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Why Citizen Development Is Inevitable

This is an unprecedented time in the 70-year history of business information technology. Amateurs, or *citizens*, are riding a new digital horse, and enterprise IT organizations can no longer fully control the reins. The repercussions will be profound.

Throughout the history of modern enterprise, IT organizations, automation groups, analytics and data science functions, or other professionals have been the sole or primary developers of enterprise capabilities in data and technology. This has led to great frustration in organizations due to greater demand than supply because IT professionals couldn't meet demand in a timely fashion. It has also led to frequent communication breakdowns between technical experts and business leaders and users.

Today, however, new technologies as well as more digitally oriented employees are making possible the development of technology solutions by amateurs outside of IT or other specialized groups—known as *citizen developers*, *citizen data scientists*, or *citizen automators*, depending upon what types of technology they are trying to create. Given the rapid developments in AI

that cross these boundaries—generative AI systems can already create application programs, automation workflows, or data science analyses—the best future term might be *technology-enabled citizens* or something similar. These citizens no longer need professional intermediaries to obtain the information and digital capabilities required to do their jobs. This development constitutes a revolution in how humans and machines combine to meet organizational objectives.

Once derided as “shadow” or “rogue” IT, applications, automations, and AI models developed by amateurs are already powering substantial components of organizations. IT organizations that were once unalterably opposed to citizen development have begun to encourage it. As companies seek to digitize much of their operations, they increasingly realize that the large population of enabled IT amateurs is essential to their success. Some companies still resist significant citizen development, but it seems inevitable in the long run.

What Are Citizens?

A *citizen* in this context is someone who develops applications of information technology outside of a formal information technology group within organizations. It is rarely a formal title but rather an informal description or persona. There are various versions of citizens, including *citizen developers* (typically using low-code/no-code application development tools), *citizen automators* (using robotic process automation tools or other automation systems), *citizen data scientists* (who develop sophisticated analytical or machine learning models), and even *citizen data engineers* (who use data management tools to manipulate data). As other professional roles using technology emerge, it is likely that there will eventually be citizen versions of them.

Our definition of *citizen* with regard to information technology is similar in some ways to Brook Manville’s and Josiah Ober’s notion of citizens in Athenian democracy. They wrote:

Underpinning all the achievements [of that society] was a system of governance based on personal freedom, collective action, and an open, democratic culture. Athens was at heart a community of citizens—a “politeia,” to use the Greek word—and each of those citizens had both

the right and the obligation to play an active role in the society's governance.¹

Just like Athenian citizens, technology-focused citizens need community, freedom, and responsibilities. Citizen developer communities are critical to individuals' ability to learn about new technologies and build on the work others have already accomplished. Freedom comes into play because being a citizen with information technology is a voluntary activity; it doesn't work well to force people to undertake it—they may lack either the skills or motivation, or both. And there are multiple different citizen activities from which to choose. Responsibility and obligation in the citizen technology user context involves adhering to guidelines and guardrails for effective technology use and being transparent about the technology capabilities a citizen has developed and how it was done. Developing technologies and systems may not be the citizen's only or even primary job, but it's a role that needs to be taken seriously.

As we've suggested, citizens generally hold jobs outside of IT organizations. They occupy an almost infinite variety of primary roles—doctors, marketers, supply chain analysts, financial analysts, entrepreneurs, human resource specialists, researchers, product developers, etc. But all of these jobs today involve information generation, manipulation, and consumption. Technology helps collect, store, process, and analyze that information. In many cases, citizens do more than create technology and manage information for their own jobs; they take on that responsibility for their department or business unit. Citizen-developed technologies, then, can be intended for use by one person (in which case they may not need a lot of governance or controls) or multiple people (when they probably require a bit more oversight). Some citizens have developed tools that are used by the entire enterprise, although this is somewhat rare.

Citizens are defined as people outside of IT, but they may move in and out of IT-related organizations over time. IT groups may realize that they would benefit from a citizen perspective in the creation of IT systems.

¹Manville, Brook and Ober, Josiah, "Beyond Empowerment: Building a Company of Citizens," *Harvard Business Review*, January 2003, <https://hbr.org/2003/01/beyond-empowerment-building-a-company-of-citizens>.

Earlier, these business-focused IT employees were referred to as *business systems analysts*. Today they take on other roles. For example, in data science groups (which may be in IT or may be in other parts of a company), professional data scientists were at one time the only real job role. Now, however, there are intermediary or hybrid roles that are increasingly found within data science projects and products. They may include data product managers, translators, or citizen data scientists. These people can develop or help to create data science models with citizen-level skills and can also oversee some of the operational and people-related changes that are required to make data science successful.

Somewhat confusingly, *citizen development* is used throughout organizations and the literature as both a broad term for citizen technology activity and a term for citizen application development using low-code/no-code technology. But we're also discussing citizen automators, citizen data analysts, citizen data scientists, citizen web developers, etc. So in many cases we'll use the term *citizen technology enablement* to describe all of the types of information technology activity that may be performed by citizens.

Why Is Citizen Development Growing?

As we've suggested, citizen development is growing because technology is becoming more human, and humans are becoming more technical. The first trend is a generally slow but continuous evolution toward technologies that are easier for nonprofessionals to use. Vendors began to produce tools for end users to create or customize solutions as early as the 1980s. The particular technology domains in which we have seen great progress include low-code and no-code program development, easy-to-use visual analytics tools, automated machine learning, web page development systems, mobile app development platforms, and automation programs. Even programming technology has become easier to use over time, and many professional programmers already draw from code repositories for much of their projects. Most automation tools were always point-and-click, drag-and-drop activities, but vendors have added even more easily mastered versions of their tools for citizens. Automated machine learning systems have made it possible for amateurs to generate complex machine learning models. Automation programs, such as robotic process automation tools or ServiceNow, have special versions intended for use by citizens.

The trend toward increased usage of these technologies became apparent to Gartner systems engineering researcher and analyst Eric Knipp in 2009, when he published a research report that first named citizen developers.² Gartner predicted at the time that within five years a quarter of all applications developed in organizations would come from citizens, although no one seems to have assessed whether that specific prediction came true.

Citizen-oriented tools became more common and more powerful between 2015 and 2022, slowly shifting the balance of power away from IT departments and toward the hands of citizens. However, the explosion of generative AI onto the scene in late 2022 has accelerated the democratization of powerful technologies in ways that almost no one was prepared for, least of which are IT departments and business leaders within enterprises. It has turned an evolution into a revolution. In many domains technology has become more citizen-oriented.

At the same time, most humans have become more technology-oriented. Virtually every participant in advanced economies today uses powerful technology on a daily basis—at the very least, downloading and using apps of multiple types on a mobile phone. Everyone has more computing power on their desktops and in their pockets than was contained in data centers a couple of decades ago. Online and inexpensive courses in multiple aspects of technology abound. While there remain some forms of detailed knowledge about IT development that are not possessed by amateurs, the gap between them and professionals is shrinking.

In addition to the increased supply of tech-oriented citizens and citizen-oriented technologies, the demand arising from traditional IT/business conflicts is also still at play. Business discontent with IT backlogs and the pace of IT development is a perennial issue, as is the communication gap between business stakeholders and IT professionals. It's been a long-standing truism that businesspeople understand their business, IT people understand their technology, and seldom shall the twain meet. While these factors haven't necessarily worsened, the broad digitization initiatives within companies may have decreased the willingness of citizens and their managers to tolerate them.

² The Gartner research report is proprietary, but the research is described in Darryl K. Taft, "Gartner: 'Citizen Developers' to Deliver 25% of Apps by 2024," *EWeek*, October 23, 2009, <https://www.eweek.com/development/gartner-citizen-developers-to-deliver-25-of-apps-by-2014>.

To quantify the level of discontent, a 2021 survey of about 1,000 “business decision-makers” (sponsored by a citizen-oriented technology vendor) found that:

- 3–12 months is the average backlog for planned IT projects, and the situation is worsening as business project demand outstrips IT budget growth.
- 55% of respondents say business units already do more than IT to procure or develop new applications.
- 53% of business decision-makers believe the volume of applications built or sourced by non-IT business units will increase over the next 12 months.³

IT professionals became an important role when businesses had limited direct access to information technology; mainframes and minicomputers resided in temperature-controlled data centers and serviced entire corporations. But today, technology is everywhere. Data and information are everywhere too. Large language models provide access to massive troves of intelligence, at a price that is virtually free. And, thanks to ChatGPT (and equivalents), coding is soon to be everywhere, since it is no longer a skill out of reach for most “nontechnical” people. At home and at work, we’ve all become constant users of computers, software, local networks, and the Internet. If it’s “shadow IT,” we’re all in the shadows now. More likely, however, shadow IT is being brought into the light.

Thanks to the mass simplification of technology development, we are all now the potential builders of the next generation of these tools. It’s only natural that the creation of business systems would shift from professionals to these pervasive and increasingly knowledgeable IT amateurs. One chief information officer told us that in meetings between IT professionals and knowledgeable business users, it is increasingly difficult to tell who belongs to which group—they all can discuss business issues (even if citizens understand them a bit better) and IT solutions to them (even if IT professionals understand them a bit better). There is no easy way to help IT understand

³“IT’s Changing Mandate in an Age of Disruption,” Economist Intelligence Unit report sponsored by Appian, <https://appian.com/learn/resources/resource-center/whitepapers/economist-survey-its-changing-mandate.html>, 2021.

the business better (other than having them work more closely on projects with citizens), but there are plenty of technologies available to help businesspeople develop better IT solutions.

The Front Lines of Digitalization

Copious data suggests that enterprises struggle with a chasm of digital capabilities. A quick Internet search for “why digital transformations fail” yields a plethora of blog posts, articles, and books on the subject. Digital transformation is taking too long, in part because millions of application development, coding, data science, and tech-associated jobs are going unfilled. To compete in the future, companies know they need more IT capabilities, and the current supply chain has failed to provide the necessary resources. The only way for companies to fill the void is through greater emphasis on skill development of their existing staff—their citizens.

Imagine two different organizations. Both have explicit initiatives underway to digitally transform their businesses. In one, the IT organization tries to carry the load by itself. There, the mandate to digitize has only created more demand for new applications, automations, and data analyses—but no new supply. Department leaders and digitally oriented professionals initially submitted request after request, but as the backlog grew, they became discouraged and stopped bothering to ask when their solutions would be forthcoming. After a couple of years, no one even mentioned digital transformation anymore.

In the other organization, digital transformation was a broad organizational mandate. IT was certainly a part of it and had to update a variety of enterprise transaction systems as well as moving most systems to the cloud. They had their hands full with this aspect of the transformation.

Fortunately, in this hypothetical company many citizens were engaged in the transformation process as well. They built individual and departmental applications and even an occasional mobile app for customers—mostly with a quick review from a helpful IT professional. They automated their own processes after improving them. They built dashboards, scorecards, and even some straightforward machine learning models for marketing, supply chain management, and human resources. Digitizing the company was regarded as everyone’s job, and thousands of initiatives took place all around

the company. Not surprisingly, the company began to outdo its competitors—not only on digital capabilities but on market share and profitable growth as well.

These two organizations are fictional, but they are reflective of a variety of companies we've seen and researched for this book. Almost every company, nonprofit, and governmental organization wants to be more digital these days, and for good reason. It leads to less friction in dealing with customers and suppliers, product and service offerings that are better attuned to customer needs, more satisfied employees, a better fit between production and consumption, and so forth. It's a worthy objective, so why not try to achieve it with all the resources available to an organization? Noel Carroll, a business school academic at the University of Galway, researches citizen development and has concluded that organizations employing it broadly have considerably more "digital agility" than those that do not. We wholeheartedly agree.

Citizens as we've defined them are the front lines of digitalization. Just as we rely upon frontline workers to figure out better ways to do their work, to satisfy customers, and to make good use of their work hours, we can now rely upon them to use information technology to make themselves and their departments or functions more effective and productive. Where we once depended upon frontline employees to practice Lean Six Sigma or other approaches to quality improvement, we can now also allow them to create applications, mobile apps, automated workflows, and data analyses. Not everyone wants to be a citizen developer of technology, but increasing numbers are willing to volunteer—particularly if the communications, tools, and incentives are right.

When frontline employees develop their own technologies, there is often a very different attitude about them than with centrally developed systems that are imposed by IT. We've all experienced systems that we have to use by central mandate, and we often don't like them much. We focus on their shortcomings more than their advantages, and we resent having to learn the new tools or to change our work processes to incorporate them. But when we develop the technologies ourselves, we're much more tolerant of any problems, and we're more likely to be positive about workflow adjustments that we've imposed upon ourselves.

It's also possible—though just speculation at this point—that citizen enablement could play something of a leveling-up role in financial inequality. Satya Nadella, the CEO of Microsoft, has argued that citizens on “the front line” in many industries could learn new skills, accomplish new tasks, and be paid more as a result. The phrase he used in a speech was that “IT level wages can go to the front line.” If this seems self-serving for the CEO of a company offering citizen development tools, then David Autor, a respected labor economist at MIT, has made a similar point. But Jeremy Kahn, a *Fortune* magazine editor, argues that this leveling function is far from certain—in that, for example, citizen enablement could end up reducing the compensation of IT people—so it is far too soon to count on any reduction in inequality. He compared writing software by citizens to a time-consuming and unrewarded task like making travel reservations; he wrote:

The same may not happen with the task of building software or compiling and analyzing data—workers will now be expected to do it themselves, without any increase in pay or compensating reduction in primary responsibilities. So our jobs might just get a little more stressful and more miserable.⁴

Kahn's perspective suggests that to make citizens happy in their jobs, we'll have to figure out ways to motivate and incentivize citizen development. And our research suggests that many organizations haven't figured out how to do that well yet.

Not every citizen-developed technology will function well or advance the broader digital cause, but many will—and far more than just professional IT developers can create. Of course, there are risks to citizen tools and activities, and we detail them in this book. But after talking with more than 100 people involved in citizen development—citizens themselves, sponsors, IT leaders, vendors—we have yet to hear any disaster stories.

⁴Jeremy Kahn, “Microsoft CEO Satya Nadella Is an AI Winner. He Doesn't Like to Talk About the Potential Losers,” *Fortune Eye on AI Newsletter*, Jan. 16, 2024, https://links.newsletter.fortune.com/e/evib?_t=5c2d888702774d17aa3d0350287b6d73&_m=311acf79dbf244828a364b900a35975c&_e=4G0Hw7D4GkaYxYrnqlsLzhT5cLZVa0RdeAEkXuXNwMUNggQeXqz6jGNH7247xFq6.

With proper guidance and governance, development of technology by people at the front lines of organizations can be empowering, productive, and safe.

Monarchy, Federalism, or Anarchy?

More than 30 years ago Tom coauthored an article called “Information Politics” in which he and his coauthors compared data management approaches to political power structures.⁵ The primary alternatives were monarchy (or more broadly, autocracy), federalism (a common form of partial democracy), and anarchy (we won’t discuss here two others: technocratic utopianism, or assuming that technology solves all problems, and feudalism, in which there are multiple monarchs). Citizen development approaches can be similarly classified.

In some organizations, IT is the king or queen, and citizen enablement, if allowed at all, is viewed as a lowly activity practiced by commoners. Such a monarchy, of course, is not the best environment for citizen activities to flourish. Under federalism—which Tom and his coauthors deemed the most desirable model for information management—there are some domains reserved to central IT groups, such as transactional systems of record and key data definitions. The remaining types of development are allowed and encouraged to be done by citizens. We think that federalism is generally the right model for facilitating citizen development. As in federalist democracies, however, effective federal models for citizen development do require some strategizing (and perhaps even arguing) about what activities are allowed by what parties.

The third model, anarchy, is what could happen in organizations if citizens had no oversight or governance. There might be, for example, as many systems and information results as there are employees—“infinite versions of the truth.” The organization might become dependent upon citizen-developed systems that no one even knows about or for which the developer has long departed the company. IT budgets could become both bigger and more difficult to control, as many individual users contract separately with (the same in some cases) vendors of software and data. And poorly developed systems by citizens could be hacked into by cyber-crooks.

⁵Thomas H. Davenport, Lawrence Prusak, and Robert Eccles, “Information Politics,” *MIT Sloan Management Review*, Fall 1992, <https://sloanreview.mit.edu/article/information-politics>.

Many organizations are moving rapidly toward an information politics model that is closer to federalism than monarchy. And as we've stated, some monarchs (IT leaders) welcome the change. Just as in nation-level democracies, there are plenty of reasons to urge more citizen involvement. On the positive side, widespread citizen enablement could usher in a much broader and faster approach to technology-based innovation in organizations, including digitization, automation, and data analysis. With no need for an intermediary to misunderstand requirements, more systems that are developed will fit the business need and will actually be used. IT professionals wouldn't become obsolete, but they could focus on monitoring citizen-developed tools and building complex systems and technologies that truly require their expertise.

Of course, the citizen revolution raises questions about what is the ultimate fate of IT organizations within companies and how they can facilitate and safeguard citizen development without placing too many obstacles before it. Passing on the benefits of citizen development is economically infeasible, and not to manage it effectively is equally untenable. We'll address this tension at several points throughout the book.

Another potential benefit of citizen development, if it is executed in an aggressive fashion, could also change the relationship of employees to organizations. Information technology has historically involved *creators* (IT professionals) and *users* (some might prefer the term *victims*, but we think that's a bit exaggerated) who are relatively powerless users of the technology developed by others. But just as legions of Six Sigma colored belt-wearers transformed process improvement around the turn of the 21st century, citizen development could spark a new era of digitally enabled business improvement. Citizens could not only improve or streamline their own business processes and tasks but could automate and analyze them as well. In Chapter 15, "Guidance," we even propose a citizen development belt hierarchy, although it doesn't approach the complexity of the five- or six-level (depending on your source) Six Sigma belt assortment.

Such widespread citizen activity could have two different and opposing impacts. It could spark increased engagement with work and would likely improve employee satisfaction and retention. Or it could lead—as social media conversations suggest it already has—to employees automating key tasks in their own jobs and using the freed-up time to find second or third jobs or to surf popular Internet sites. While we believe the first outcome is

more desirable for the organizations that sponsor and cultivate citizen capabilities, they have to work out appropriate motivations and rewards for citizens to avoid the latter outcome. Either way, we suppose, citizens will be happier in their job (or jobs).

Like Seemingly Everything Else, Citizen Development Is Social

Another reason why citizen development is a growing and successful movement is the social nature of the activity. If you're a citizen in a large company, chances are good that there are regular meetups, hackathons, etc., to discuss different aspects of citizen development. Creating such a community is usually a fundamental responsibility of the citizen development champion, as we discuss in Chapter 8, "The Citizen Champion, With and Without Air Cover."

But even if you're a citizen developer who labors from a basement couch, there are plenty of online social sites in which citizen technology efforts can be discussed. There is the "overemployed" branch of citizenry, which regularly discusses on social sites their ability to use citizen-developed solutions to hold down multiple remote jobs. Another prominent site that we'll describe in Chapter 2, "A History of Citizen-Led Innovation," in the context of citizen data science is Kaggle, which is primarily viewed as an online data science competition venue (with more than 16 million members, now owned by Google). In addition, however, it offers learning tools, previously developed machine learning models and notebooks, and a discussion board for every competition. Some of the Kaggle participants are professional data scientists looking to make a few extra bucks in a competition, but many of them are amateurs.

There are also a variety of "community" sites run by citizen-oriented vendors. Alteryx, for example, has an Alteryx Community site with an academy for learning the tools, a discussion board, and a "gallery" of previously developed workflows and other Alteryx assets to share. The discussion board often reveals its citizen focus; the first post we looked at starts with this:

Hi community,

Maybe this is a dumb question so apologies in advance.

Microsoft also supports a large online community site for Power Platform users (when we first accessed the site, it boasted 882,000 members).

It also includes forum discussions, events, user groups, and tutorials. Its citizen orientation was also revealed by the first post we read, which included this:

Hoping someone can guide me with some steps since this is the first time I have worked with Copilot Studio.

Even general-purpose discussion boards sometimes address citizen development topics. For example, Tom's former coauthor Julia Kirby referred him to a posting on Reddit by a user ("Chonny") who used machine learning language analysis models to analyze the New Testament chapters attributed to the apostle Paul. He wanted to determine how likely they were to be written by Paul (many were not, he concluded). Although the work seems to us a pretty sophisticated analysis, he made it clear that it was an amateur effort.

I have a bit of time and access to good NLP [natural language processing] models at work. . . This isn't intended to be serious research, but could be considered a starting point or template for those curious to pursue this further. Note that the Epistles were originally written in Greek, while the classifier is trained in English. Better results would likely be obtained using a model trained in ancient Greek.

After posting his results, he received some constructive criticism from other Reddit users, suggesting, for example, that he did really need to analyze the original Greek texts. But some were quite encouraging, such as this post:

Seems like a fun "napkin-math" experiment and while some might be confused by the indeterminate results, having a bit of background in the tech I think the fact your model had such a significant result for Titus was a surprising success.

However, Tom's friend, Julia, suggested that the religious establishment might not be happy about this sort of work.

This is a fun example to me because of course what he's proposing would be a big deal to the Catholic Church, which has of course

immense resources it could use to equip people in its hierarchy with AI tools but presumably is not doing so . . . and probably isn't crazy about the idea of some amateur sleuths making findings with the potential to undermine doctrine. (They're still getting over that Luther guy.)

In other words, corporate IT organizations are not the only potential objectors to citizen development.

But the larger issue is that the social nature of citizen development makes it generally more successful. For vendors, online social activity takes away some of the support requirements that would otherwise be necessary. For citizens themselves, not only do they get suggestions about how to do their IT work better, they also feel like they are part of a larger group that is doing this work and is passionate about it. Any opposition they face from inside their organizations might be countered by support (or at least interest) from the online community.

Support from social sources, however, doesn't mean that citizen development is safe. As we've noted, without proper controls and guardrails, widespread citizen development could usher in chaos. We'll describe some approaches to preventing such chaos throughout this book and preview some of them here.

Making Citizen Development Safe and Effective

Because citizen development can—even if rarely—cause problems and create risks for organizations, it's important for IT organizations—or whichever group is primarily overseeing citizen activity—to institute approaches and policies to make citizen-developed IT systems effective and safe. It's common to refer to such approaches as *governance*, but that term is only a part of what organizations need. *Enablement* is perhaps more appropriate because it encompasses all activities designed to make citizen-developed tools work well. Enablement consists of four components: genesis, governance, guardrails, and guidance. Each is described briefly here.

- **Genesis:** A journey of 1,000 innovations begins with a single step. In the case of citizen development, it is important to understand and support who takes those first steps, and how. Most citizen initiatives

are often grassroots and happen rather organically, based on the creativity and inspiration of individuals in various operating departments and teams across an organization. As such, the tools they use, the solutions they develop, and the approaches they take are almost entirely ad hoc. We showcase such grassroots efforts by a finance professional at Mass General Brigham Hospital, a supply chain expert at a large consumer products company, and countless others. Some other organizations have a much faster launch, creating a support organization and orchestrating citizen learning and technology adoption. This approach, exemplified by Shell, is generally more desirable but less common. In studying the citizen trend, it's particularly important to understand how these initiatives take root, and provide the most supportive and clear environment and set of systems to ensure high rates of early (and compliant) success.

- **Governance:** This is the typical term used to describe how organizations ensure safe systems and data. It has not been a popular term with many businesspeople; who wants their work to be governed? But it is sometimes necessary, particularly when citizen systems or models have a negative impact on transactional systems of record or when they use key data elements and modify them in ways that create “multiple versions of the truth.” Companies in highly regulated environments will also be concerned about analytical or AI systems that use personally identifiable data in ways that may not be private or secure. Approaches to governance may involve mandatory reviews by the IT organization, or, at the least, appointment of some manager within the citizen's organization to perform data stewardship activities. Another approach to governance, in a healthcare provider, automatically identified any data that might be of interest to external regulators.
- **Guardrails:** Companies may also try to build in automated or semi-automated guardrails that make it easy to do the right thing with citizen technologies and difficult to do the wrong thing. One insurance company, for example, used a citizen automation tool that automatically alerted the IT organization when it was created. Other examples of guardrails might include data catalogs or libraries in which clean and official versions of data are stored and made accessible; application program interfaces (APIs) to transactional systems

that are read-only; and repositories of code, automation programs, or machine learning features that have been tested and can be easily reused. AT&T, for example, has an extensive program of citizen automation and data science with an extensive automation code library and a voluminous feature store for machine learning models.⁶

- **Guidance:** Citizens also need guidance on whether the applications they have developed are safe and effective and how to master new technologies. Some companies offer individual guidance to citizens; for example, Mayo Clinic’s AI Enablement organization encourages employees with ideas for AI applications to talk with a professional about the idea and how it might best be developed. If there are regulatory or technology infrastructure issues with the proposed application, the citizen is informed about how best to proceed. Other organizations offer regular community meetings of citizens to discuss new technologies and how best to use them. Wolters Kluwer, for example, has an “Addicted to Learning” series that teaches citizen developers, automators, and data scientists about new technologies that are relevant to their jobs and the company.

With this multifaceted approach to enablement, organizations can build citizen capabilities while ensuring a low level of problems with the tools they develop. Further, the concept of “enablement” is much more appealing to citizens who just want to get their work done and do not view a heavy governance hand as positive. Enablement activities signal respect for citizens rather than control. In Chapters 13 through 16 we’ll describe each of these “4Gs” in greater detail and discuss organizations that have successfully embraced all three aspects of enablement.

Generative AI and the Future of Citizen Development

Although generative AI only became known to most audiences in late 2022 with the release of ChatGPT, it already seems apparent that it will revolutionize citizen development. It’s clear that it is or will be a very com-

⁶Thomas H. Davenport, “Citizen Data Science and Automation at AT&T,” *Forbes*, Jan 30, 2023, <https://www.forbes.com/sites/tomdavenport/2023/01/30/citizen-data-science-and-automation-at-att/?sh=72a820f21b32>.

mon interface to software for code generation, low-code/no-code development, automation offerings, and analytics and machine learning. It may even replace the need for some of these programs; the Advanced Data Analysis feature in ChatGPT Enterprise, for example, can create machine learning models (by generating Python code) that rival those from specialized machine learning software. The only barrier to supporting many different business tasks with sophisticated technology will be the ability to express what one wants to accomplish in simple language. Even that barrier may be eased as generative AI systems develop conversational approaches to prompting.

Citizen development already seemed inevitable, but generative AI will only make it more so. Companies should begin now to prepare for this situation by educating citizens about the possibilities that generative AI offers them. Generative AI and the systems it controls or interfaces with will need clear access to high-quality data—both structured and unstructured—to perform data analysis and create applications and models, so data preparation and ongoing curation are other important preparatory activities. And since generative AI is likely to lead to a substantially larger number of citizens in most organizations, organizations should prepare for a greater degree of enablement activities to ensure the quality and ease of citizen development.

It may be that generative AI is the final straw that breaks the model of most IT development coming from professionals. There is little doubt that advanced levels of IT expertise will continue to be necessary, but the bulk of it may be devoted to guidance and oversight of citizen development. Active involvement by IT leaders in building citizen capabilities will undoubtedly make the movement more successful in organizations. Some IT professionals may find this a distasteful future for their profession, but others are likely to welcome and thrive in it.

