Low-code:
empower the capability to accelerate

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In today's fast-changing environment customers are better informed, better connected and more demanding than ever before. Digitization is no longer a choice, it is indispensable. Irrespective of the size and industry you are in, your organization needs to continuously transform to survive in the evolving and demanding business environments.

Traditional application development falls short and cannot keep up with the demands from the business. Low-code platforms proved over the last years to provide a solution to deal with both business and IT challenges. Low-code software development can therefore be a serious accelerator, driving the digital transformation of your organization! This article looks at the potential and the reality of low-code development platforms and how low-code can drive digital transformation within organizations. It illustrates how to start your low-code journey, what it entails and how to make low-code software development a success for your organization.

We need to **offer new products** and enter **new channels**

We need **digital experiences** for customers and employees

We need to **get rid of manual processing** though Excel/Acces applications

We want to **embrace innovation**, while minimizing (security) risks and keeping control

Business Demand

IT Capacity

We **can't respond fast** enough

We have **not enough skilled developers**

Our complex IT landscape and **legacy systems slow us down**

We need to **manage many software vendors**

Our high **maintenance costs limit budget** for innovation

Figure 1. Business and IT challenges regarding application development.

INTRODUCTION

Today's businesses aspire more and more technology-based innovation. This leads to growing demands for software development to perform in fast-changing environments and live up to customer expectations. At the same time, the complexity of systems and the IT landscape, long lead times for changes and limited developer capacity interfere to meet these increasing demands.

Low-code development platforms employ visual, declarative techniques that make it possible to develop software model-based, rather than the traditional writing of software code. Research shows that this does not only speed up software development and shorten time to market but also frees up time for experienced developers and it makes software development more responsive and accessible for the business ([OUTS19]).

In this article, we will look at the potential and the reality of low-code development platforms and how low-code

can drive digital transformation within organizations. We will show you how to start your low-code journey, what it entails and finally, we will provide guidelines on how to make low-code software development a success.

BUSINESS APPLICATION DEVELOPMENT CHALLENGES

The recently published CIO survey by KPMG and Harvey Nash [KPMG19] clearly shows that both digital leaders and established businesses have as a priority to develop innovative new products and services, deliver consistent and stable IT performance to business, improve business processes, increase operational efficiencies and enhance the customer experience. However, the challenges are numerous, as summarized in Figure 1.

Both business and IT feel the pressure mostly driven by the ongoing digital transformation. It's fundamentally changing the way the business operates and delivers value to customers.

- The business needs to develop innovative new products and services, to improve their business processes and to enhance customer experience to attract customers with technology as the enabler.
- IT needs to deliver the business transformation resulting in growing backlogs while maintaining a stable (legacy) IT landscape within a tight labor market.
- Specifically, for software developers it is a challenge to keep up with the pace of changes in the software development world; the rise of modern software development platforms, new frameworks, integration possibilities, modules, etc. are almost impossible to keep up with. On top of that, organizations demand developers who understand the business process and work in an 'agile' way.

Business demands for technology-based innovation keeps outpacing IT delivery capacity

INTRODUCTION TO LOW-CODE

Low-code platforms proved over the last years to provide a solution to deal with the high business demands for technology-based innovation and the challenges of IT and developers. Low-code software development can be an accelerator to drive the digital transformation of your business!

> Low-code development platforms employ visual, declarative techniques that make it possible to develop software model-based; development mainly happens with visual graphical user interfaces, which means that programming involves more configuration with models rather than traditional writing of software code.

Visual modelling promotes a better understanding of requirements, cleaner designs, and more maintainable systems. Models help us organize, visualize, understand, and create complex things ([Qua02]). In general, this means that, compared to traditional programming, a higher productivity rate can be achieved.

That's exactly the promise of low-code platforms such as OutSystems, Mendix, and Betty Blocks; acceleration of the digital transformation by enabling rapid application development of business applications with a minimum of development, as well as minimal upfront investment in setup, training, and deployment ([Vrie19]). They are offered as a platform as a service (PaaS) and are intended for developing and delivering enterprise web and mobile applications, which run in the cloud, on-premise or hybrid environments. By offering full application lifecycle management, from design to deployment and maintenance, low-code platforms empower organizations to focus on customer experience and innovation, rather than on application development and management.

Next, we will dive into the promises and caveats of low-code and how it can accelerate your digital transformation in more detail.

LOW-CODE CAN BE A CATALYST TO YOUR DIGITAL TRANSFORMATION

Today's customers are better informed, better connected and more demanding than ever before. The only survival essential for businesses are to transform rapidly and sustainably. Organizations are aware of the increasing importance of the Digital Transformation. It is the whole process of transforming your business and organiza-
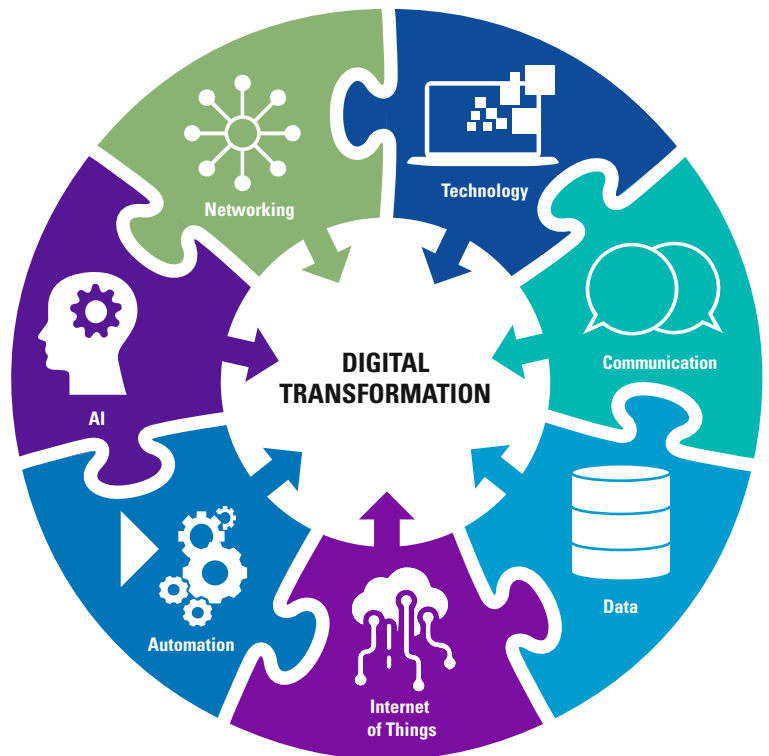

Figure 2. Digital Transformation - Connecting the Disconnected.

tional activities, processes, people and business models to benefit from the mixture of digital technologies.

According to the KPMG research [KPMG17], making digital transformation a success begins with a fully integrated front, middle and back office, creating a 'Connected Enterprise', which is fully focused on the customer. Organizations that are getting connected by making significant investments across several connected enterprise capabilities are better able to understand what customers need and value, and they achieve it by delivering the intended experience in a profitable way.

There is not one tool, technology, or solution which can shape all these capabilities. Rather we need multiple tools or a platform which is interoperable, flexible and easy to integrate. This is exactly the reason why implementing and applying low-code development to business strategies has become more and more appealing to organizations.

What does low-code promise?

Low-code platforms promise to be of help in a variety of ways. Let's look what low-code promises, why it is so appealing and how it can help to overcome the challenges that are holding back the Digital Transformation.

Increases productivity and shortens time to market

Low-code is a Rapid Application Development (RAD) technology. RAD tools are enabling organizations to create reusable software components that represent business services in a rapid way. There are many languages, libraries, and frameworks available now to the development community. These can speed up the development, but still requires the team to design the prototype, data modelling, code the app, do the version control, perform DevOps activities, release management, application monitoring, etc. Low-code platforms make use of a visual modelling development approach to application development, resulting in fast development ([Kuma19]). Low-code platform also comes with a complete pre-built deployment process with no downtime and no interruption to business operations. The promise of low-code solutions is that it offers everything from design, development, testing, integration and deployment of apps within a single solution.

Aligns business and IT so business leaders can solve digital challenges

Business-managed IT, a phenomenon where technology is managed by business units themselves, isn't going away. In 2019, 64% of organizations allow business-managed IT investments ([KPMG19]). Business-managed IT requires a new relationship between business and IT, and those that get it right are much more likely to be significantly better than competitors because of the seamless connection between business requirements and technical execution. Low-code development platforms will enable business and IT to truly converge, enhances mutual understandings, and boosts agile way of working.

Bridges workforce skill gap

With the increasing demand for digital, organizations face challenges fulfilling the growing demands for developers; in 2019, 67% of IT leaders accept the fact that skill gaps are a major challenge for their businesses ([KPMG19]). More and more organizations are opening doors for the 'citizen developer'. Gartner defines a citizen developer as a non-professional developer who builds simple business applications used by other people under limited or no IT governance. Low-code, but even more no-code, can empower anyone to be a developer, which bridges the gap of skills. Citizen developers are the new frontiers of software development, while being part of the mainstream workforce.

Seamless integration

Low-code platforms promise easy integration with new technologies, cloud services and back-end systems. While organizations are investing in new and emerging technologies, such as Artificial Intelligence (AI), Robotic Process Automation (RPA) and Big Data, they must deal with an existing (legacy) IT landscape. Low-code tools provide interoperability and easy to integrate systems with built-in connectors and libraries. This can help overcome the integration challenges that organizations are facing.

Easier application maintenance

The traditional application maintenance sums up to 80% of the total-cost-of-ownership (TCO) of a software application across its lifecycle. Low-code helps reduce the maintenance cost by various means. In a recent report "State of Application Development", low-code users stated that more of their application development effort was devoted to innovation instead of maintenance, outperforming those not using low-code by at least 5% (regarding the total IT hours spend) ([OUTS19]). Research company Metri supports the statement that the productivity of software development rises with low-code, however, they correctly add the comment that the license costs can also rise [METR18].

Reliable and secure

Applications running on a modern low-code platform inherit the underlying reliability and security features of the platform. It promotes a transparent model to all the stakeholders and better control.

Low-code caveats

Low-code is a hot technology trend and according to research from Forrester [Ryme17], Gartner [Wong18] and KPMG [KPMG18], the low-code market is expected to grow exponentially. With any hot trend, there is always a risk for a hype. While low-code can be a great RAD technology, it is still software development with comparable challenges. Let's look at few of them.

Need for low-code experience and development competences

Low-code enables easy application building through a drag-and-drop interface, which makes it easier and more accessible for citizen developers. While for small and stand-alone applications this could work, large business applications are way more complex; it is wish-

ful thinking that citizen developers can develop such applications independently. The knowledge and competences of experienced developers are still a necessity for building high-quality integrated applications. For sure, an IT-savvy citizen developer can be of added value under the supervision of an experienced developer. A Centre of Excellence can support the successful application of citizen developers.

An effective UX, functional design and scalable architecture are essential

Like traditional software development, more extensive and complex low-code applications also need an effective approach and governance. Defining software requirements takes a comparable amount of time compared to traditional development. You still need a UX designer for a functional design, and attention to technical aspects such as a coherent logic and architecture. These are essential for a qualitative and scalable application, of which the costs can be managed in the long term.

Proper attention to orchestration

Development with multiple developers as part of an agile team within one application needs to be orchestrated. Splitting in modules, management of dependencies and management of the multi-disciplinary agile team needs to get proper attention.

Software quality and maintenance are still crucial

Even in a low-code environment, maintaining high quality, sustainable software is key in the era of digitization ([Vrie19]). Low-code platforms promote a better understanding of requirements, cleaner designs, and more maintainable and sustainable software. Care for software quality and security, (portfolio) management, life cycle management and maintenance processes, and managing quality and costs in the long term are also applicable to low-code applications.

LET'S START THE LOW-CODE JOURNEY AND HOW TO MAKE IT WORK

In a nutshell, low-code development platforms address both the growing demands from the perspective of business as well as classic IT capacity related problems. But where do you start? What are the questions organizations should ask themselves to find out whether low-code platforms are suitable for them? What steps should be taken to successfully make use of these platforms and reap the benefits?

The low-code journey provides an overview on how such a journey could look like and what should be considered.

1. Discover: start experimenting and discover what low-code could mean for you

Key in introducing low-code platforms within an organization is showing its capabilities and strengths right away. The power of low-code is that functional Proof of Concepts (PoCs) can be built in the same amount of time as non-functional prototypes (e.g. mock-ups). This makes experimenting with low-code accessible for every organization to discover what it means and the value it may deliver. It is recommended to start experimenting on a small scale without spending too much effort on administrative processes and formalization.

2. Vision: engage and define your low-code vision

During the discovering phase, you will notice that the first movers within the company will get excited and the buzz will spread throughout the organization. The company will initiate actions to extend previously built PoCs and start piloting. At this stage, it is time for the IT, innovation, technology or development unit to start structuring initiatives and developing a low-code vision.

The low-code journey: from experimenting and discovering to delivering value at scale and continuous improvements
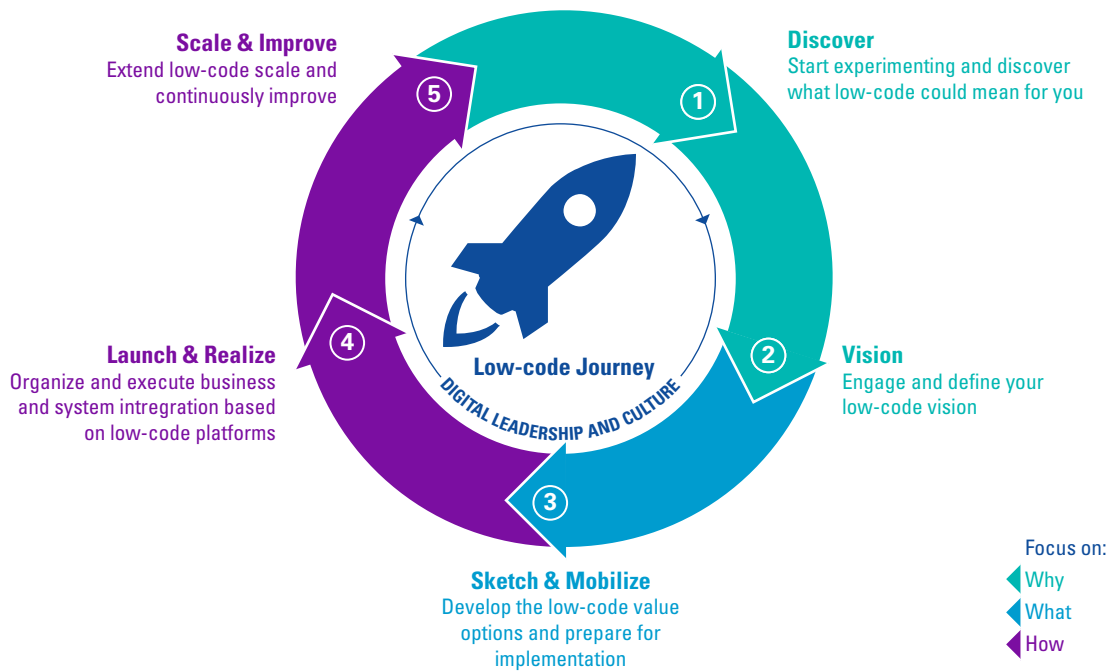
Figure 3. KPMG's low-code journey.

A bi-model IT framework allows low-code initiatives to be aligned with (the cadence of) traditional software development initiatives and their related maintenance or operational projects. While developing your low-code vision, it is important to take a broad view and include topics such as your (digital) business strategy, sector developments and other (emerging) technologies. The experience shows that low-code platforms are perfectly suitable as a strategic platform to realize your digital transformation. To get to a decisive vision, it is recommended to keep a pragmatic approach and create a compelling low-code story which will realize awareness and traction across (board, business and IT) stakeholders. It is recommended that, if possible, you already select your low-code platform of choice and already start thinking about implications which will require attention in the next phase.

3. Sketch and mobilize: develop the low-code value options and prepare for implementation
After experimenting with low-code and developing your low code vision it is time to translate your vision into a more formalized plan and start piloting. This can be done either in certain business units or organization-wide. The extent to which low-code platforms are being used varies. From implementation initiatives of one single application built internally or externally to the full embedment of a low-code platform in which your organization can build and deploy apps continuously. In the end, you will have to establish a business case for change. This stage will teach you what the value options are and what the impact on your operating model will be. On-boarding low-code may require enhancements to your operating

model for you to be set for success, such as technical requirements, the (agile) way of working and existing IT landscape.

4. Launch and realize: organize and execute business integration and system implementation based on low-code platforms
Making use of low-code platforms – either for a single application or as an entire development platform – makes software development, -integration, -debugging and -security validation significantly easier. However, you will still have to organize and manage your initiatives like a traditional software implementation. This can be either in project mode or embedded in an Agile development or DevOps team within your organization. In general, more extensive and complex low-code implementations need an effective approach and governance. Care for software quality and security, life cycle management and maintenance processes are crucial to be in control and manage quality and costs in the long term. Expertise in gathering requirements, design thinking, process optimization up to the actual software building, -testing, -deploying and –quality assurance need to be preserved.

5. Scale and improve: practice low-code at scale and continuously improve
Achieving your first successful results will make you and your organization eager to create more value and scale low-code. Scaling will increase your capabilities to continuously change and adapt in today's fast changing world. Combining industry- and business process knowledge with innovative- and technical capabilities will

help you determine the best way forward and establish your roadmap for upscaling. While determining your roadmap, bear in mind the wide range of possibilities low-code has to offer – from building (innovative) customer engagement applications to operational efficiency applications and even (partially) replacing (legacy) core systems.

Leading low-code platforms such as OutSystems and Mendix facilitate integrations with ERP systems (e.g. SAP), existing databases, API's and other technologies. Finally, when your organization is leveraging the low-code platforms, it is highly recommended to establish a Centre of Excellence (CoE). Your CoE will ensure coordination, alignment, consistency and continuous improvement when practising low-code at scale.

CONCLUSION

In today's fast changing environment, customers are better informed, better connected and more demanding than ever before. Digitization is no longer a choice, it is indispensable. Irrespective of the size and industry you are in, your organization needs to continuously transform to survive in the evolving and demanding business environments.

However, traditional application development falls short and cannot keep up with the demands from the business. Low-code platforms proved over the last years to provide a solution to deal with both business and IT challenges. Low-code software development can therefore be a serious accelerator, driving the digital transformation of an organization! Accomplishing the use of a low-code platform should be a strategic business decision, not a decision to just build another app.

Low-code development is a hot technology trend at the moment and with any hot trend, there's always a risk for a 'hype'. While the promises can certainly be real, they can be achieved or even surpassed when certain conditions are met. For example, the increase in productivity and delivery speed can be strengthened when the organization is familiar with the concepts of agile, DevOps and design thinking. On the other hand, it should be clear that low-code comes with comparable challenges to traditional software development; proper attention to application-architecture design, technical debt, software quality, security measures and maintenance are essential to manage the costs of low-code environments in the long run.

An effective approach or 'low-code journey' can help to take the required measures to reach the agreed upon ambition level and to make low-code part of your organization's DNA!

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