it is everything that needs to be covered."*

Thus, management should proactively endorse and facilitate the organization's business units in formulating business-led citizen development visions. Pioneering business units that demonstrate success can serve as prime examples, attracting interest from other areas of the business, resulting in the adoption of citizen-driven low-code/no-code cascading throughout the organization. This type of word-of-mouth promotion will garner greater buy-in from the business, as highlighted by one of our interviewees:

> *"It's intriguing. When a [low-code/no-code] app becomes available, it prompts other employees to [ask]: 'How can we use this platform? Where do I start' We then direct them to the resources and invite them to explore, confirming our platform's value."*
> IT Lead for Citizen Development, Case 13

4. Encourage Use of Low-Code/No-Code Tools by IT Professionals

Low-code/no-code tools are not used only by citizen developers. With their intuitive and user-friendly features, tools like Microsoft Power Platform and smapOne focus on citizen developers. However, multipurpose platforms like OutSystems and Mendix cater more to professional developers, offering advanced functionalities like software testing and custom coding.[24] OutSystems, for instance, is marketed as having "no limits for pro developers," highlighting

24 Technological advancements will likely further contribute to the simplification of low-code/no-code platforms by better hiding code complexity. Novales and Mancha describe two dichotomies for low-code/no-code platforms: 1) suited for citizen developers vs. suited for professional developers; and 2) general-purpose platforms vs. domain-specific platforms. For more information, see Novales, A. and Mancha, R., op. cit., September 2023.

the increasing use of low-code/no-code platforms by professionals.[25] As a consequence, organizations are merging professional and citizen development. However, as emphasized in the following quote, professional developers still have a vital role to play because of the limited capabilities of citizen developers:

> *"We have professional developers. If you [citizen developer] are willing, you can create a basic application for your need. But when it comes to complex applications, it would not be the most efficient way to develop it yourself."* Product Owner for Citizen Development, Case 5

Moreover, as the low-code product owner at the company in Case 16 described, his company's current emphasis is on raising awareness among professional developers to recognize low-code/no-code as an integral part of the development landscape rather than sidelining it:

> *"Our focus last year was on the professional space, educating software engineers about incorporating low-code/no-code into their toolset. We're not positioning it as a replacement for traditional coding. ... However, in some cases, we question the need to start from scratch with ... SQL databases and custom coding."*

The Case 15 company formed a team in the IT unit focused on the Mendix platform, illustrating the benefits of IT professionals employing low-code/no-code tools. After deciding to migrate to SAP S/4HANA, this company used Mendix for user-interface development, achieving front-end development that was five times faster than with Java and Fiori, thus saving time and money. The low-code team leader summarized the company's success as follows:

> *"The SAP team was a bit hesitant—now they are less so because they saw that it's bringing the value ... it's cutting the money. It will accelerate [professional low-code/no-code]. It's a catalyst—we're growing nicely, but with this, it will boom."*

25 The Freedom to Think Big Again, OutSystems, available at: https://www.outsystems.com/pro-developers/.

5. Foster a Symbiotic Relationship Between Business and IT Units

The influence of power and politics should not impede citizen development. Successfully driving a low-code/no-code-enabled citizen development strategy requires a strong symbiosis between business and IT units, thus providing a new opportunity for the long-demanded strategic partnership between the two.[26] Echoing the sentiments of many, one citizen development leader noted:

> *"Building trust and collaboration between IT and business was the biggest hurdle we had to overcome. IT had a really bad reputation. ... The business didn't understand why [IT] blocked a lot of things. With citizen development, IT is trying to open some doors slowly. Business uses it in a certain way—IT supports and makes that transformation happen. [As a result, the] business understands that IT is valuable. I think that's also very important of this program."* Lead for Citizen Development, Case 8

Concluding Comments

Advanced low-code/no-code technologies in the hands of citizen developers drive the modernization and democratization of digital innovation. Based on our analysis of the experiences of 24 case companies, we devised a seven-step framework for crafting a low-code/no-code-enabled citizen development strategy that provides organizations with clear guidance for embarking on their citizen development journeys or recalibrating existing efforts, identifying the crucial design choices at each step. By mastering the intricacies of each step, organizations can exploit the myriad opportunities and track their success in the multifaceted world of citizen development.

Looking ahead, our research reveals three key trends. First, low-code/no-code usage

26 The ongoing discourse in practice and research suggest the need for a stronger collaboration between business and IT. See, for example, Khan, N., Reynolds, J. and Schrey, C. "Partnering to Shape the Future— IT's New Imperative," *McKinsey & Company*, May 2016, available at: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/partnering-to-shape-the-future-its-new-imperative#/.

is becoming a standard skill, akin to today's expected proficiency in Microsoft Excel, reflecting a more inclusive IT culture in the spirit of "everyone's IT."[27] Second, organizations need to address compensation schemes and personal development to retain talent, adapting to the growing IT abilities of citizen developers. Third, generative AI such as ChatGPT and Copilot are poised to further boost citizen developers' productivity and skills once they become fully integrated into low-code/no-code platforms. These trends underscore the dynamic nature of citizen development and the need for organizations to be ready to adapt to changing circumstances and to remain forward-thinking.

Appendix A: Research Methodology

The primary data source in our research consisted of 34 semi-structured interviews with key stakeholders representing 24 case organizations. These interviews were conducted between May 2022 and September 2023. Our approach involved open and explorative questions. We initially used a predefined protocol for the interviews and adapted this protocol as our data collection progressed. Interviews ranged in duration from 25 to 97 minutes, with an average of 55 minutes. All interviews were conducted in English or German and were recorded with the participant's consent and then transcribed for analysis.

The interviewees performed a wide spectrum of roles, including senior executives, managers, digital initiative leaders, citizen developers and others involved in realizing low-code/no-code and citizen development initiatives. To capture perspectives from both the central IT and business sides, we also strived to include a mixed representation of stakeholders. An overview of the interviewees and their firms is provided in the table below.

The interviews covered several topics, including the organizations' adoption and evolution of low-code/no-code-enabled citizen development strategies, the structural setup, the constitution of business-IT interactions (e.g., training, governance, service offerings) and the role of contextual factors. To aid triangulation, we complemented this data with publicly available secondary data sources (e.g., company reports). Some interviewees provided us with further information such as internal documents. Additionally, we engaged in a multitude of informal discussions with industry experts to learn about their views, extending and validating our findings.

We proceeded with data analysis in parallel with the data collection. The initial analysis phase involved open coding and memo writing. Throughout the analysis, our objective was to decipher fresh interpretations for realizing citizen development within organizations. To ensure reliability and a shared understanding of the data, two researchers independently coded the interviews, followed by collaborative discussions among all researchers.

Our methodology involved several phases of sensemaking and brainstorming to develop our seven-step framework. We first constructed preliminary models using the identified codes and categories as building blocks. Following this, we created visual representations, which we iteratively refined through discussions within the author team. A key feature in this process was the constant comparison analysis across all cases.[28] Subsequently, we organized the different models into a logical sequence, resulting in the creation of the seven-step framework.

Appendix B: Citizen Development Design Choices Made by the 24 Case Companies

For each of the 24 case organizations, the second table below shows the citizen development structural design choices in terms of the number of tools deployed, the low-code/no-code architecture, the type of Citizen

27 "Everyone's IT" emphasizes the democratization of IT accessibility, meaning that IT is commonly available, low in complexity and user friendly. For more information, see: Gregory, R. W., Kaganer, E., Henfridsson, O. and Ruch, T. J. "IT Consumerization and the Transformation of IT Governance," *MIS Quarterly* (42:4), December 2018, pp. 1225-1253.

28 For more information on case study-based research, see: 1) Eisenhardt, K. M. and Graebner, M. E. "Theory building from cases: Opportunities and challenges," *Academy of Management Journal*, (50:1), February 2007, pp. 25-32; and 2) Paré, G. "Investigating information systems with positivist case research," *Communications of the Association for Information Systems*, (13:1), February 2004, pp. 233-264.

Overview of Interviewees (Appendix A)

Case No.	Primary Industry	Firm Size[a]	Interviewee Role	Interview Duration (mins:secs)
1	Healthcare	Very large	Digital Transformation Consultant (Low-Code)	55:12
			IT Strategy Manager	25:19
2	Education	Large	Product Owner Microsoft 365	48:08[b]
			Specialist Digital Transformation	48:08[b]
3	Energy and Utilities	Very large	Citizen Development Community Caretaker	37:31
			Product Owner Power Platform	89:48
4	Automotive	Very large	Digital Transformation Consultant	52:34
5	Manufacturing	Very large	Product Owner for Citizen Development	75:00
			Business Lead Citizen Development	29:54
6	Energy and Utilities	Very large	Product Owner for Low-Code	75:02
7	Finance and Insurance	Large	Product Owner Power Platform	62:07
8	Professional Services	Large	Lead for Citizen Development	52:51
9	Energy and Utilities	Very large	Lead for Citizen Development	48:20
10	Transportation and Storage	Very large	Head of Digital Services	97:32
11	Manufacturing	Very large	Expert for Microsoft 365 (Power Platform)	64:13
12	Energy and Utilities	Very large	Product Owner for Citizen Development Governance	51:27
13	Manufacturing	Very large	IT Lead for Citizen Development	63:03
14	Manufacturing	Medium	Head of IT Services	47:57
15	Automotive	Very large	Product Owner and Center of Excellence Lead for Low-Code	67:29
16	Energy and Utilities	Very large	Lead Architect for Low-Code/No-Code Platforms	59:12
17	Public Administration	Medium	Head of IT	48:36
			Business Developer	53:14
18	Retail	Very large	Solution Architect	38:17
			Head of Product	63:13
19	Pharmaceutical	Very large	Head of R&D	49:12
			Business Process Manager	51:03
20	Telecoms	Very large	Head of Digital Work	46:14
			Business Manager	Head
21	Finance and Insurance	Very large	Product Owner Digital Onboarding	59:17
			IT Strategy Manager	39:06

Overview of Interviewees (Appendix A) (Continuation)

Case No.	Primary Industry	Firm Size[a]	Interviewee Role	Interview Duration (mins:secs)
22	Finance and Insurance	Medium	Lead for Citizen Development	64:47
23	Energy and Utilities	Medium	Product Owner for Business Processes	53:31
24	Automotive	Very large	Lead for Low Code	48:24
			Vice-CIO	54:45

[a] *Medium size*: Up to 2,000 employees and annual revenue up to 1 billion euros; *Large size*: More than 2,000 employees and annual revenue up to 5 billion euros; *Very Large size*: More than 10,000 employees and annual revenue greater than 5 billion euros
[b] Both participated in the same interview.

Citizen Development Design Choices Made by the 24 Case Companies (Appendix B)

Case No.	No. of Tools [a]	Low-Code/No-Code Architecture [b]	Citizen Development Hub Type	Citizen Developer Workforce Formation
1	4+ [c]	MP, MT	Type 2	Multimodal
2	1	SP, ST	Type 3 → Type 2	Certified and authorized
3	1	SP, ST	Type 2	Certified and authorized
4	1	SP, ST	Type 1	Certified and authorized
5	3	MP, MT	Type 3 → Type 2	Multimodal
6	2	MP, ST → MP, MT	Type 3	Fully democratized → Multimodal
7	1	SP, ST	Type 1	Certified and authorized
8	2+ [c]	MP, ST	Type 2	Fully democratized
9	3+ [c]	MP, MT	Type 2	Multimodal
10	2	MP, MT	Type 1	Certified and authorized
11	1	SP, ST	Type 2	Certified and authorized
12	6+ [c]	MP, MT	Type 3	Multimodal
13	6+ [c]	MP, MT	Type 2	Multimodal
14	1	SP, ST	Type 3	Certified and authorized
15	2	MP, MT	Type 3	Certified and authorized
16	3+ [c]	MP, MT	Type 2	Multimodal

Citizen Development Design Choices Made by the 24 Case Companies (Appendix B)

Case No.	No. of Tools [a]	Low-Code/No-Code Architecture [b]	Citizen Development Hub Type	Citizen Developer Workforce Formation
17	2	MP, ST → MP, MT	Type 2	Multimodal
18	3	MP, MT	Type 1	Multimodal
19	2	MP, MT	Type 2	Certified and authorized
20	2	MP, MT	Type 3	Fully democratized
21	3	MP, ST → MP, MT	Type 2	Multimodal
22	1	SP, ST	Type 1	Certified and authorized
23	1	SP, ST	Type 1	Fully democratized
24	3	MP, MT	Type 2	Multimodal

[a] Number of low-code/no-code tools officially recognized by the organization.
[b] ST=Single-Team; SP=Single-Platform; MT=Multi-Team; MP=Multi-Platform
[c] Interviewee did not specify the exact number; the minimum number is shown.
→ The organization reported that it had just changed or was in the process of changing its previous approach.

Development Hub and the formation of the citizen developer workforce.

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