Using low-code platforms for faster and more cost-effective development of digital citizen services
Increasing need for faster development of digital citizen services

Government agencies worldwide are looking to provide a better-quality and less-costly digital service experience to citizens. Governments need to deliver services faster and cannot afford to spend months in writing requirements and then developing and testing new applications.

Typical responses from government leaders include implementing innovation plans, applied performance management and budget cuts to spark transformative change. However, most of these initiatives have failed to turn the tide on delivering sustainable improvements. Budget cuts have led to short-term cost savings at the cost of infrastructure, system maintenance and upgraded life cycles.

Government chief information officers (CIOs) recognize that their agency must be agile and innovative, but they struggle to be responsive in developing digital initiatives. CIOs must balance addressing their decaying application landscape with contributing to their agency’s digital needs.

The top priority for application developers in the government sector is to improve the quality of digital citizen experiences, followed closely by reducing service delivery costs. But is that possible with traditional software tools and processes?

Hard-coding applications in traditional languages may offer maximum flexibility and customization, but this typically comes at the expense of longer development times and higher budgets — due to managing complexity in designing, testing, deploying and maintaining the applications.

It is time for a different approach. It is time for low-code platforms.
Why low-code platforms in governments are needed now

With low-code platforms, developers are no longer writing all code manually. Instead, they use visual modeling tools as a service in the cloud to quickly assemble citizen-facing web and mobile applications. This makes the process of creating an application fast, and organizations can implement digital solutions much more quickly (Figure 1).

From Code... ...to Low code/No code

In its Magic Quadrant for Enterprise Low-Code Application Platforms, September 2020, Gartner defines a low-code application platform as:

“An application platform that supports rapid application development, one-step deployment, execution and management using declarative, high-level programming abstractions, such as model-driven and metadata-based programming languages.”

Gartner states that low-code platforms are mature, and that enterprise low-code application platforms offer compelling productivity gains as well as speed-of-delivery benefits.

Following the faster release cycle of new policy measures by politicians, the demand for rapid deployment of processing applications increases in the public sector. Agencies need a quicker way to deliver — and low-code development platforms provide a proven method to shorten time to value for these new applications. Additionally, as efficiency, transparency and flexibility are increasingly crucial to the public sector, the need to use a standards-based platform is becoming necessary to meet all of these nonfunctional requirements.

Although every extra component always comes with integration challenges and risks for lock-in, low-code platforms do come with abundant pre-built, out-of-the-box integrations.

In summary, low-code platforms offer faster development, excellent user experiences on all channels, and the power to extend or even replace back-office applications that in the past have proven costly and slow to change.
Embracing citizen development and ecosystems

When business users ask an IT team for a schedule to develop a critical new application, the typical answer is, “We’re almost done modernizing. We should be finished in the next few months.” This typically means that IT will not be able to take care of your requirements in a short time frame. There needs to be another way for business to take ownership of development, without jeopardizing the integrity, security, performance or effectiveness of the IT landscape.

Enter citizen development. A term often associated with low-code platforms, citizen development allows IT professional and public and private organizations to create functionality through user-friendly interfaces and (web) applications deployed on corporate IT infrastructure. According to the Gartner IT Glossary online:

A citizen developer is a user who creates new business applications for consumption by others using development and runtime environments sanctioned by corporate IT. ... [However, today,] end users can build departmental, enterprise and even public applications using shared services, fourth-generation language (4GL)-style development platforms and cloud computing services.

Because low-code platforms are very accessible and exciting to use, they encourage more people to take on the challenge of creating business functionality for automatically rolling out into production.

Where IT professionals are scarce, this is an effective way for the IT department to increase the number of contributors to the application landscape. This is even becoming a necessity, as IT teams are often locked into maintaining the existing estate and face a growing backlog of application requests. Digital transformation increasingly demands new applications delivered with a fast turnaround.

Thus, the application development ecosystem needs expansion, which can be as simple as opening a low-code development environment to more civil servants or attracting talent pools via startups or universities. The offloading of the traditional IT team brings various benefits, such as:

• **Speed.** Faster deployment of solutions can help address new government policies.

• **Agility.** The business can now, with the help from the right ecosystem, design the new user experience in a more agile and iterative way, expediting its speed to market. This includes empowering more people to own a piece of solution development.

• **Focus.** The IT team can now focus on setting up the standardized and secure environment, assuring the integration of legacy applications and providing the right conditions for producing and supporting low-code artifacts.

• **Standardization.** Standardizing on common and reusable low-code platforms across the agency or the government ensures the best cost-benefit ratio or ROI for all, while reuse can be stimulated across agencies or even the ecosystem.
The role of IT and enterprise architecture is vital to creating the right environments for citizen development to thrive, avoid havoc or security breaches, and help teams understand the financial and other such impacts of individual integration decisions. There is a new symbiotic relationship coming to live here, where flexibility is made possible through standard environments.

Low-code platforms are not an excuse to “program just about anything.” IT professionals work with basic coding principles such as performance, application robustness, consistency in user interface design, code maintainability, documentation, security, privacy, etc. This behavior needs to be reflected in low-code solutions, too.

The above also introduces a change in the business organization as more responsibilities for developing applications (using low-code platforms) are shifting from the IT team to the business team or the ecosystem. Business users will need to be coached in new methods like design thinking to understand how a great citizen user, or customer, journey should look. Then they will own the creation of the code that follows establishing a good citizen experience.

Introducing low-code platforms comes with tasks for both the IT and business sides and thus requires good change management. Even a new business-IT relationship needs to be established.

The right platform for the right purpose

Obviously, the quest to allow business users to develop applications themselves is not new. Many technologies have claimed they are so easy to use that business users can build and deploy applications on their own.

With low-code platforms, the difference is the strong integration with the infrastructure, such as the cloud. All big cloud players now offer a low-code approach in their portfolio, and they have made major investments in making sure the code integrates well with other products. In fact, they have done a great job of incorporating the infrastructure and deployment choices into the application suite. For a developer, it has become easier than ever to use these platforms. Examples of this include the PowerApps approach of Microsoft, Honeycode by AWS or Google’s latest announcement with AppSheet.
Not only are cloud vendors providing integrated low-code platforms, even big software players such as Salesforce, ServiceNow, Oracle and SAP now include options to create add-on applications on top of their platform in a low-code way. Many independent players, such as Mendix, OutSystems, Betty Blocks and Zoho, as well as several startups, are providing new and innovative approaches to low-code development.

Because there is so much choice, we will now provide our thoughts on choosing the right platform (Figure 2).

First, on the X-axis we map out application’s complexity. We define a range — from applications with limited complexity and simple, straightforward workflow and processes to applications with complex workflow and substantial integration requirements, wherein the decision of eligibility is the result of a business validation process that often cannot be determined in real time.

On the Y-axis, we consider the application’s criticality. Here, we define the range — from applications that have a limited number of users or are not business-critical to applications that are widely used (e.g., public facing), which are business-essential and require always-on business and IT support.
In this model, we see four different zones of typical usage patterns:

- **Zone 1: Business leads, creates and deploys independently**
  In this zone, the business leads the development and deployment of applications. The business can decide when to put an application in production, be it for internal usage or limited external usage. Obviously, the IT department will have set up the necessary standards and protocols to enable this flexibility, so low-code platforms are well defined and standardized across the portfolio of services and well-integrated with security features.

  Zone 1 is a mandatory location for embracing low-code application platforms and to gradually motivating the business to be in control of its application estate.

- **Zone 2: Business leads and deploys, IT supports**
  As complexity or criticality rises a bit, we enter zone 2. The business or ecosystem still owns the initiative to develop applications using a low-code platform. However, due to increasing integration challenges, the IT department’s help is needed. Version management, solution stability, applications not impacting one another — these matters all need proper consideration. This requires good business/IT alignment, but given the right governance, the business is still in control.

  Zone 2 is a good candidate for using low-code application platforms.

- **Zone 3: Alignment and collaboration are needed, IT coordinates and deploys**
  Moving up to zone 3, we position here those applications that are business essential and require integration with other applications for the end-to-end business process to work flawlessly. Due to the rising complexity of the integration, IT must be involved in the deployment of the application. Business can still develop code in a low-code platform, but as more complex integration features are needed to send or receive data or events from other applications, IT must validate and conform to the standard (and secure) approach.

  Zone 3 is a good candidate for using low-code application platforms but will require the IT team’s assistance to help facilitate integration and deployments with other applications.

- **Zone 4: Enterprise grade, with professional IT developers**
  In zone 4, we are positioning enterprise-grade applications that follow a complex logic and require a lot of integrations with both modern and legacy applications often still running on noncloud environments and not yet using APIs or microservices to exchange information. In this zone, lots of custom code using professional IT developers need to be closely assembled and combined to release the application to production. Some parts of the infrastructure are not yet deployed or migrated to the cloud and require specific mechanisms to handle. This requires capabilities within the IT department to handle changes and move new applications to production.

  Today, zone 4 is still seen as an emerging candidate for using low-code application platforms. It provides low-code opportunities for specific parts, but due to the heavy-lifting integration work — often with legacy and noncloud environments — it demands professional IT skills.
We encourage the usage of low-code platforms in zones 1, 2 and 3 and suggest keep an eye open toward zone 4. With further expansion of the low-code platforms, we see a trend upward. So, as these tools further mature, it is inevitable that these low-code platforms will be used for significant work (Figure 3). Low-code platform vendors claim that they are already enterprise grade, and some might be.

Starting to position low-code platforms as part of the application development standards is now an important part of a government agency’s IT strategy and roadmap. Gartner predicts that by 2024, 65 percent of application development can be covered by low-code platforms.

The next step for an IT agency is to fill in the zones with the appropriate technology. This will be an ongoing task as these low-code platforms continue to evolve (Figure 4).

Figure 3. Use of low-cost platforms is projected to grow.

Figure 4. An example of coverage of the selected low-code platforms (for illustration only; not advocating for the selection of three platforms)
It is unlikely that one size will fit all, but the market evolves quickly. Today, IT departments can define technologies and standards, and low-code platforms can be put to work. In the next section, we will discuss several possible scenarios for doing so.

**Potential use cases**

So, what are the potential use cases for these low-code platforms? Let us go back to the diagram we have been using and now lay on top of it some typical services (products) provided by a government agency (Figure 5).

On the left side of the diagram, we propose a mapping toward typical processes in a government agency, while on the right side, we have tried to map these processes to typical services (products) that a citizen can request.

**Prototyping**

In an agile world, a prototype of the application is created before going live or building it out in a production environment. Here, also, low-code platforms can help increase productivity and efficiency (Figure 6).

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**Figure 5.** Typical government processes and services for low-code deployment

**Figure 6.** Key steps for incorporating low-code development
When the business has a new idea, low-code platforms can help visualize the flow and customer journey that the idea supports. The business can make use of agile techniques like design thinking to define what a good experience for the user (both internal users and citizens) would look like and build a prototype. The business can iterate several times before deciding that the concept is ready to move to production or needs to be enhanced.

Depending on the complexity and need for integration with other applications (including legacy), the choice for one low-code platform might change to another platform, be it for cost efficiency, maintainability, integration or security. Even so, the work done earlier is never lost, as it has served its purpose of enabling a fast prototype. Together with the IT department, the business can now decide to continue upgrading features and reuse the same low-code platform or work together with IT professionals to move to another coding approach.

**Conclusions and recommendations**

We observe that low-code platforms are on the rise, and most or all cloud or solution vendors have a low-code extension available. Some government agencies are exploring these options on their own.

Therefore, our recommendation is for the business and IT components of a government agency to jointly start exploring where and how low-code platforms can serve as an alternative to developing applications. The purpose should be to enable the business — and by extension, also the ecosystems — to assemble and put applications into production, for both internal and external citizen-facing services, or products.

This does not mean that the IT team is set aside. It means that the symbiosis of both teams working together to enable a more efficient and productive way of creating applications will be strengthened. Empowering the business will require a process of change and coaching. Setting the right standards and platforms in place will require vision and IT planning. So, it can only be done if the business and IT share the same vision. Starting with setting up prototyping is a good first step for those who are not yet familiar with low code.
About the authors

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