

Low-code platforms are potentially a saving grace for organizations caught in between critical software legacy and the urge for innovation. This can be a serious accelerator, driving digital transformation. However, a shortage of rightly skilled developers and large solution partners stands in the way of success on a bigger scale. Therefore, the development of an ecosystem is key for low-code on the Dutch market.

LOW CODE

# Breaking the deadlock for low-code on the Dutch market



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You need a vision, a strategy and the right solution partner to drive the low-code journey. Don't get stuck in the middle. Do it right or don't do it at all!

## THE RISE OF LOW-CODE PLATFORMS

Low-code and no-code software development platforms are hot technology, but definitely not a new phenomenon. The pioneers of the modern low-code platforms like OutSystems and Mendix are innovating the capabilities since the early 2000s. The rise in low-code functionalities, capabilities, ability to scale and increasing need for digital transformation using *Shadow IT* and *Citizen Developers* led to its adoption as replacement of the enterprise platforms. With gaining popularity of the low-code technologies, big players like Microsoft launched PowerApps in 2016. In June 2020, Amazon also joined the race with its own no-code code development tool Honeycode that aims to build mobile and web applications without writing any code.

*Shadow IT* refers to the information technology (IT) services (developed or managed by the business units), outside the knowledge or ownership of IT.

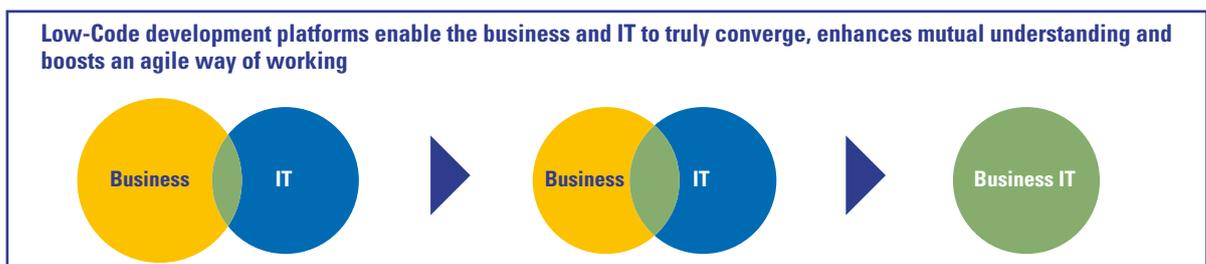
*Citizen developers* are the business users who make use of IT sanctioned platforms to create new business applications.

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Typical for low-code development platforms is the use of visual, declarative techniques that make it possible to develop model-based software. This development mainly happens with visual graphical user interfaces, which means that programming involves more configuration with models rather than the traditional writing of software code ([Kuma19]). This helps a wider range of people contribute to software development and enables a tighter collaboration between IT and business to rapidly co-develop the software, or transform the business processes. Such a collaboration capacitates to stay focused on the goal of frequently achieving customer value, and quickly responding to changes, which improves agility.

**Figure 1.** Low-Code enables the tighter collaboration between business and IT.



Leading analyst firm Gartner writes in its enterprise low-code application platforms report ([Gart19]) of August 2019 that by 2024 “low-code application development will be responsible for more than 65% of application development activity”. It acknowledges Mendix, OutSystems, Microsoft, Salesforce and Appian as leaders in the low-code application platforms segment in its latest Magic quadrant.

Forrester Research, another independent market research company, evaluated the 13 leading low-code vendors in the market for its Q1 2019 report and named five as leaders, see Figure 3. The report made it clear that the AD&D (Application Development & Delivery) category vendors offer new value to organizations by removing critical limitations on the speed of app development and delivery. The leaders named in this category were Microsoft, Salesforce, OutSystems, Mendix, Kony ([OutS20]).

Clearly, in both the Gartner and Forrester reports, Microsoft, Salesforce, OutSystems and Mendix are positioned as leaders. The maturity of the low-code platforms, with all the additional benefits of integration and extensibility, scalability and performance, security and governance, results in broad adoption.

**Figure 2.** Magic Quadrant for Enterprise Low-Code Application Platforms.



**Figure 3.** Forrester Wave™: Low-code development platforms For AD&D Professionals, Q1 2019.



## HOW THE DUTCH MARKET HAS ADOPTED LOW-CODE PLATFORMS

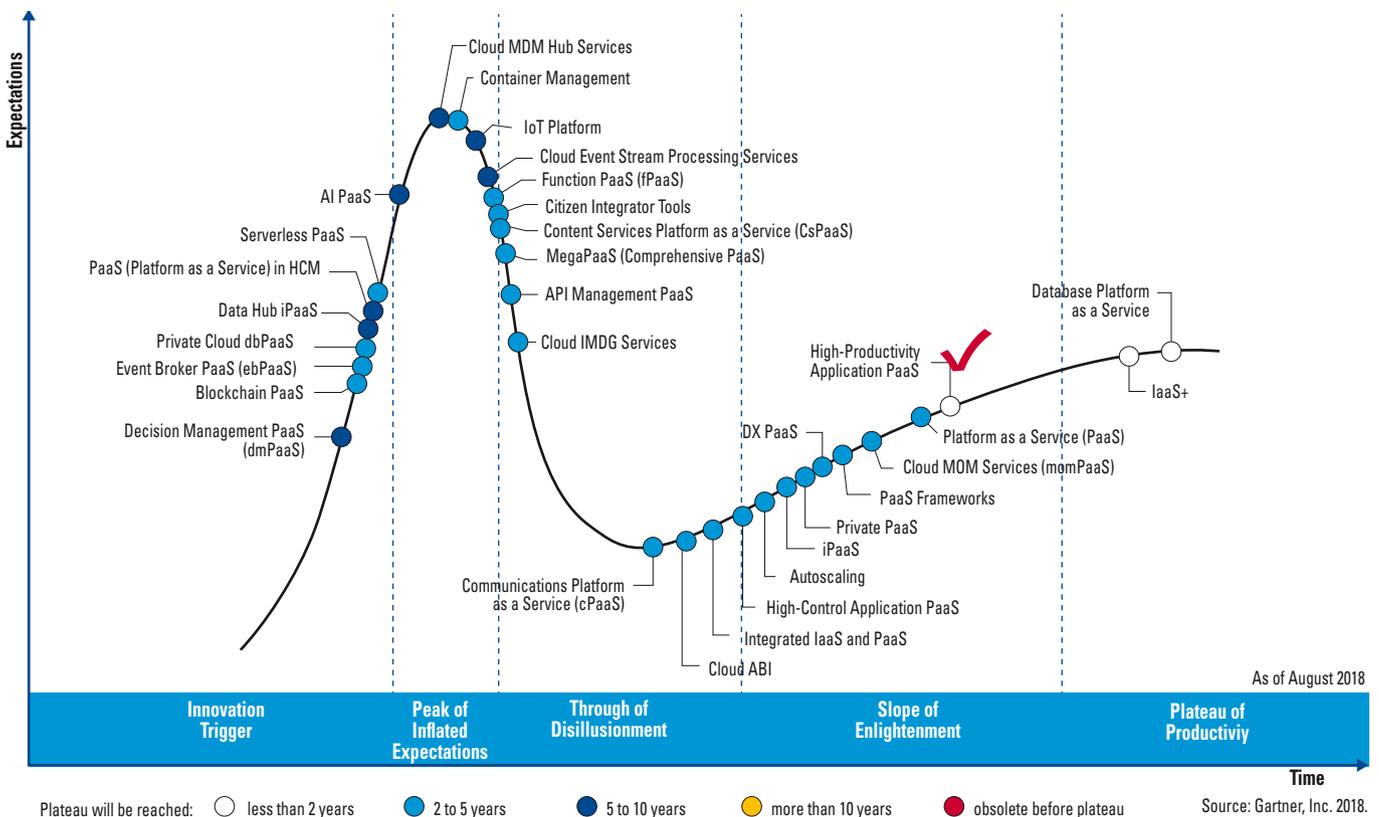
The Dutch market has adopted low-code rather early in the hype cycle. It has been here for more than 10 years. In Figure 4, Gartner has positioned hpaPaaS (*High-productivity application Platform as a Service*, referring to rapid application development platforms, which are offered as a service. Low-code and hpaPaaS have overlapping capabilities and have been used interchangeably) on the plateau as a very mature technology, meaning that companies can adopt it without hesitation. The platform has already crossed the chasm. In fact, Dutch companies were among the innovators and the early adopters on the low-code adoption lifecycle. One of the leading Dutch providers of the platforms, Mendix (acquired by Siemens in 2018) announced ([Mendix2]) to achieve 400% growth back then in 2011. This demonstrates the growth of the tool and the local customers it already had at the time.

In the early phase, businesses started experimenting with low-code platforms with smaller apps to support their internal line-of-business. The credentials of the leading platforms show it was used and adopted in varying and conventional industries e.g. government, construction and engineering, transportation and logistics etc. The low-code market in the Netherlands has – to

date – been dominated by Mendix and OutSystems. This is also reflected in the number of consulting partners. A search on both the platforms’ partner directories in July 2020 showed that Mendix had 79 registered partners in-all (country-wise data not available), while OutSystems had 37 registered partners in the Netherlands alone. Both vendors have tapped the market by demonstrating a few great examples over time. Starting from internal business supporting processes to B2B applications to massive enterprise systems, the low-code platforms proved over the last years they could provide a solution that can deal with high business demands for technology-based innovation and the challenges of the IT delivery capacity. With organizations seeing low-code, significantly reducing the time-to-market with numerous proven use cases and successful track records, large multinational corporates got attracted and are adding low-code in their software development toolkit. In the Netherlands, the success of the low-code platforms got triggered by some remarkable customer stories.

- BAM Infra, the Netherlands’ largest construction company, implemented their “digital construction” initiative by delivering supporting software for employees and contractors supported by the Mendix low-code platform. BAM is involved in a variety of international infrastructure and construction projects. The application portfolio at BAM supports

Figure 4. Gartner, Hype Cycle for Platform as a Service, 2018.



a wide array of use cases. BAM has adopted low-code development and combined agility, responsiveness, and proactiveness to reinvent itself in an industry known for its rigidity ([Mend19]).

- Royal Vopak, a 400-year-old and one of the world's largest tank terminal operators for the oil and gas, was confronted in 2014 with Oracle's decision to stop supporting the JD Edwards ERP-system as of 2020. Vopak chose to build a new terminal management system and additional software for the core processes themselves, using the low-code platform with a focus on cloud and mobile usage. Vopak used OutSystems to build custom applications and move their dependence from the retiring ERP system. The speed of the low-code development, flexibility and agility gave Vopak the ability to innovate the company's core processes and provide them with business differentiators. With this new system, they got real-time insights into the terminals' logistic, mobile workforce, and integration with the legacy systems ([Huls17]).

As in the above cases, both low-code vendors demonstrate their ability to implement large enterprise-grade applications at a global scale. The key value proposition for these implementations is the ability to develop faster and make the entire applications delivery process more agile.

## FOUR WAYS TO LEVERAGE ON LOW-CODE PLATFORMS

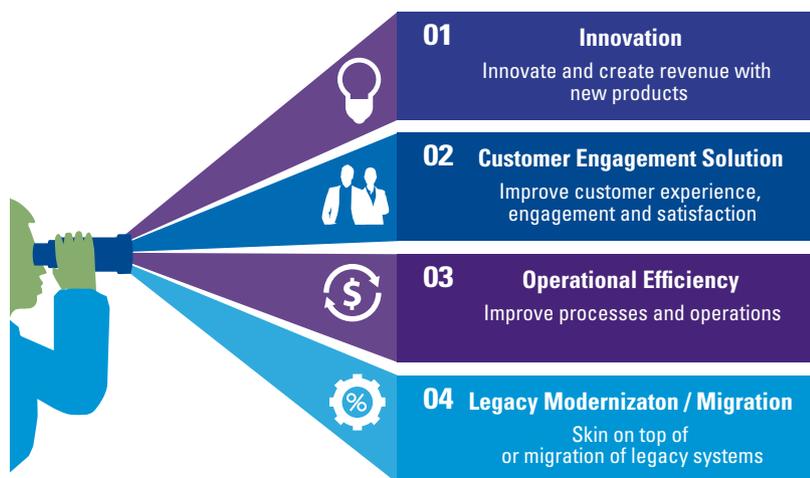
The race to add richness to low-code applications, aggressive vendor investments targeted at some of the most pressing needs, and ability to quickly respond to the challenges of modern enterprise applications are making the low-code platforms attractive. Low-code is often used in the niches of a company. On a high abstraction level, the use cases can be boiled down to four best fitted categories (Figure 5) where low-code gets the job done ([Good18], [Warr18b]).

1. **Innovation.** Innovative apps are making solutions/processes extremely exciting with impressive productivity, generating business value, using emerging technologies and driving innovation. These could be smart and connected apps merging the physical and digital world using the Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning (ML). Applications under this category generally start with an idea and evolve with a high rate of change while relying on multiple integration points with external data feeds, web services, IoT data, geodata etc.
2. **Customer engagement.** This group of applications focus on business and customer experience. The general goal is to improve customer experience, keep them engaged and improve the satisfaction score. The customer could be another business entity or end

users. Think about B2B (Business-to-Business) portals, B2B apps, B2C (Business-to-Consumer) portals, B2C apps; these are one of the largest pools of applications where low-code presence can be seen. These applications often connect to core digital systems and have multi-channel connectivity.

3. **Operational efficiency.** Not all of the applications need to be bulletproof or come with a slew of features; oftentimes basic applications aim to improve the organization-specific business processes, or operations are sufficient to enable the team to become more productive and deliver more value. These are principally B2E (Business-to-Employee) apps, workflow or case management applications, compliance and quality management applications and departmental apps. Such applications are often combined with B2B apps. This is also a large group of applications where low-code is widely used. Being organization specific in nature, they are generally integrated with Systems of record, ERP solutions, CRM solutions, Salesforce, SAP, Microsoft Dynamics, Oracle, NetSuite etc.
4. **Legacy modernization.** In many organizations, legacy applications serve critical roles in driving business operations. There is a clear need to modernize outdated systems. Often, when retiring the legacy is a not an immediate solution, a low-code solution could be positioned to co-exist to get the most out of the legacy before pulling the plug. The primary focus could be on replacing the legacy or building new skins on top of it while maintaining the system itself. This category could be one of the biggest markets for low-code to penetrate. At enterprises, these applications mostly interact with (but not limited to) Lotus notes, 3GL/4GL apps, Access, SharePoint, Excel, Core record keeping systems and core system extensions.

Figure 5. Classifying the Low-Code use cases.



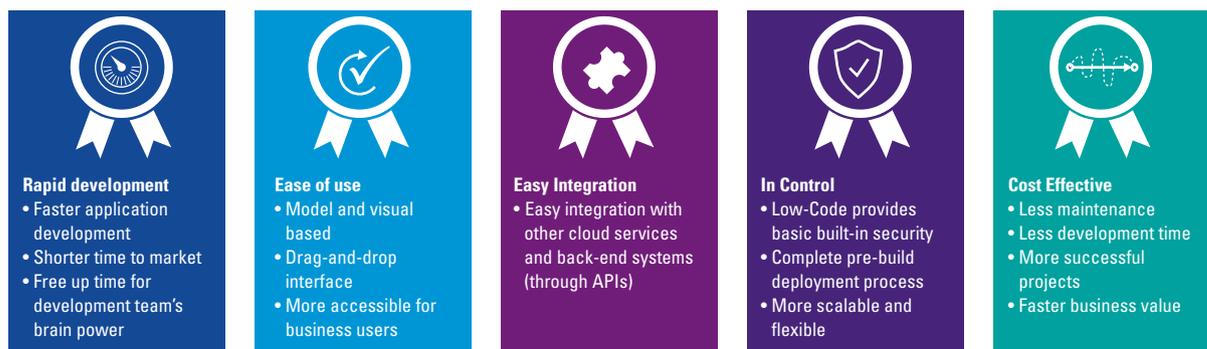
# Low-code solutions can reduce the complexity of integration with other systems, making it interoperable

## THE KEY ADVANTAGES OF THE LOW-CODE PLATFORMS

Never before, in the history of software development, has the complexity of technology been this huge. Developers are expected to cover a vast array of areas: (multi-)cloud, hybrid infrastructure, security, performance, scalability, cross-platform, multi-device responsiveness, offline availability, distributed caching, databases, extensions, APIs, AI, ML, DevOps. The complexity has increased exponentially and, so has the application development time. In this complex environment, the low-code platforms are developing themselves into a solid foundation for digitization, with many advantages:

- **Rapid development enables faster time-to-market.** With low-code platforms, businesses can translate ideas into working prototypes in days rather than weeks or months. It gives the true agility to quickly respond to change, fail fast, iteratively improve faster and reach the market better. Rapid development enables shorter time-to-market with faster application development. As a result of the rapid development tool, it significantly shortens the development time compared to traditional development, which can be better utilized for innovations.
- **Ease of use.** The development of the applications is simplified, using the model and visual-based development. It is primarily a drag-and-drop interface; a little technical knowledge is required to develop a business application. This makes room for business users to understand, engage and be accessible in the development journey of the applications.
- **Easy integration with external systems.** Low-code solutions can reduce the complexity of integration with other systems, making it interoperable. Integrations have always been the most cumbersome and tiring process in any software development. With the help of low-code platforms, developers significantly reduce time and effort using its out-of-the-box REST APIs, SOAP web services, webhooks, SAP, OData and external databases connectivity.
- **In control.** Since the infrastructure and codes were generated by the low-code platform, the underlying platform takes care of many important security aspects. It integrates with a wide array of identity providers and implements RBAC (role-based access controls). Once a low-code platform is connected and audited in the organization's software perimeter, new uses cases can be built fast in a controlled environment.
- **Scalability.** The low-code platforms provide the ability to scale on demand. The applications can benefit from auto-scaling, auto-provisioning, auto-healing out of the box to meet the enterprise needs for users, volumes of data, app functionality. However, the suitability in larger projects and for crucial enterprise applications are yet to be witnessed at large scale.
- **Privacy.** Low-code platforms apply necessary procedures to safeguard the confidentiality of the data stored by the applications.
- **In-built monitoring and logging.** Applications developed using low-code benefit from the platforms' easy-to-use in-built monitoring solution. There is a wide range of monitoring available e.g. performance, network, server, usages activity, technical debt monitoring. Applications also leverage from the out-of-box logging analytics which helps in troubleshooting errors, web service and API invocations, access logs.

Figure 6. Key advantages of low-code.



- *Maintainability.* Few platforms provide the service which measures key aspects of app maintainability against a set of ISO/IEC 25010 parameters i.e. modularity, reusability, analyzability, modifiability, testability, and highlights any potential issues that should be addressed. As mentioned, it also provides the technical debt monitor, which helps perform code and runtime performance analysis before recommending solutions to help improve the system's maintainability.
- *Mobile-first, offline-first.* Low-code supports mobile app development with offline and native capabilities. The platform provides control over (offline) data storage, data synchronization and offline architecture.
- *Cost-effective.* Due to the fact that the basic applications can be built with relatively less skilled staff and that the development cycle of these applications is shortened, more applications can be realized in the same amount of time with less cost. The applications are maintainable and significantly reduce the total cost of ownership (TCO). Hence gives great business value.

## DEVELOPING THE LOW-CODE ECOSYSTEM IS CRUCIAL FOR A SUCCESSFUL ADAPTION

Undoubtedly, the low-code platforms OutSystems and Mendix are powerhouses with a bundle of great features, but still, a lot of work lies ahead for continued success. It is recognized that both the leading platform providers have commercial targets and focus on market penetration and new clients and less on continued and successful implementation. But to create a sustainable ecosystem with many skilled developers, a wide and large market penetration is necessary.

This, therefore, contains a substantial risk (many new clients but limited use of the platform at each client) for the low-code ecosystem. Despite the powerful easy-to-use low-code platforms and numerous success stories, many companies are struggling to successfully realize the implementation and high-scale adoption in their application landscape.

The providers should also focus on increasing the use and adoption of the platform with their clients. The true value of the platform is not being retrieved if only a handful of applications are being realized. New clients are often left with a license and a partner for implementation. They either need to train their staff or rely on hiring new staff on the market. Skilled developers are scarce due to relatively young technology and shortage in the IT labor market. An alternative is to extend the development team with the entrepreneurial boutique firms for the execution. The largest of such boutique firms in

the Netherlands employs around a hundred developers. Today, as the pressure is continuously building to increase the digital footprint on every line of business, you need a large pool of developers or professional consultants. Admittedly, OutSystems says "Low-code is still quite a young software category... and there is a lack of expert partners" ([Warr18a]).

Since the platform provider's strategic focus is on tapping and increasing the market share in the competitive and attractive low-code market, there is a less priority on the advisory and architectural support. The consistent quality of the small and mid-sized applications is often lower than the quality of CMMI5 level development of large traditional vendors (e.g. TCS, Infosys, Cognizant, Capgemini).

There are examples in the Dutch market where clients are dissatisfied with the low-code platform. This is in most cases not caused by the platform but by a poorly designed software architecture. The root cause can often be found in the lack of skilled software architects, uncontrolled citizen development and in some cases insufficient quality control measures. KPMG discusses ([Koed20]) the quality risk of citizen development and advocates the quality-centered low-code development approach. One can argue that the platform provider should have been part of the quality control system. Have they perhaps focused on new business too much?

The growing demand for low-code in the Netherlands is paired with the claim of not having enough certified developers (certification assures the knowledge and demonstrated experience). We crunched the numbers in August 2020 to find the figures, and they are supporting the claim. An overview of OutSystems community shows a total of 24,104 certifications awarded across the globe. This number includes all types and levels of certifications and not the certified personnel, which means that the figure includes multiple certifications attained by a single developer. OutSystems has multiple guided learning paths that train you to become a web developer, mobile developer, or a support engineer (now retired). Examining OutSystems' community members' directory led to nearly 800 public profiles from the Netherlands with at least one minimum level of certification. At the same time, Mendix claims to have 13,503 certifications globally, and its community members directory led to nearly 920 public profiles from the Netherlands in possession of a minimum level of certification. In either case, the numbers of certified developers do not meet the demand of the growing consumer base. However, a growth has been observed in the number of certified professionals, likely as an effect of free certifications in the Covid19 period and/or access to a wide range of free online courses and workshops.

## THE WAY TO SUCCESSFUL USAGE OF LOW-CODE SOFTWARE

There are many indicators that the demand for low-code developers outnumbers the talent in the local market. With the increasing number of clients in the Dutch market, only a few developers per company are available. This equation is not effective and time and again leads to low-quality applications.

So, what is the way forward?



Use low-code if you use it in a strategic way. It is okay to do a small pilot but do not get stuck in the middle with only a few apps in your kitty. This may end up being expensive and ineffective. To

break even at the operating level and get the most return on investment, clients have to adopt the platform strategically and with a clear vision. KPMG recommends the ( [Kuma19]) 5-step low-code journey *Discover – Vision – Sketch & Mobilize – Launch & Realize – Scale & Improve* to reap the benefits. Get yourself partnered with a registered and strong low-code partner. The partners come with a broad array of experiences, industry expertise and exclusive access to the resources helping you achieve business results.



Do not allow the business to buy too much other candy in the software candy store. Fragmented use of the platform is detrimental. Many efficiencies can be reached by embedding the low-code

platform in the overall platform architecture. Use the platform to a maximum in order to keep the overall application landscape maintainable. Otherwise, low-code will die in your software factory as just another toolkit.



Establish cross-functional agile teams and use a smart co-sourcing model with a few experienced registered partners to staff the agile development teams. The cross-functional teams are self-sufficient

and should understand the existing application landscape and have experienced business analysts.

Co-sourcing will help accelerate the internal staff's ability to use the platform. Scale the team and the low-code digital factory with internal staff as the low-code application landscape grows.



To scale up the low-code factory, it is advised to create a competence center (also known as a "Digital Factory". The digital factory is a whole new way of working, with new integrated solutions,

increased agility and cross-functional teams. The Digital Factory acts as a counter for the business where they get support in implementing digital use cases. Eventually, the factory will have implemented many small and medium use cases and will have the experience to speed-up any following use case. Establish the control framework in the digital factory to ensure the quality measures of software development are guarded. This will ensure the output of the factory is predictable.



Equip the team with the standard processes and promote best practices within your low-code digital factory. It lays the foundation and gives the right direction to the team. Pay attention to

the architecture to avoid the spaghetti situation. If the team is working under well-defined architecture, the technical debt will be kept under control. To remain relevant and flexible, introduce modularity in the architecture.



On the other hand, low-code providers and vendors should invest more in promoting opportunities for acquiring the skills. Bring the right partner, developer advocate to grow in the

market. Make a sustainable ecosystem which attracts and encourages talent, give them a future-proof career. Give them reasons to be enthusiastic, so that the platform providers can fill the talent gap. Help the developer community to thrive so that they remain active and relevant.

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An experienced low-code partner enables your organization to speed up the time-to-market and thereby gain a competitive advantage

## IN CONCLUSION

Disruption is a fact of today's fast changing business environment and no organization is immune in that respect. Organizations need to be able to respond to disruption. Low-code comes to the rescue and can be a serious accelerator. Low-code products are mature and capable of fulfilling the need, provided it is done in the right way.

Doing it right means doing it consistently and strategically. For example by establishing a Digital Factory that uses the platform to its maximum to support businesses to a fast implementation of digital needs. These can be small innovative apps, apps to generate operational effectiveness and customer facing apps. The factory can also be a step-up to replace legacy systems. The digital factory is ideally sourced with internal staff that understand the business and existing application landscape and have a long-term view on the digital goals. Often the digital factory is supported by experienced partners in a co-sourcing model. We do observe the risk of a shortage

of skilled developers and a shortage of large solution partners. To gain trust and build a strong foundation for the low-code ecosystem, a herd of solid IT service and consulting firms with the dedicated low-code practice must be present in the market. Skilled low-code champions along with a strong community should also be available in the market. Low-code platform providers have to work towards building a sustainable ecosystem, as they are the essential building block.

We spoke to organizations who went for the low-code journey. The ones who were involved non-stop in that process, the ones with a vision and the ones armed with a right registered low-code partner to back the strategy and fill the skill gap, had the least problems and were the most positive. An experienced low-code partner enables your organization to speed up the time-to-market and thereby gain a competitive advantage with its strategy and broad experience on the platform. We can help you with your low-code journey. We recognize ourselves very much in the story of *Do it right or don't do it at all*.

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