



Barcelona
Digital Talent

Low-Code Analysis

New paradigm in software development



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Executive summary

High demand for technology and shortage of digital profiles: the perfect storm for Low-Code consolidation

Digitalisation has become one of the main levers for competitiveness in the fourth industrial revolution. It is expected that in the period 2018-2023, it will be Five hundred million new applications will need to be created globally, which would exceed the number of applications generated in the last 40 years.

Moreover, the demand for the professionals needed to develop digitalisation is growing beyond the capacity to generate talent. It is estimated that there is a shortage of 350,000 ICT specialists in Europe, of which 75,000 are in Spain.

This contextual situation is ideal for Low-Code to go beyond the stage of emerging technology and consolidate itself as a new paradigm in software development projects.

Low-Code allows software development with minimal manual coding, facilitating its use by people with no ICT experience

Low-Code technologies minimise or even eliminate (No-Code) manual coding in the development of software applications. Among its main features is the ease of development due to the drag&drop visual interface, the range of pre-designed components and the reusability of modules to other formats such as web, mobile, etc.

As a result, Low-Code tools accelerate the speed of development and improve the efficiency of software production while reducing maintenance. In this regard, some of the analysed manufacturers report cost reductions of more than 70% and implementation time reductions of between 50% and 90%.

Moreover, the short learning curve required by these tools allows their use by non-ICT users.

Examples of time and cost improvements provided by low-code manufacturers

10x

it is 10 times faster
to create an
application

74%

reduction in
the cost of apps

650 days

saved by developing
60 apps
in 20 months

\$20M

savings by increasing
developer productivity
x9 in 6 months

Low-Code supports any type of development, from prototyping solutions to programming core systems core

The most common use cases are related to the development of digital channels such as websites and mobile apps, both for internal use and for interaction with customers. The contribution of Low-Code technologies in the accelerated deployment of solutions in response to new management needs arising from COVID-19 deserves a special mention.

The most frequent use cases include proof of concept testing before solution deployment and the adaptation and extension of enterprise software such as CRMs and ERPs.

Finally, Low-Code technologies can also be applied in developing core business critical systems. However, factors such as the lack of maturity in using these platforms or limitations of the technology stack make it the least common implementation option.

Main use cases of Low-Code



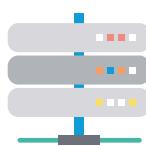
Digital channels

Portal Development
App Development



Rapid prototyping

Proof of concept
MVPs



Core systems

Process re-engineering and refactoring of business-critical systems

Re-engineering/Extension of legacy systems



Digitisation/ Process Extension

Business process improvement
Adaptation of SaaS solutions
Process

Extensibility pre-configured

One in four new applications is already being developed with Low-Code

Nearly 25% of new applications developed by companies already use Low-Code and No-Code technology, reaching a market size of more than 13.8 billion euros of dollars. The sector is booming, sustaining a double-digit growth rate in turnover (over 23% in 2020 and 2021).

Low-Code is on the agenda of most CIOs of large companies in Spain, although it is at an earlier adoption stage than other geographies such as Northern Europe or the USA. Proof of this is that “business” users are doing only 5% of Low-Code development without any support from ICT departments.

Low-Code. Worldwide revenues 2019 - 2021 (USD million)



Low-Code native platforms and traditional software companies make up a range of manufacturers that are characterised by different business needs

Among the leading Low-Code platforms, we find native companies such as Mendix and OutSystems, focused on digitising processes such as Appian and SaaS platforms with a broad functional coverage such as Microsoft, Salesforce or ServiceNow.

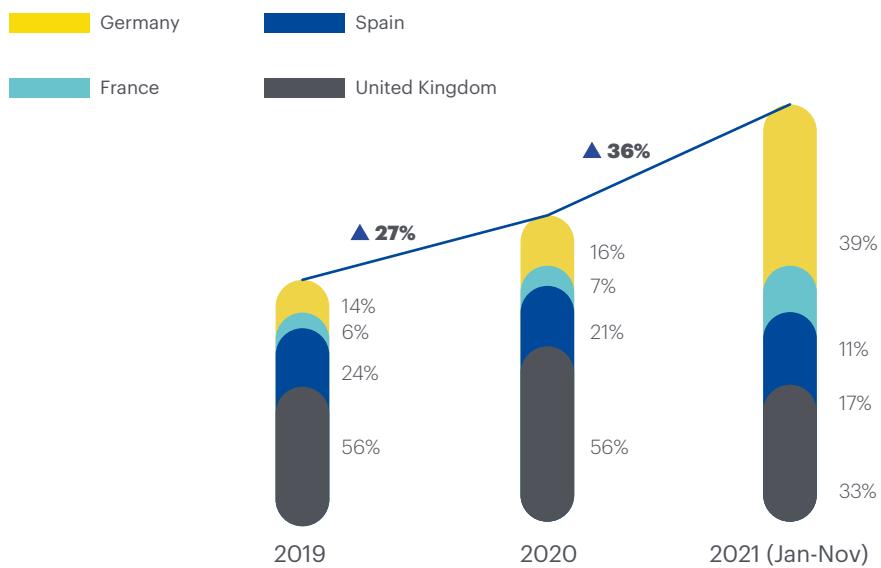
In the No-Code category, we find Caspio, focused on data-driven applications, QuickBase, focused on operations and integrations, and AppSheet, which is leading the way in automation and AI application, hand in hand with the giant Google.

Faced with a shortage of digital profiles, companies are already training non-ICT employees in low-code

There is a clear correlation between the large-scale deployment of the Low-Code sector and the demand for professionals who are proficient in these technologies. In the last two years, job offers related to low-code skills have grown by 73% in major European markets such as the UK, Germany, France and Spain.

The short learning curve allows professionals from non-technological areas in companies to adopt software development skills. Various studies show that between 40% and 60% of organisations have opted for Low-Code reskilling of non-technological professionals to overcome the difficulties in recruiting digital profiles.

Evolution of the demand for Low-Code profiles in selected European countries



Source: Job and Markets Insight

Resistance to change, vendors' business model and doubts about its applicability in critical processes are preventing Low-Code from reaching its full potential

Among the main barriers to adopting Low-Code is the refusal of IT areas to assume the potential security and scalability risks associated with the fact that part of the application development is transferred to the business areas.

In addition, doubts are identified about the capabilities of these technologies when developing core business solutions.

Licensing costs and the lack of flexibility in the evolution of tools due to an over-reliance on vendors are also frequently cited as obstacles.

Despite the barriers, analysts, companies and IT vendors all agree that this is a new paradigm set to revolutionise software development

[Gartner](#) forecasts that by 2025, 70% of new applications developed by companies will use No-Code and Low-Code technologies. Research and Markets has put the industry's revenues at \$187 billion by 2030, 14 times higher than today.

This accelerated pace of adoption is expected to result in a revolution in IT development profiles. According to [Gartner](#) by 2023, the number of non-technological developers in companies (or citizen developers) will be four times higher than the number of professional developers.



Methodology

This report aims to show the impact that Low-Code platforms, also known as low-code application development platforms, have and will have on society and how this technological concept could be taken advantage of to solve one of today's biggest challenges is the lack of digital talent.

The shortage of digital talent is a fact that contrasts with the situation of the European labour market, and especially with the Spanish market, where the high unemployment rate stands out (at 14.57% in the third quarter of 2021, according to the INE); a factor that is exacerbated among profiles that do not have digital training.

Low-Code is a technological concept that emerged more than a decade ago, but it was not until 2017 that it became popular. We can now talk about the Low-Code revolution, driven even more by the acceleration of digitalisation.

However, this Low-Code boost lies not only in the technology's capacity to speed up the development of applications but also in its ability to democratise them, allowing profiles without digital training to generate applications; a factor that will boost the conversion of non-digital profiles to digital profiles, undoubtedly influencing the improvement of their employability.

Considering the current landscape, this report will analyse how Low-Code, by representing a huge paradigm shift in enterprise application development, can support the resolution of the challenges posed, generating a win-win scenario for both business and society as a whole. The report will also provide a better understanding of the benefits and opportunities of such technology and how best to adopt it.

At the methodological level, this study draws on different sources that provide both qualitative and quantitative information:

- **Third-party reports.** First, secondary data sources are analysed in depth through numerous reports from various analysts (IDC, Gartner, Forrester) and specialised companies (Research and Markets, Job and Markets Insight). In addition, use is made of the databases of public bodies (Eurostat).
- **Findings from the interviews.** Secondly, data is collected from primary sources through several in-depth interviews. The interviewed profiles belonging to the top management of relevant companies in their sector allow adding a more pragmatic vision of Low-Code based on their experience using these kinds of technology. In addition, representatives of the top Low-Code manufacturers have been interviewed to get their perspective on the market.

Study participants

Accenture

Virginia González

Low Code Capability Lead
in the Advanced technology Center

Agbar

Luis Navarrete

CIO

Appian

Oscar García de Andoin

Senior Director-Alliances-Appian
Corporation

Bayer

Massimiliano Di Renzo

Head of Cross Functional Applications
and Analytics

Caixabank

David Almendros

Director CoE Inteligencia Artificial
at CaixaBankTech

Correos

José Miguel Aoiz

Deputy Head of IT Development

Telecommunications and Information Technologies Centre (CTTI) of the Generalitat de Catalunya (Catalan Government)

Emili Platel

Director of corporate architecture
and cross-cutting components

DKV

Julián Nuño

Deputy CIO | Chief Transformation Officer

Experis (Manpower Group)

Antonio Vieiro

Technical Architecture Manager

I2Cat Foundation

Julio Barrera

Director of SEG
(Software Engineering Group)

Hays

Selena Sabiote

Information Technology & Digital Manager

Iberdrola

Iban Sáenz

Global Head of Factories

Mapfre

Victor Moro

CIO Spain

Mendix

Fernando Torres

Cloud Portfolio Developer Iberia

Microsoft

Juan Chinchilla Alvargonzalez

Director of Dynamics 365 and Power
Platform

Mobile World Capital Barcelona

Eduard Martín

CIO & Intelligent Connectivity Director

Naturgy

Jordi Esparbe Mainar

IT Innovation Manager at Naturgy

Nestlé

Cristina Ghetti

Head of Workforce360 and nearshore TI
hubs Barcelona & Milan

NTT DATA

Paulo Silva

Head of Emerging Business Areas & Delivery
Models

Outsystems**Manuel Rodrigues**

Regional Sales Director Spain

Salesforce**Marcel Palou**

Salesforce Platform Account Executive

SEAT**André Radon**

Chief Information Officer

**General Secretariat for Digital Administration
(SGAD) of the Government of Spain****Santiago Graña Domínguez**Deputy Director General for Planning and
Governance of the Digital Administration at the
Ministry of Economic and Social Affairs of Spain
Digital Transformation of the Spanish Government**Servicenow****William Olivieri**

Solution Sales Manager AppEngine

Wolters Kluwer**Damien Peteau**Tax & Accounting Director of Software
Development, Architecture and Operations**Zurich****Oscar Pallisa Gabriel**

Chief Information Officer

A blurred background image showing three people working at computer desks in an office environment. On the left, a woman with blonde hair and glasses is focused on her screen. In the center, a person with dark hair is seen from behind. On the right, a young man is also working at his desk. The office has a modern design with white walls and a large window in the background.

1

Context

An increasingly digital context

Both Spain and Europe are gearing up to ride the wave of digitalisation and benefit from the significant productivity gains it promises

In the current context, digital technologies have emerged as one of the best examples of adaptation to a new reality. The business plans of digital transformation is no longer an option but a real necessity for companies to remain competitive in the market.

Thus, the commitment to digitalisation at the level of the economy, business and society is evident, as confirmed by the Digital Economy and Society Index (DESI), produced by the European Union, in which Spain improves its overall score by 3.9 points and is 4.9 points above the European Union average. However, it drops one step in the ranking to 11th place, losing the 10th position of the previous two editions, due to the improvement in digitalisation in all the countries analysed.

However, in the Digital Spain 2025 plan, the government states that, although the country has strengths to advance in the Digital Transformation process, it is making limited progress in digitising the productive fabric, investment in R&D&I and the digital skills of the population.

No one disputes that Spain's digital reinvention is strategic because of the high socio-economic impact it could generate, which could reach an annual value equivalent to 1.8% of GDP by 2025.

In addition, with the communication "Shaping Europe's Digital Future", the European Commission aims to strategically position Europe as a territory that responds to this global challenge, as opposed to, for example, China and the US, which have long since taken the lead.

In short, technological innovation could drive a new era of productivity, which could be accelerated by the avalanche of recent discoveries with transformative potential, the new investment boom, and the rapid adoption of new technologies, which the pandemic has allowed to be internalised faster and are now non-negotiable.

Following the European trend, 45% of Spanish companies have among their priorities investment in digital transformation and sustainability as leverages for recovery. In fact, companies that make progress on both fronts are almost three times more likely to become "leaders" than the rest. However, companies will face challenges securing all the digital talent needed to carry out these transformation processes.

— « »

"Within the framework of the National Recovery, Transformation and Resilience Plan for Spain, the Kit Digital programme of subsidies to small businesses, micro-SMEs and the self-employed has been set up to 3,067 million euros. It aims to digitise around one million SMEs and the self-employed throughout Spain in all productive sectors over the next three years."

Santiago Graña Domínguez

Deputy Director-General for Planning and Governance of the Digital Administration at the Ministry of Economic Affairs and Digital Transformation of the Government of Spain

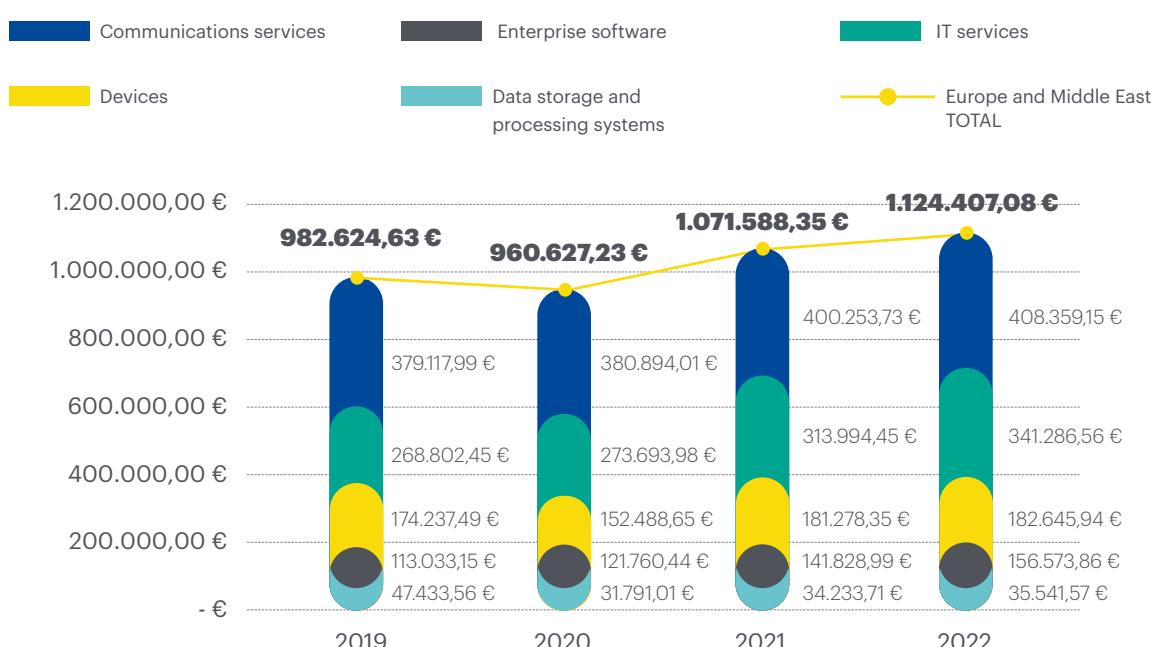
Investment in information information is intensifying

After the pandemic and Brexit-driven contraction of ICT investment in EMEA, the level recovered in 2021 of ICT spending by organisations

Although the ICT business performance in 2020 suffered due to the pandemic and Brexit, in the case of Europe, the outlook for recovery is solid. If before the pandemic, most organisations were making progress with their digital strategies at a steady pace, it is expected that as soon as the situation normalises, organisations will increase their ICT spending levels.

Thus, ICT spending in the EMEA region started to recover in 2021, after a contraction in 2020, with spending on devices increasing by 13.7%. Total ICT spending is forecast to reach 1,071,588 million euros with a growth of 6.3% in 2021, and this positive trend is expected to continue in 2022 with a growth of 4.7%, reaching 1,124,407 million euros.

EMEA ICT spending by segment (Millions of euros)



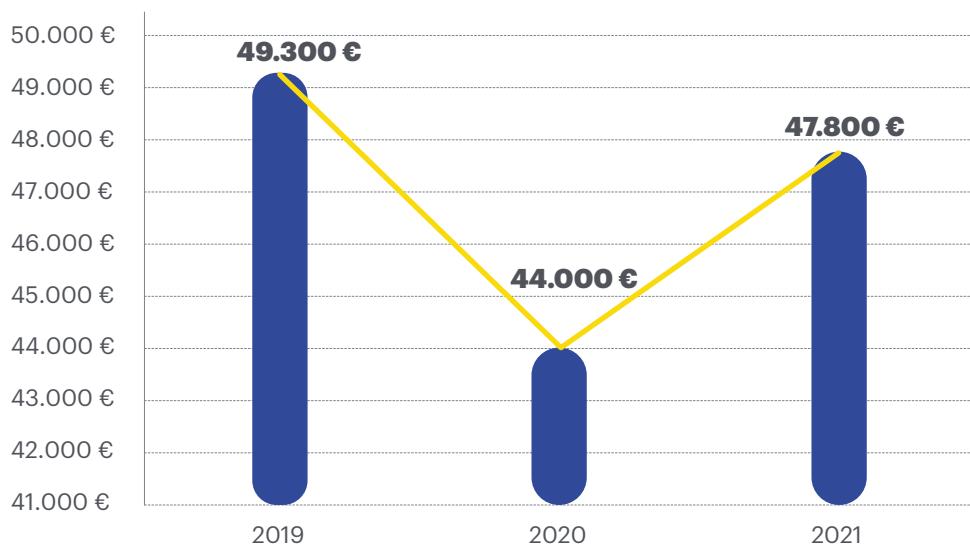
Exchange rate applied: 1€= 1,13\$

Source: [Gartner 2020](#) and [Gartner 2021](#)

Expectations have also been consolidated in Spain to make progress in the recovery of the ICT business during 2021

The trend will continue in Spain, where after a 10.8% decrease in ICT spending in 2020, an 8.6% increase is expected by 2021, reaching 47.8 billion dollars in ICT investment.

IT expenditure in Spain (Millions of euros)



Source: [IDC 2021](#)

A severe shortage of talent divide

The ICT sector suffers from a critical situation due to the high demand for applications and the lack of specialised talent. It is estimated that there is currently a shortage of 350,000 ICT specialists in Europe, of which 75,000 are in Spain

All this sudden digitisation has overwhelmed the capacities of already overstretched IT departments.

As evidence, [IDC](#) predicted that 500 million new applications will need to be created globally in the period 2018-2023, which will surpass the number of applications generated in the last 40 years.

This implies the existence of many companies wanting to develop applications and a massive demand for digital talent to which the global labour market cannot respond, as evidenced by the difficulties companies face in filling vacancies in this field globally.

Thus, the current deficit of ICT specialists in Europe is estimated at no less than 350,000, of which 75,000 ICT specialists would be required to meet the needs of the Spanish market, as pointed out by the association DigitalEs.

More applications are needed, and there is no talent to generate them.

« »

“The developer gap is expected to grow from 1.4M developers globally to 5M in four years.”

Juan Chinchilla Alvargonzalez

Director of Dynamics 365 and Power Platform at Microsoft

Businesses suffer from the lack of ICT talent in an increasingly more pronounced

Many organisations struggle to attract and retain the quality and quantity of digital talent needed for their business. On average, 55% of EU companies that hired or tried to hire ICT specialists found it difficult to do so

The lack of specialised ICT talent is one of the main challenges facing companies in virtually every sector of activity.

According to Eurostat, on average, 55% of companies in the European Union that recruited or tried to recruit ICT professionals encountered difficulties. In the case of Spain, this percentage stands at 24%, and although this indicator is below the European average, it is also evidence of the tensions in the Spanish ICT market.

Therefore, many organisations find it challenging to attract and retain the quality and quantity of talent needed to nurture their businesses with innovative technology.

This is critical, as new technologies are nowadays a fundamental pillar to ensure competitiveness, innovation and job creation in an increasingly globalised world.

As if this were not enough, this gap is expected to grow in the future, as the demand for ICT profiles in Spain doubles every two years, following the European trend, according to Experis in its report "TechCities Experis 2021". In this sense, we can say that if there is already a perceived shortage of digital talent today, this problem will only get worse in the future.

This could be a severe setback to the economy, given information technologies' cross-cutting and driving role.

— « »

"There is a clear imbalance between supply and demand for digital profiles, which is leading to a war on salaries and working conditions offered"

Selena Sabiote

Information Technology & Digital Manager at Hays

The Low-Code is presented as a solution to mitigate the lack of digital talent

Low-Code avoids conventional programming as much as possible and thus simplifies development

The current context, with this very high demand for application development and a pressing lack of ICT talent that traditional mechanisms cannot meet, represents an excellent opportunity for Low-Code platforms, understood as those technologies that allow programming "with little code" through the use of visual interfaces with pre-configured components. However, this is not the only reason Low-Code is gaining importance today.

We can also consider the following causes as drivers for the rise of Low-Code:

- **A large proportion of today's workers are millennials** (born between 1981 and 1993) and they will be a large majority in a very short time, coinciding also with the incorporation of the first Z generations (born between 1994 and 2010). Both groups, also known as digital natives, are accustomed to a very high-quality digital experience in the consumption of websites and mobile applications, so it is a point to satisfy both as consumers and in the world of work, having to provide them with agile tools, very different from the current software development environments.
- **Companies want to maximise the productivity of their resources**, i.e. they are always under pressure to do more with what they have. Businesses must find efficiencies in processes, technology and capability to meet digital transformation objectives.
- **The market demands that the delivery of applications become faster, more agile and safe.** On the one hand, the challenge of delivering solutions as fast as businesses and customers require. On the other hand, these solutions' robustness and security are among the most critical challenges companies face when developing digital solutions.

All these causes demonstrate the need for a change in the digital paradigm, creating an ideal scenario for adopting Low-Code since this technology influences and positively impacts each of them.

2 The Low-Code universe

```
applicationworks.php x file.edit.php x upload.process.php x upload.process2.php x
Q-DocxPresentationFiles
) else if ($application_presentation_file <> ((count($application_presentation_files) <= 2) || count($application_presentation_files) > 4)) {
    set_error('error', 'en az 2 en fazla 4 sunum dosyası yüklenmiştir');
} else {
    $arrPresentationFiles = array();
    $arrReportFiles = array();
    $arrModelFiles = array();
    $media = new media();

    if (is_array($application_members)) {
        $serial_application_members = serialize($application_members);
    }

    if ($application_presentation_file) {
        //check_file($application_presentation_file, 'application_presentation_file');

        foreach ($application_presentation_file as $file) {
            $mimetype = $media->mimetype($file['name']);
            $doctype = $media->doctype($file['name']);
            $ext = strtolower(substr(strrchr($file['name'], '.'), 1));
            $file_name = $row['application_code'] . '-' . $file['name'];

            move_uploaded_file($file['tmp_name'], ABS_PATH . $file_name);

            $sql = "INSERT INTO
                    ". DB_PREFIX . "files
                    (
                        file_desc,
                        file_mime_type,
                        file_name,
                        file_path,
                        file_date,
                        file_md5,
                        file_size
                    )
                    VALUES (
                        '$doctype',
                        '$mimetype',
                        '$file_name',
                        '$desc',
                        NOW()
                    )";
        }
    }
}
```

Discovering Low-Code

Everyone is talking about the Low-Code.

— « » —

"Low-Code tools contribute significantly to agility, as there is almost no need for specific coding."

Emili Platei

Director of corporate architecture and transversal components at CTTI (Generalitat de Catalunya)

— « » —

"Democratisation of the code towards the employee, through the use of Low-Code."

Jordi Esparbe Mainar

IT Innovation Manager at Naturgy

— « » —

"Low-Code brings technology closer to employees, when they need it, and when they want it."

Cristina Ghetti

Head of Workforce360 and nearshore IT hubs Barcelona & Milan at Nestlé

— « » —

"Making software without knowing about software development."

Julio Barrera

Director of the SEG (Software Engineering Group) at the i2cat Foundation

— « » —

"Low-Code abstracts from the coding complexity and allows you to focus more on the business process."

Iban Saenz Iparraguirre

Global Head of Factories in Iberdrola

————— « »

"Low-Code accelerates the digitisation of companies while developing their digital prowess."

Luis Alfonso Navarrete

CIO at Agbar

————— « »

"Low-Code tries to streamline businesses by making them more Customer Centric."

David Almendros

Director CoE Artificial Intelligence at CaixaBankTech

————— « »

"The future of programming with little effort."

Jose Miguel Aoiz

Deputy Director of IT Development at Correos

————— « »

"Enhance development beyond IT."

Andre Radon

Chief Information Officer at SEAT & CUPRA

————— « »

"Low-Code allows for rapid prototyping of applications, speeding up development."

Damien Peteau

Tax and accounting director of software development, architecture and Operations at Wolters Kluwer

Top-of-mind on the Low-Code

Low-Code is associated with a wide variety of concepts, including agility, simplicity and speed

Given the diversity of information on this novel technology with great transformational potential, it was decided to ask the representatives of the organisations participating in the study what words came to mind when Low-Code was mentioned.

The most frequently mentioned concepts, i.e. those most associated with Low-Code, were agility, simplicity and speed, followed by acceleration, automation, *Time to Market* and democratisation.

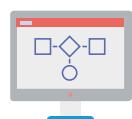
Indeed, all these concepts are related to this new technological paradigm that is set to revolutionise the ICT development model. However, what is Low Code?



What is Low-Code?

Low-Code technologies minimise or eliminate the manual coding required to develop and deploy software applications, reducing the investment in time and/or cost and simplifying the training required by the teams in charge of creating, evolving or maintaining such applications. In the current context, they represent a new technological paradigm set to revolutionise the field of ICT development.

Within the framework of the Low-Code technology concept, there are numerous platforms with different approaches and value offerings, which comply, to a greater or lesser degree, with this set of characteristics:



Visual development interface (drag & drop)

They allow development without programming thanks to a panel of visual elements.



Integration capacity

Enable connection to third-party systems and enterprise applications.



Focus on business

They make it easier to visualise earlier and improve the functional design of an application.



Range of pre-engineered components

They speed up development thanks to the existence of off-the-shelf components.



Ease of use by non-experts

They are easy to use for profiles without high computer skills.



Reusability

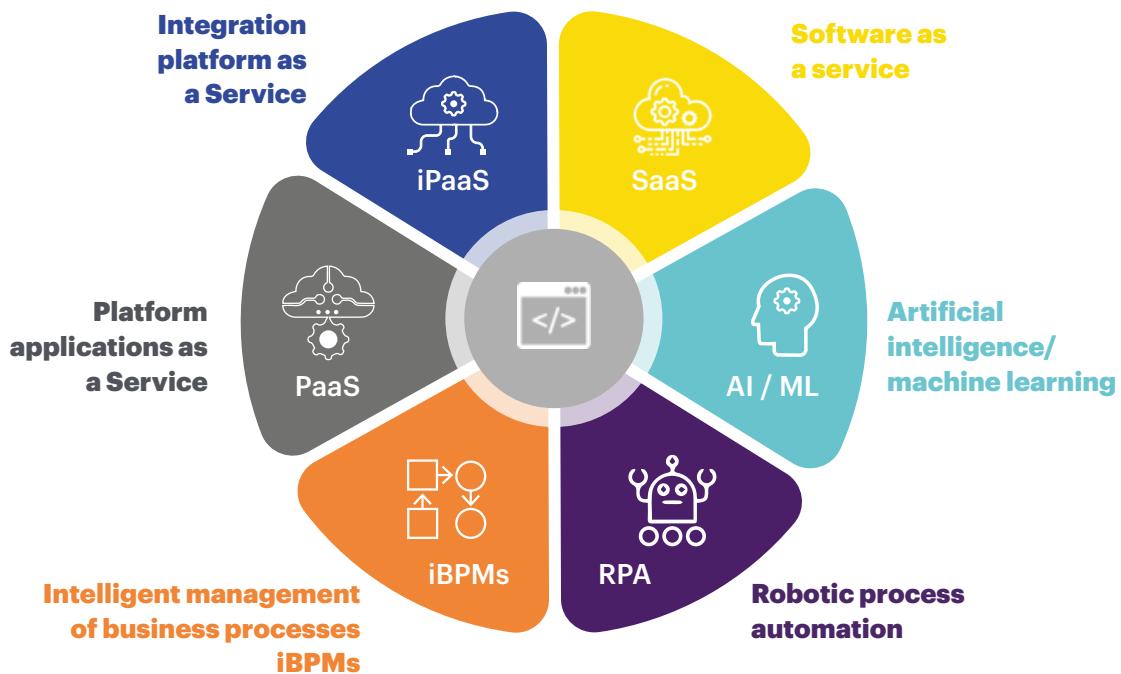
They generate developments that can be easily extrapolated to other web formats, mobile, etc.

Low-Code as a point of confluence of different technologies

Low-Code further enhances agility and productivity in software development through its application in combination with other transformative technologies

Although Low-Code is a technological concept that facilitates Digital Transformation and Hyper-automation initiatives, it is not the only one, and it is frequently applied in combination with other transformative technologies such as iPaaS, SaaS, aPaaS, iBPMS, RPA, AI/ ML, etc. to achieve maximum agility and productivity in software development.

This is why the boundaries between Low-Code and other technologies are sometimes blurred. Many of today's Low-Code platforms have extended their capabilities by incorporating new functionalities leveraging these technologies.

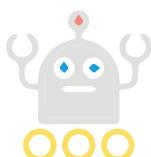


**SaaS:** Software as a Service

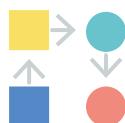
Software distribution and licensing model used to deliver software applications over the Internet as a service. The data it handles is hosted on servers of an information and communication technology company, accessed via the Internet from a client.

**IA/ML:** Artificial intelligence/machine learning

Artificial Intelligence is when a computer system can draw conclusions from a data set. Machine learning algorithms are those whose performance improves as they are exposed to more data, enabling machine learning that allows AI to mimic human reasoning.

**RPA:** Robotic process automation

Technology that allows the easy configuration of one or more scripts (software robots, also called bots) that automate business or ICT processes, including data manipulation, automatic responses or transaction execution.

**IBPM:** Intelligent business process management

Technology that enables improved business performance through the management, orchestration and automation of business processes.

**aPaaS:** Application Platform as a Service

Cloud computing service model, which provides environments for the development and execution of software applications. It allows developers to create large-scale applications that would otherwise exceed the capacity of their own hardware or lack the tools to develop.

**IPaaS:** Integration platform as a Service.

A set of automated tools for connecting software applications deployed in different environments. It is often used by companies that need to integrate local applications and data with applications and data in the cloud.

Another type of Low-Code: the No-Code

No-Code makes application development even more straightforward, allowing applications to be created without programming a single line of code

Within the Low-Code universe, there are two distinct platform segments. On the one hand, there is the Low-Code platform segment and, on the other, a specific platform segment called No-Code, which further simplifies the task of generating applications and whose impact can be very relevant, making it easier for people with no knowledge or technical training in software development to create certain types of applications. Therefore, they represent a higher degree of simplicity for the user than Low-Code platforms.

At this point, it is necessary to introduce the definitions that have become widespread in the Low-Code and No-Code world to differentiate the groups of regular users of each platform. On the one hand, a citizen developer or business developer is a non-technical professional who is capable of programming both with tools No-Code and Low-Code tools and some previous training. On the other hand, the technical/professional developer is used to software development and requires a shorter learning curve.

With the help of such No-Code and Low-Code platforms, these citizen or business developers will be able to generate applications without the need to learn high-level programming, creating a new model of relationship or symbiosis with professional software developers.

Comparison between No-Code and Low-Code segments

| | No-Code | Low-Code |
|--|-----------------------|---|
| Parameterisation/ Development | 100% Parameterisation | Parameterisation + Technical languages |
| Ease of use | Very high | High |
| Productivity | Very high | High |
| Flexibility and control of the tool | Limited | High |
| Use cases | Limited | Multiple, with wide coverage |

Source: In-house document

Benefits of Low-Code and some data on its potential

Low-Code continues to grow in capability and maturity, enabling faster delivery of applications with fewer technical resources involved in the development

The main benefits attributed to the use of Low-Code platforms are the following:



Shorter Time to Market

Less time is spent on development using such tools, which reduces the time to market for new products.



More efficient app development

It uses fewer resources, and app development is more straightforward and much more agile than other technologies.



Increased team productivity

Increases team development capabilities by reducing development complexity and human error through automation.



Short learning curve

It is a more straightforward technology to learn than traditional programming languages, making it more accessible to those with limited knowledge of technology.



Collaborative and agile development

It allows the ICT and business departments to work together from very early stages, making the development cycle more agile and focused on the end-user.



Training profiles to develop apps

It facilitates the reconversion of non-ICT profiles, such as expert profiles in other technologies, through reskilling and training them in Low-Code to develop applications.

For their part, vendors of the leading Low-Code solutions already refer to some indicators of success stories in real projects that reveal the impact that this technological concept can have.

Examples of time and cost improvements provided by low-code manufacturers

10x

it is 10 times faster to
create an application

74%

reduction in
the cost of apps

650 days

saved by developing
60 apps
in 20 months

\$20M

savings by increasing
productivity x9
of developers in 6 months

Note: The ratios shown correspond to the commercial information provided by the vendors participating in this study.

The companies interviewed are indeed perceiving the benefits of Low-Code in the first pilots using these platforms. Nevertheless, they need to progress using the platforms to verify the promise of the potential benefits indicated by the vendors.



Shorter Time to Market

"Above all, the simplicity and speed in achieving results. In a month or a half, we have set up proofs of concept with isolated internal processes."

Julian Nuño

Deputy CIO | Chief Transformation Officer at DKV



More efficient app development

"The speed is higher, so they allow for rapid prototyping."

Eduard Martín

CIO & Intelligent Connectivity Director at Mobile World Capital Barcelona



Increased team productivity

"Creating simple applications with Low-Code can be achieved with low programming skills. However, implementing more complete and complex information systems with Low-Code tools requires more technical knowledge and application of application lifecycle management models."

Emili Platel

Director of corporate architecture and transversal components at CTTI (Generalitat de Catalunya)



Short learning curve

"We see the main benefits of Low-Code as the speed and ease of use of this type of platform."

Antonio Vieiro

Technical Architecture Manager at Experis (Manpower Group)



Collaborative and agile development

"Quality increases when you work together with business, and this makes you focus more on the final needs of the client or end user."

David Almendros

Director CoE Artificial Intelligence at CaixaBankTech



Training profiles to develop apps

"Low-code makes it possible to accelerate digitalisation, especially in the area of personal and team productivity, by expanding the developer base autonomously on the business side, without requiring intensive technology support."

Oscar Pallisa Gabriel

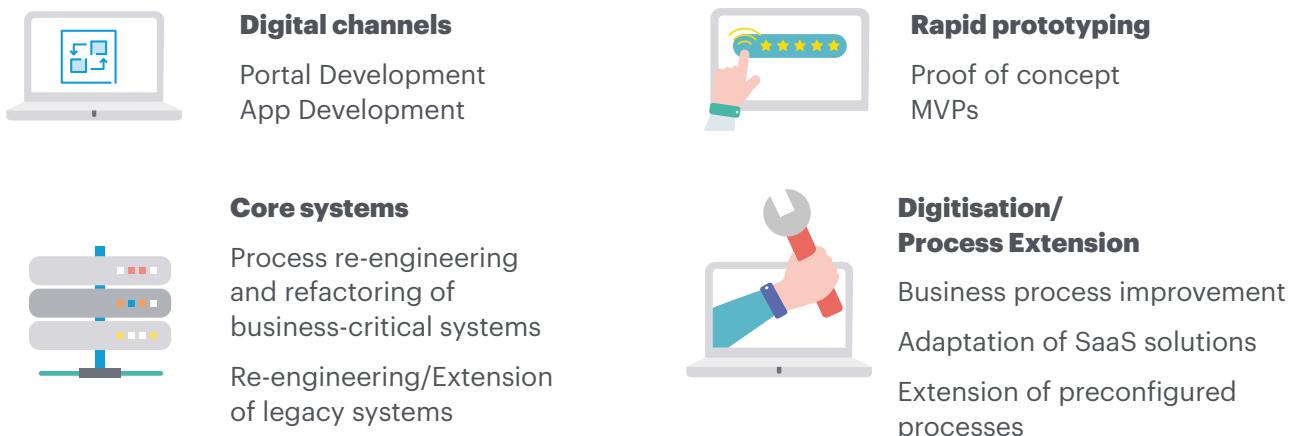
Chief Information Officer in Zurich

Main cases of use of Low-Code

Portals, mobile applications, prototypes, process extensions and core systems are the use cases enabled by Low-Code

The use cases that Low-Code platforms can address are manifold, allowing them to address almost the entire spectrum of enterprise application development, from the simplest to the most complex or business-critical applications.

The following scheme shows a general classification of the main use cases identified in the interviews and also those highlighted by the most prestigious analysts:



Source: In-house document

In general, everything related to digital channels, i.e. web portals and mobile applications, applications for both employees and customers of the company, is the most common use case for employees and where Low-Code is having the most significant impact.

In addition to these applications, proofs-of-concept, prototypes, or MVPs are also an everyday use case. For testing the functional value of almost any kind of solution, Low-Code offers much value by speeding up developments.

Low-Code is also frequently used to extend cross-cutting systems, such as CRM or ERP, partly because enterprise solution vendors offer their own Low-Code platform to customise and add value to the standard solution.

Finally, as far as core or business-critical systems are concerned, we can say that Low-Code is not yet among the most common use cases. Although there are specific references, it implies a high level of maturity in the use of technology by companies. Other factors also influence its implementation, such as the type of company and the initial technological stack, which can be conditioning factors.

————— « »

"The automation of internal processes and the creation of multi-channel solutions in an agile way are highlighted by our customers for adopting Low-Code."

Paulo Silva

Head of Emerging Business Areas & Delivery Models in NTT DATA

The set of use cases that have been described in greater depth during the interviews are listed below:

| Low-Code development of a platform to provide security information to customers and staff | | |
|--|---|---|
| Use case: | | |
| Typology: Core systems | Sector: Administrative activities and auxiliary services. Security services. | Location: Spain |
| Description of the use case: | | |
| <ul style="list-style-type: none">• The company adopted Low-Code in its core business, responding to the need for a platform that could scale, that was compatible with the cloud, and that could integrate with other systems, and develop a native mobile and web applications and its Back-End.• The platform has given them flexibility, agility and the integrations they need for fast-paced, customer-centric innovation.• One of the first systems the company developed with the Low-Code platform was POPS. This operations platform provides relevant security information to customers and security personnel, helping to provide a more predictive service. | | |
| 50% of Time to Market reduction | <18 months of ROI | 120,000 users in 14 countries |

| Development of an application to improve the safety of the electricity distribution process | | |
|---|--------------------------|------------------------|
| Use case: | | |
| Typology: Digital channels | Sector: Energetic | Location: Spain |
| Description of the success story: | | |
| <ul style="list-style-type: none">• The company spends a large amount of money to keep the electricity distribution lines in Spain, quantified in thousands of kilometres of cable, safe from vegetation, as the lines face security of supply problems caused by dense vegetation, which can jeopardise the quality of service.• In order to optimise this internal business process, a medium-low sized application was developed, which is used by the company's employees to manage the pruning work to maintain the correct functioning of the electricity distribution lines.• The need arose from the business area, which, thanks to the advantages of Low-Code, were able to participate in the development value chain. | | |

| | | |
|---|--|---|
| 3,400 kilometres analysed to manage the pruning and maintenance of the electrical corridors where the power lines run | x3 speed the business area was able to visualise the functional design of the application in advance | +30% Agility thanks to rapid prototyping it was possible to better visualise the ideas that emerged in an agile way |
|---|--|---|

Creation of multi-channel, multi-country portals that can be easily integrated with multiple systems

Use case:

Typology: Digital channels

Sector: Insurance

Location: Multi-country (Spain)

Description of the use case:

- The company sought to offer a multi-channel solution in different regions, maintaining a focus on digital assets that can evolve in the future and have the ability to integrate with multiple systems easily
- To this end, the integrator assembled multidisciplinary teams with working commercial knowledge to support the complete project cycle (from analysis to post-production) and selected a Low-Code platform capable of developing the different portals.
- The capabilities of the Low-Code platform have been leveraged to ensure a consistent and homogeneous user experience and user interface (UX/UI) across portals, accelerate integration with all systems and simplify the periodic implementation of new functionalities. In addition, the development of shared modules has facilitated re-use in different regions.
- As a result, new portals have been created that have made it possible to close the old ones without affecting the business.

+190,000

customers who can make use
of the customer portal

+10,500

advisors using the portal

x3 speed

in development by the creation and
use of shared components in all
solutions and regions

Deployment of automated customer solutions to optimise resources and save time

Use case:

Typology: Digitisation / extension
of processes

Sector: Financial Services

Location: Spain

Description of the success story:

- The company uses the Low-Code platform to build and deploy automated solutions for its customers in a highly agile manner, with more than 50,000 automated files and tasks per month, each incorporating an average of 350 files.
- The company has digitised and automated the workflow for requesting deferrals on debit payments and accelerated existing processes to cope with multiple peaks of service requests during shutdowns and service interruptions.
- They have used the vendor's platform to automate multiple repetitive tasks and streamline and optimise various workflows, such as mortgage applications, loan application management and communication management. It provides them with a centralised solution for automated processes that is flexible, stable and scalable.

€30,000

savings per month with new digital mortgage
automation

> 50,000

automated items and tasks per month

Low-Code enables a new customer area, the unification of four systems into one and the digitalisation of processes

Use case:

Typology: Digital channels.
Digitisation of processes

Sector: Health

Location: Spain

Description of the use case:

- As a result of the different merger processes of the mutual insurance companies that gave rise to the current company, there came a time when three different systems of coordination of business activities (CAE) coexisted. A strategic initiative was launched to unify all existing functionality in each of the three systems into a single application to design and build a single CAE system. For this purpose, a Low-Code platform was used to harness the power of this type of technology to modernise functionality, shorten development times, ensure scalability and integration with existing systems, and facilitate their maintenance and evolution.
- The management process of the company's collaborating agencies (sales opportunities, commissions, etc.) was also digitalised through the implementation of a self-service portal for agents, which is integrated with the company's core systems, facilitating access to a set of management functionalities and automatisms that were manual or based on office automation (sending e-mails, Excel sheets, etc.).
- In addition, the company has a Client Area where all the functionality derived from the service they provide is made available. Here, the use of the Low-Code platform has enabled an agile response to the new services and needs resulting from the new context of the COVID-19 global pandemic, such as:
 - Stock management of PPE suits, masks, PCR and antigen tests, cleaning and disinfection materials.
 - Information on protocols and procedures, and event management (COVID testing of attendees, mobility, test results, access validation, etc.).

Unification

from having 3 different CAE systems, to having a single, much more competitive system

+30%

operational efficiency resulting from the unification of CAE systems

+40%

Time to Market reduction in the development of applications resulting from new needs

Low-Code as a tool to democratise application development and change company mindset

Use case:

Typology: Rapid prototyping

Sector: Food

Location: Spain

Description of the success story:

- The company wants to bring technology to employees quickly, easily and cost-effectively. They use Low-Code as a lever for innovation and inclusion.
- They have a very ambitious programme in place involving all employees (factory staff, business knowledge, ICT, etc.) covering the following blocks:
 1. Use of the Low-Code tool by all employees to increase their productivity in their daily work.
 2. Innovation laboratory to develop applications of medium complexity by professionals with ICT skills.
 3. A space where questions are answered for all employees who want to experiment with the Low-Code tool to develop their ideas "out of the box".
 4. It relies on an IT service provider with Low-Code expertise to develop applications in agile format and respond to the challenges posed.
- For the programme to be successful, a governance board has been defined to define what Low-Code developments can be used for, which are usually focused on internal application development and rapid prototyping.
- They have created a Low-Code community as a channel for collaboration and doubt resolution. They have Evangelists, experts who carry out activities, articles, training pills, and they can also find training on the corporate platform, with which they have achieved great capillarity in the organisation.

Mindset Change

technology has been democratised, all workers can come up with prototypes arising from the needs of the business

1,000 apps developed

por perfiles con y sin conocimientos TIC

+500 people

have made use of the development programme

Low-Code has made it possible to accelerate the development of applications related to the new social and business reality brought about by COVID-19

The advance of the COVID-19 pandemic has meant that organisations have had to develop numerous applications in record time to adapt to the new reality and to the regulatory changes that were taking place. In this context, the speed of application development was a critical factor, so many companies and public administrations started to work with Low-Code because of this need to accelerate the Time To Market of certain developments. Listed below are several use cases addressed to support specific processes.

| Process support | |
|---|--|
| COVID-19 passport | <ul style="list-style-type: none">• Employee risk assessment/self-diagnosis.• Access control to public facilities. |
| Management of procedures and protocols | <ul style="list-style-type: none">• Management of mass procedures for citizens (Temporary Redundancy Plans, subsidies, guarantees, loans, etc.).• Management of health security protocols.• Management of health security protocols. |
| Internal communication | <ul style="list-style-type: none">• Apps for citizen communication.• Communication apps for civil servants.• Collaborative spaces for the management of de-escalation in the administration. |
| Information gathering | <ul style="list-style-type: none">• Compilation of the situation and needs of citizens.• Gathering information from employees for de-escalation.• De-escalation management in schools. |
| Space management | <ul style="list-style-type: none">• Office space management.• Event capacity management. |

Agile development of an application for sharing information between hospitals and patients' families

Use case:

Typology: Digital channels

Sector: Health

Location: Spain

Description of the success story:

- A group of professional volunteers from the vendor partner ecosystem quickly and swiftly implemented an application to help hospitals in the autonomous community keep the families of people admitted to hospitals informed during the COVID-19 pandemic.
- The data provided related exclusively to the process for which the patient had been admitted, not to his or her medical history.
- Every hour, the hospital's IT system was responsible for leaving encrypted files on the Cloud platform containing the information to be transferred to the relative. These files, which included the patient's file, family members' data and medical reports, were uploaded to the CRM and automatically, thanks to the Low-Code platform, were published on a web portal of the Autonomous Community, "Info Familiares", where the patient's relatives and/or family members had to register.
- This is an example of how Low-Code can be used not only for cost reduction, but also for immediacy of implementation.

7 days

in creating the application through Low-Code

3 hospitals

where it is already in pilot phase

3 hospitals

where it is in the implementation phase

New time recording platform

Use case:

Typology: Digitisation and process extension

Sector: Food

Location: Spain

Description of the use case:

- Due to the uncertainty caused by COVID-19, the company needed a platform to help its employees manage the recording of working time and the hours generated in terms of recoverable paid leave. Hence, it needed a very agile and intuitive tool to be used by different teams and profiles.
- For this purpose, two applications based on Low-Code were developed, a mobile application for employees, which allows them to register the hours worked (start and end of the working day, including breaks) daily, and to have and review the history of records, know the balance of overtime, etc. and another application for Tablet/PC for administration, which allows, on the one hand, human resources employees to review and manage all daily records of employees, and upload files with absences and, on the other hand, supervisors to review/approve/reject overtime requests from employees.
- This has made it possible for the company to manage employees' accumulated hours and for employees to check their overdue hours, and to check overtime

1,600

employees benefiting from a method of timekeeping adapted to their needs

+2

digital channels the company has in place to address the needs arising from the pandemic

+40%

agility in the development of an application and a portal for time registration and control

Application of Low-Code in the companies interviewed

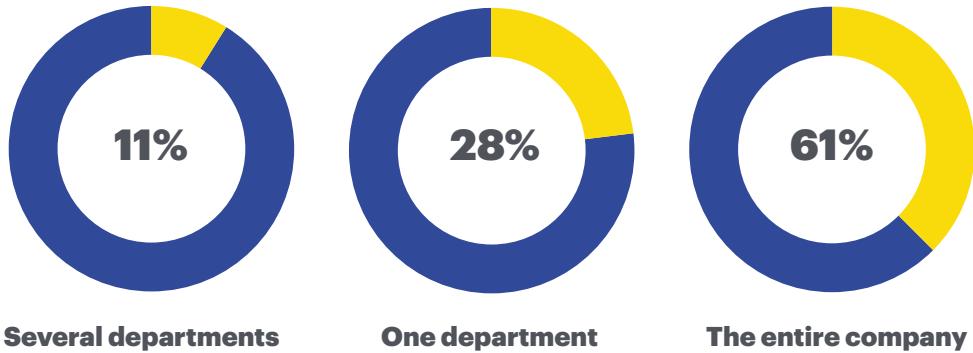
Applications used by several departments or even by the whole company and that help to carry out daily tasks are the most frequent examples detected in the interviews carried out

Large organisations and vendors themselves have publicised numerous success stories linked to Low-Code through their digital channels. Here is a sample of some of the use cases reported by participants in the study. Mainly the use cases mentioned refer to the development of new applications in web and mobile formats, both for creating new services and improving existing business processes. In addition, rapid prototyping of solutions enabled by Low-Code tools has allowed the development of applications in a short period of time to address the needs arising from the COVID-19 pandemic.

The most advanced applications are internal applications, namely those that can be used by any company employee.

Regarding the type of users who consume the applications made using Low-Code platforms, the companies participating in the study indicated that their primary focus had been the development of applications for internal company use, being most with 60% for global use, i.e. applications available to any employee. Some 30% of these were for a single department, while the remaining 10% of applications were for shared use by several departments.

Scope of internal Low-Code developments by the interviewed companies



As for external applications, we have found few cases of use by companies, but the existing ones have a significant mass of users, finding applications consumed by more than 50,000 users and others by more than 100,000 users, mainly in the banking and retail sectors.

Examples of applications made by interviewees

Applications used by several departments or even by the whole company and that help to perform daily tasks are the most frequent examples detected in the interviews conducted

Here is a sample of some of the use cases reported by participants in the study.



HR application

Application to find job assignment opportunities in business areas for technology people.



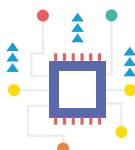
Employee portal

Application for viewing and downloading payslips and holiday requests.



Logistics distribution

A warehousing, picking and route optimisation application that allows you to share data of interest with external partners, allowing it to be consumed by your users without the need for them to adhere to the standard of your warehouse management system.



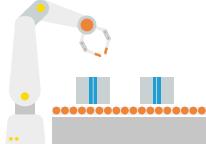
Automation of process flows

Application to automatically send reminders and send approvals on audit checks, which automated the process.



Inventory of companies

Application to collect information from different start-ups in innovation projects and share it with stakeholders for assessment.



Reduction of wastage/industrial waste

Application to automatically check if machine parameters are correct and up to date, considered of great interest due to the relevance of waste reduction in factories.



Management of courtesy details

Application that manages the delivery of flowers to the dressing rooms in the audiovisual world was realised thanks to the platforms' capabilities to map any process quickly.



Virtual friend for Christmas

Chatbot to interact with the employee on how to manage the Christmas gift (type of gift, pick-up, delivery at home, etc.), as a way to bring the company's values closer to the employees during the COVID-19 pandemic who were working remotely.



Operator management and task automation

Application that allows the monitoring of operators' activities by providing key performance indicators and facilitates the automation of tasks and the improvement of internal processes, supporting decision making and improving productivity by freeing employees from repetitive work.



Automation and digitalisation of mortgage processing

Application that automates the flow for requesting deferrals on debit payments and speeds up processes to cope with multiple peaks of service requests.

Applications carried out in record time and with few resources have made it possible to adapt to the changing scenario brought about by the pandemic

Health crisis management

Application to address the COVID-19 pandemic would allow searching and verifying symptoms, scheduling appointments, identifying the best testing site close to each citizen's home, etc.

Back to office management

Application for job reservation in the post-COVID return to office. The application allows you to manage the capacity of each floor reserve space and parking in the office.

COVID-19 prevention at airports

Application to manage all COVID-19 tests for business customers on air travel.



3 Main Low-Code platforms

Native platforms and enterprises traditional software compete in the Low-Code market

Low-Code segment platforms achieve the highest adoption rates

Within the Low-Code and No-Code platforms, there are two main differentiated typologies.

- No-Code platforms, which do not require manual coding, are focused on Citizen Developers and Business Developers, profiles mainly from outside the EU ICT field that, thanks to the use of these platforms, have the necessary capacities for the development of applications in an agile way.
- Low-Code platforms, aimed at Citizen Developers or Business Developers and ICT profiles to improve the productivity of application development processes.

Leading platforms

| No-Code | Low-Code |
|-----------------|------------|
| Google Appsheet | Outsystems |
| Quick Base | Salesforce |
| Betty Blocks | Servicenow |
| Caspio | Appian |
| | Microsoft |
| | Mendix |

Selection of platforms based on turnover and market relevance according to leading analysts.

In the category of Low-Code platforms, we find Low-Code native companies such as Mendix and OutSystems, and platforms focused on digitising processes such as Appian or those that we could identify as SaaS platforms with a broad functional coverage such as Microsoft, Salesforce or Servicenow.

In the No-Code category, all of which are companies that have emerged from this technological revolution, we find Caspio, a veteran company focused on applications based on data, Quick base focused on operations and integrations, AppSheet, which is leading the way in automation and AI application by Google giant and Betty Blocks which, despite its small size, has positioned itself as an alternative for developing quality applications with a modern architecture.

However, it should be noted that, despite the differentiation made between the two market segments discussed above, the borderline between the Low-Code and No-Code segments is not so clear. This is because it is a dynamic market, where manufacturers compete for market share, resulting in a high degree of innovation that allows vendors to be more agile in the launch of new product versions, with the consequent incorporation of additional features, in many cases able to meet the needs of different target audiences.

These Low-Code platforms are increasing their rate of adoption by companies, driven by trends such as, among others:

- **The democratisation of ICT development:** since Low-Code allows for an exponential increase in the number of employees with technological or analytical skills to develop applications both within ICT departments and in business areas.
- **Hyper-automation:** a set of advanced technologies capable of extending automation in the enterprise such as IBPMS, RPA, iPaaS, AI, etc., since Low-Code is among the most widely used tools to support automation initiatives, making it a key technology for orchestrating multiple technology tools or platforms.
- **The composable enterprise** (an organisation that adapts to the pace of business change through a continuous process to meet the expectations of rapidly changing markets): because Low-Code enables organisations to adapt with agility to the high pace of business change by accelerating the *Time to Market* of product and service development of product and service development.

In addition, all of the above-mentioned manufacturing companies offer competitive products, accompanied by a clear strategy and comprehensive geographical coverage and applicability in different industries. This translates into a firm commitment to the evolution of its products, which results in the launch of new versions regularly, capable of meeting customer expectations.

Concerning the product roadmap, vendors highlight integration with other technologies such as artificial intelligence, BPM, RPA, and integration with all systems in the new digital work environment. All of this is key to increasing the capabilities of the platforms, and the possibilities of customer service offerings.

If we talk about their marketing strategy and business model, it is unanimously agreed that most of the vendors' business is focused on the sale of licences. For this reason, the bulk of implementations are carried out through its partner ecosystem (with the presence of large integrators with a very high level of knowledge of customers and sectors). However, as manufacturers, they also offer professional services specialised in complex product implementations.

Characteristics of the Spanish market highlighted by the vendors

Low-Code segment platforms have the highest adoption rates

Low-Code platform vendors confirm that in the Spanish market (along with the European market), the adoption of this technology usually goes through an initial testing phase with small investment budgets and pilot tests, until, as at present, a significant number of successful implementation references begin to consolidate in companies in different sectors of activity and the commitment to continue adopting these technologies is consolidated.

Manufacturers highlight large Spanish companies that already have use cases that are a reference in Low-Code worldwide and with a high degree of customer satisfaction.

This is reflected in the fact that most vendors are registering very high growth rates (several of them in triple digits), with the growth of the Spanish market being higher than that experienced by these same manufacturers in other European countries, or even globally. This is partly justified by the fact that the Spanish market is in earlier stages of technology adoption compared to more mature markets, where growth curves are more stabilised.

The opinion of vendors and of large ICT service providers is that Low-Code is on the agenda of most CIOs of large Spanish companies, regardless of their sector of activity. This added to the boost in digitalisation in the business sector thanks to the proliferation of the new figures of the Director of Innovation or the Director of Digital Transformation. The existence of a public sector capable of acting as a driving force due to its own transformation process and investment to promote the digitalisation of companies means that Low-Code manufacturers are very optimistic about the future of these technologies in the Spanish market.

Below are summary sheets with relevant characteristics of the leading platforms in the Low-Code segment.

For Appian the Low-Code is *Time to Market*

| | |
|-----------------------------------|--|
| Highlights: | <ul style="list-style-type: none">• Low-Code hyper-automation platform that facilitates the automation and digitisation of processes.• It excels in its ability to integrate with other systems.• Templates and accelerators for cross-cutting and sectoral processes are available. |
| Characteristics: | <ul style="list-style-type: none">• Workflow automation.• It adapts to complex processes.• It provides intuitive and visual development tools.• It allows applications to be created and distributed instantly.• Instant mobile version.• Ease of implementation and digitisation of processes.• Integration with other systems. |
| Applicability: | <ul style="list-style-type: none">• Digitalisation and automation of processes.• Business applications. |
| Who they are addressed to: | <ul style="list-style-type: none">• It is aimed at the professional ICT developer, but with basic technology skills. |

« »

"Low-Code allows you to build business applications quickly. It also enables agile business automation to respond to today's disruptive environment."

Oscar García de Andoin

Senior Director-Alliances-Appian Corporation

For Mendix Low-Code is Efficiency

| | |
|-----------------------------------|---|
| Highlights: | <ul style="list-style-type: none">It covers the entire application lifecycle, from ideation to deployment and operations.They highlight the use of AI to support development.Its deployment options stand out.It enables the development of native mobile applications that can run offline.It is leading the emergence of Low-Code in the industrial sector. |
| Characteristics: | <ul style="list-style-type: none">Scalability.DevOps platform.Manage the lifecycle on a single platform without changing tools or language.Its tools for modelling and data management stand out. They have an open metadata repository called Mendix data HUB, included in the platform (but licensed separately).High integration capabilities can incorporate information from different systems, connect with any database, with any API system, etc. |
| Applicability: | <ul style="list-style-type: none">Transactional or event-driven applications for all types of industries.Types of applications:<ul style="list-style-type: none">Those focused on launching new products and services, where agility and speed in building applications are critical.Applications that aim to improve the customer experience of existing services. Customer portals, supplier portals, incident management tools, etc.Applications that focus on operational improvements and internal company processes.Modernisation of core systems. "Keep your core clean" is becoming increasingly popular. |
| Who they are addressed to: | <ul style="list-style-type: none">Professional developers, Citizen developers and business profiles from any department. (Operations, Marketing, Finance...). |

« »

" Low-Code helps organisations create disruptive solutions that will improve customer satisfaction, mitigate risks and reduce costs."

Fernando Torres

Cloud Portfolio Developer Iberia at Mendix

For Microsoft Power Platform Low-Code is Digital Revolution

| | |
|-----------------------------------|---|
| Highlights: | <ul style="list-style-type: none">• High productivity in small developments. It is a very agile and easy to implement solution.• End-to-end solution integrated with:<ul style="list-style-type: none">• The Azure Cloud, which allows full access to information and data.• Artificial intelligence services to speed up developments.• Other systems, such as CRM/ERP Dynamics, offer greater adaptability to companies' needs in the last mile. |
| Characteristics: | <ul style="list-style-type: none">• Optimisation of collaborative processes linked to the workplace.• Digitisation of departmental business processes.• Extension of Microsoft Cloud application solutions.• Extensible through Azure components and services and Dynamics 365. |
| Applicability: | <ul style="list-style-type: none">• Focused on collaborative or individual productivity applications (Office 365 extension).• Small departmental applications.• Tailor-made developments to extend Microsoft CRM or ERP solutions. |
| Who they are addressed to: | <ul style="list-style-type: none">• Aimed at Citizen developers and application developers. |

« »

"The digital revolution brought closer to the business user."

Juan Chinchilla

Director of Dynamics 365 and Power Platform at Microsoft

For OutSystems Low-Code is Transformation

| | |
|-----------------------------------|--|
| Highlights: | <ul style="list-style-type: none">• Platform that allows a wide range of use cases to be worked on, including those that affect the core of the business.• Deployment in the OutSystems cloud, in the customer's cloud subscription or its infrastructure.• No-vendor lock-in: the developed application is owned by the customer.• Solution covering the end-to-end development cycle.• Scalable. |
| Characteristics: | <ul style="list-style-type: none">• Full-stack visual development.• Ease of making mobile versions.• Deployment in one click.• Automatic refactoring.• An architecture that scales.• Very powerful front end / UX. |
| Applicability: | <ul style="list-style-type: none">• Construction of Apps and websites.• Automation of cross-cutting processes.• Workflow automation (personal or departmental productivity).• Modernisation of applications (critical systems). |
| Who they are addressed to: | <ul style="list-style-type: none">• It is mainly the ICT professional, but it is also helpful for business developers and other profiles (architects and operations). |

————— « »

"The Thermomix is to cooking as Low-Code is to application development."

Manuel Rodrigues

Regional Sales Director Spain at Outsystems

For Salesforce Low-Code is Democratisation

| | |
|-----------------------------------|--|
| Highlights: | <ul style="list-style-type: none">Advanced capabilities for reporting and analysis, coding and integrations.They include security functions, user management, authentications, etc. |
| Characteristics: | <ul style="list-style-type: none">High scalability and speed.Powerful user management, authentication, security and interaction with other systems. Internal reporting and collaboration capabilities.Internal reporting and collaboration skills. |
| Applicability: | <ul style="list-style-type: none">Departmental applications.Process automation.Business process mapping.Applications for administrative and inventory management. |
| Who they are addressed to: | <ul style="list-style-type: none">Citizen developers and professional developers. |

« »

"It simplifies application development and can democratise and break down the barriers between IT and business. Making apps is within anyone's reach."

Marcel Palou

Salesforce Platform Account Executive at Salesforce

For ServiceNow, Low-Code is Creativity and Productivity

| | |
|-----------------------------------|---|
| Highlights: | <ul style="list-style-type: none">Advanced workflow capabilities.Flexible and straightforward data management, offering a single data model that encourages information sharing |
| Characteristics: | <ul style="list-style-type: none">Its platform offers various application development functionalities and several pre-built vertical solutions, including ICT management services and SaaS capabilities.It allows you to take advantage of the benefits associated with workflow automation.Its platform includes IoT and process optimisation. |
| Applicability: | <ul style="list-style-type: none">All types of applications, from departmental to business-critical.Process automation and departmental applications stand out. |
| Who they are addressed to: | <ul style="list-style-type: none">From business users with no development knowledge to professional developers to all types of developers. |

— « »

"Low-Code enables developers, and non-developers, to create powerful software applications."

William Olivier

Solution Sales Manager, AppEngine at ServiceNow

A photograph showing four people working together on a wooden table. In the center, a man wearing glasses and a light-colored sweater is looking at a laptop screen. To his left, a woman in a striped shirt is also looking at the screen. On the right, another man's hands are visible as he sketches a room design in a notebook. In the foreground, a person's hands are holding a white cup of coffee. The table is cluttered with various items, including sticky notes, a spiral-bound notebook with a floor plan sketch, and a small stack of papers.

4 Adoption of Low-Code

Well-founded expectations of Low-Code

The Low-Code market grew 23% in 2021, positioning itself as a pivotal technology to accelerate the development and deployment of software applications in the aftermath of the economic consequences of the pandemic

In 2021, expectations were confirmed, and the Low-Code is already a reality. Its current market size has now exceeded \$13.8 billion, an increase of 22.6% in the last year, all in a context of a general contraction of the software market. The pandemic-driven increase in remote development will, according to Gartner, continue to drive the adoption of this technology.

For Gartner analyst Fabrizio Biscotti, the economic consequences of the pandemic have validated the value proposition of Low-Code as a critical technology to accelerate the development and deployment of software applications, as evidenced by the market projection generated by these technologies. In addition, the confluence with other significant trends such as hyper-automation and composable business will further strengthen demand in this market.

Low-Code. Worldwide revenues 2019 - 2021 (USD million)



Source: [Gartner \(2021\)](#)

How the platforms are being implemented and used

Most of the Spanish companies interviewed are still in the early stages of adopting this technological concept. In the coming years, the maturity of the Low-Code market is expected to increase, as today's data shows that it is far from reaching its full potential

According to information from interviews with selected leading vendors, it was found that Low-Code is still far from reaching its full potential. In particular, and as proof of this, those aspects in which we will see growth in the coming years were shown, confirming Low-Code's path towards maturity:

- **Increase in the percentage of citizen developers:** Currently, only 5% of Low-Code development is being done by "business" users without any support from ICT departments.
- **Incorporation of expert profiles in Low-Code platforms (via recruitment or training):** 50% of the responses pointed to a lack of experience in working with Low-Code platforms as the biggest obstacle to companies' adoption of this technology at present.

Both aspects are manifestations of the same phenomenon; the reality is that most companies are in a process, determined, but in the early stages of expected progress.

This view is aligned with the information obtained from the entities interviewed for this report. During the interviews, most experts confirmed initial levels of development whose significant but gradual growth is coming hand in hand with the overall digital skills training of the organisations and the increasing responsibility and autonomy that is gradually being handed over from the ICT control centres of these organisations.

»

"We see that internally Low-Code will increase its maturity, it avoids a "Shadow IT". In addition, we have provided training and capacity building to the business department through the manufacturers."

Jordi Esparbe Mainar

IT Innovation Manager at Naturgy

Microsoft Power Platform, Appian and OutSystems currently occupy the podium of Low-Code platforms with the highest level of adoption among the companies interviewed

Concerning the Low-Code market in Spain, manufacturers indicate a certain level of delay and a lower number of success stories and benchmark companies in using this technology than in other markets, among other reasons due to the high percentage of SMEs in Spanish productive fabric.

Although large companies have started to use Low-Code technology in all sectors of activity, particularly in the Telco, banking, insurance and public sectors. Although large companies have started to use Low-Code technology in all sectors of activity, particularly in the Telco, banking, insurance and public sectors.

In the case of the large companies interviewed, the interest in this technology is also clear, as all of them have started to use some Low-Code platform on the market (if not several), and 67% have been working with them for more than one year in different pilots and use cases. This confirms vendors' information that this is a very new technology on the Spanish market.

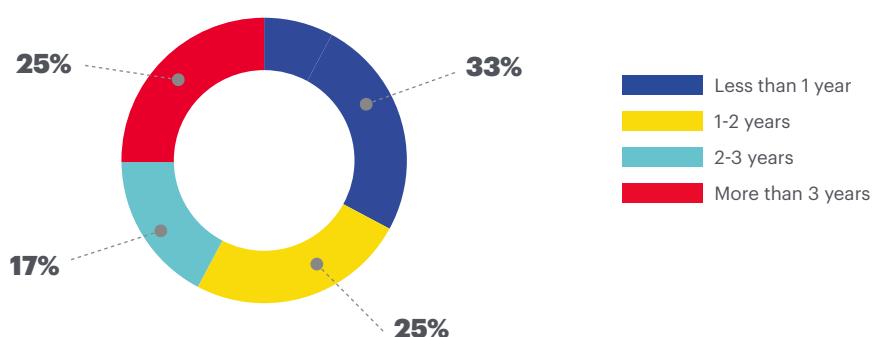
Among the most widely used low-code platforms, the companies surveyed highlighted Microsoft Power Platform, followed by Appian and OutSystems. They all have a differential value proposition adapted to cover different business objectives and needs (digital transformation, legacy modernisation, process automation, product or service innovation, etc.).

In addition, the complementarity between the different solutions should be highlighted, with companies increasingly opting to use several platforms in parallel to maximise the benefit of the technology and carry out use cases with different objectives.

In general terms, all the vendors interviewed are increasing their turnover in the Spanish market at a high rate.

Analysts such as [Gartner](#) also confirm this trend, as they expect 75% of large companies to use at least 4 Low-Code platforms in their developments by 2024.

Average time of use of Low-Code by interviewed companies



A remarkable degree of satisfaction after the first experiences of using the Low-Code



We can conclude that the companies interviewed generally show a high degree of satisfaction (4 out of 5) due to the first projects carried out with these platforms. They highlight among their comments for this score that in this way, they are more agile, have accelerated *Time to Market*, and have involved members of the business units as part of the organisation's ICT universe.

90% of the companies interviewed are relying on technology partners for the development of their first applications using Low-Code and 50% of them outsource their specialised staff to these partners

Having a technology partner, precisely an ICT service provider, is critical when it comes to the digital transformation of a company, as keeping up to date with all the technological innovations, how they work and how to implement and integrate them with the rest of the corporate systems is a great challenge for the ICT areas of companies, to the point that the choice of technology partners to accompany the digital transformation processes is usually part of the business strategy. The success or failure of the project often depends on the right choice.

In addition, having an expert who is up to date with technological advances, who analyses the needs of the company and can offer solutions that respond to them, offers companies great competitive value as it boosts their productivity, encourages innovation, and allows for better performance use of internal resources.

In the case of Low-Code, it is no different, and like any new technology that comes to the market, the lack of knowledge about it is one of the main handicaps for companies that want to use it. This is one of the reasons why 90% of the companies surveyed rely on ICT service providers to initiate the use of Low-Code as they have a significant amount of specialised talent.

Barriers identified in the adoption process

The main barriers identified for the adoption of Low-Code platforms are change management, technical applicability and the vendor's business model

In the case of Low-Code, as with any new technology, some widespread barriers to its adoption were identified during the interviews. These affect all dimensions of the company: people, technical and economic or business.



Change management

Opposition to the technological paradigm shift and development methodology. Being reluctant to migrate from traditional practices to a new digital mindset, where ICT teams develop technology and business departments are involved.



ICT Governance

It is difficult to define and implement a new governance model that allows taking advantage of the full potential of the platforms and coexistence with traditional systems, ensuring the scalability of developments, control and security, especially when it is proposed to open IT development to business areas well.



Doubts about its use in core processes

Tendency to think it is not made for core processes, as these are more complex and robust. Low-Code is usually associated with use in simpler processes, task management, process automation, etc.



Licensing

Some user companies consider licensing such tools expensive due to the difficulty of estimating the cost per development versus the generated savings. Concerning costs, it is necessary to consider the number of developer users, internal or external consumers, the hosting of applications and the support demanded.



Dependence on the vendor

The applications generated and consumption are tied to the vendor's contract, making it challenging to change suppliers in the future. There are misgivings about companies' concerns about losing control of the developments generated due to the impossibility of keeping them outside the vendor's ecosystem.



Lack of trained personnel

Difficulties in recruiting profiles with Low-Code knowledge to be incorporated into the ICT departments of organisations, as there is still not a sufficient volume of talent trained in this type of platform and practically all of these professionals are at vendors or ICT service providers, generating a dependence on them.



Change management

"There is a fear of the unknown, a change of mentality and a correct management of change is necessary, taking into account that people have been programming all their lives in the same way."

Jose Miguel Aoiz

Deputy Director of IT Development at Correos



Doubts about its use in core processes

"It reduces security by losing control. It also has performance issues with everything running in the vendor environment."

Damien Peteau Boisdenghien

Architecture and Operations at Wolters Kluwer



Licensing

"Licensing needs to be considered. If you are making a departmental application for 20 or 30 users, it is appropriate to use Low-Code but making an application for the whole company or end customers, makes it worthwhile to do it as before, even if it takes a bit longer."

Jordi Esparbe Mainar

IT Innovation Manager at Naturgy



Dependence on the vendor

"We are concerned about vendor lock-in. It is quite difficult to switch from one solution to another."

David Almendros

Director CoE Artificial Intelligence at CaixaBankTech



ICT Governance

"It is key to maintain good governance over developments made by non-ICT staff."

Massimiliano Di Renzo

Head of Cross Functional Applications and Analytics at Bayer



Lack of trained personnel

"The process of adopting the tools has been somewhat complicated, due to the lack of trained personnel and the difficulty of finding profiles that are truly specialised in the technology."

Victor Moro

CIO Spain at Mapfre

5

Low-Code: the opportunity to bridge the digital talent gap



Recruitment of Low-Code developers

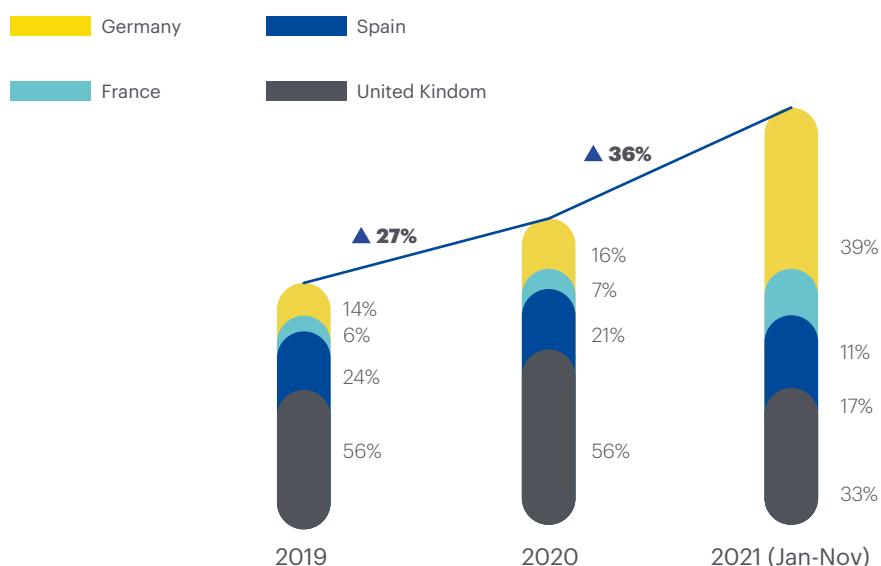
Job offers for Low-Code profiles increased by more than 70% in 2021 compared to 2019

The excellent growth expectations of the Low-Code market are inevitably related to the evolution in the number of developers in these technologies. IDC forecasts that the number of Low-Code developers worldwide will grow at a compound annual growth rate of 40.4% between 2021 and 2025, which is approximately 3.2 times the expected growth rate for developers in general worldwide (12.5%).

This growing trend is already visible in the number of job offers for Low-Code developers in the last three years in four of the major European economies (Germany, France, Spain and the United Kingdom): 27% more job offers for this type of profile were published in 2020 than in the previous year, and between January and November 2021, 36% more job offers were published than in 2020, representing 73% more than in 2019.

For these types of vacancies, the platforms where skills are most in-demand are Appian (in Spain, UK and France) and Mendix in Germany, followed by Microsoft platforms, PowerApps and PowerPlatform.

Evolution of the demand for Low-Code profiles in selected European countries



Source: Job and Markets Insight

ICT suppliers corroborate the upward trend of profiles in their workforces

The data on the increase in the hiring of developers coincides with those obtained in the interviews, in which important ICT service companies have shown how in recent years, they have significantly increased their Low-Code teams in many of the geographies in which they operate.

To this end, they are hiring profiles with knowledge of the leading platforms on the market and developing specific training and certification plans for reskilling and upskilling their employees; plans linked to the evolution of the platforms of the top vendors and articulated under comprehensive strategies that often involve universities, training entities linked to vendors and companies from different industries, to accelerate the training process.

— « »

"In the last year, the number of people working with Low Code technology in Spain has doubled."

Virginia González

Low Code Capability Lead in the Advanced technology Center at Accenture

— « »

"Our commitment to Low-Code is very ambitious, we have 6,000 professionals with expertise in this technology, and we are already a benchmark in the sector. Our capacity will grow with our market positioning and increasing demand."

Paulo Silva

Head of Emerging Business Areas & Delivery Models in NTT DATA

Organisations are already starting to rely on non-technical profiles to take pressure off the ICT department. There is a need to support such profiles, especially after the pandemic, and also due to the difficult situation of lack of digital talent

Low-Code platforms allow software development to be decentralised from ICT departments so that non-technical employees can be part of the development process, something more necessary than ever in the wake of the pandemic and the problematic situation around digital talent.

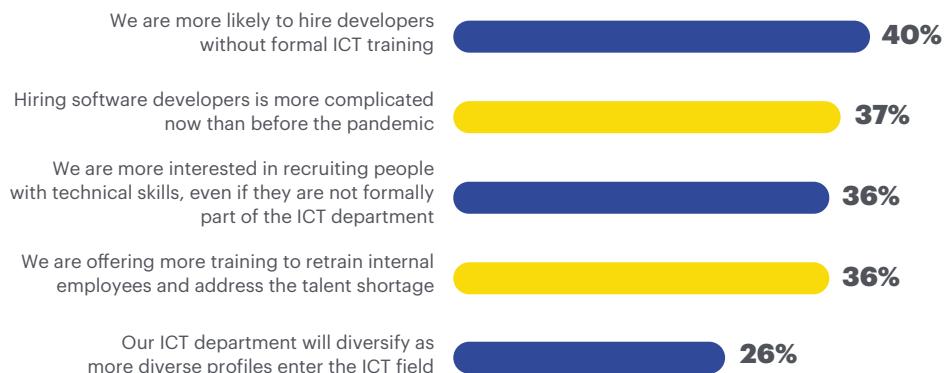
This is evidenced by data from Mendix's "The State of Low-Code 2021" survey of 2,035 ICT professionals with global representation (US, China, UK, Germany, Belgium and the Netherlands) between May and June 2021.

It is noted that pandemic pressure on ICT departments has already led 64% of organisations to rely on non-technical employees to alleviate this pressure.

Following the same trend, a quarter of ICT leaders and developers report that their company's HR department is now more receptive to hiring developers without formal ICT training.

Furthermore, two out of five ICT leaders say that their ICT department will become more diverse as more diverse profiles enter the ICT field. Thus, 45% of ICT leaders in technology companies participating in the Mendix survey expect increased diversity in their ICT departments following the pandemic.

Effects of the COVID-19 pandemic on employment and recruitment in organisations



Source: Mendix- State of Low-Code WhitePaper

Greater diversity in ICT and profile conversion

Many ICT professionals see Low-Code as part of a bright future that will be increasingly collaborative

The Mendix survey data also shows that ICT professionals perceive Low-Code as a trend that removes social barriers, allowing accessing the ICT field to a more significant number of those who do not have a university education and belong to diverse age groups.

This is why Low-Code is already being perceived as a means to boost the inclusion of people with diverse profiles in the ICT sector, which benefits the sector by having a larger potential pool of talent available and paves the way for greater inclusiveness in a growing industry.

In addition, the addition of functional and business profiles to application development teams is an excellent opportunity for companies, as it reduces communication barriers between IT and business departments, reduces the *Time to Market* of applications and generates innovation by incorporating a very close vision of the client.

72% of ICT leaders say Low-Code is a trend they can't afford to miss out on

»»

"These technologies are capable of involving business profiles in the digital transformation of their companies, by enabling rapid development of applications in a collaborative way between areas and integrating business knowledge into them, which which multiplies the potential success of the project, as these areas, being very close to the customer, have a better understanding of their needs and can therefore promote and facilitate user-centred development."

Victor Moro

CIO at Mapfre

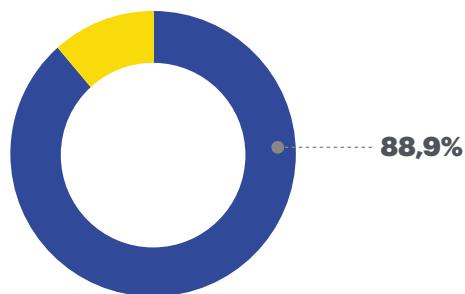
Low-Code can be used as a fundamental tool in the reskilling and upskilling of employees

Therefore, Low-Code is perceived as an enabling technology capable of getting employees with specific technical skills to increase their level in this field, acquiring technological development skills that are much more in demand by their organisations.

This is why it can be considered a handy tool for reskilling, allowing staff with extensive business knowledge and interest in technology to participate in the development of applications, which is very useful in sectors such as banking, which is in the midst of a restructuring process.

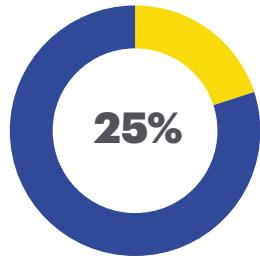
Nevertheless, it is also for carrying out upskilling programmes where professionals with technical knowledge trained in other technologies and with lower demand in the market can be trained in Low-Code, thus facilitating the recycling of these profiles.

This view coincides with that of the companies surveyed, most of whom believe in the potential of this technological concept to increase the employability of non-digital experts by getting them involved in the development of applications.

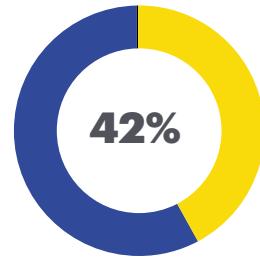


88.9% of those surveyed consider that **Low-Code can facilitate the employability of non-ICT internal profiles**, to boost their retraining.

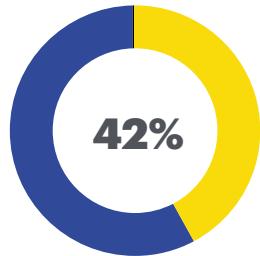
According to the interviews carried out, companies are working on different lines of action to incorporate these new competences linked to the Low-Code in their organisations



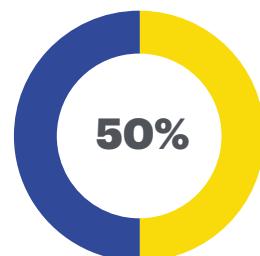
Of the companies opting to hire new profiles



Of companies choose to train IT developers



Of companies choose to train non-IT profiles



Of companies choose to outsource profiles through consultancy firms

Apart from relying on ICT providers for adoption processes, companies highlight the need to have internal profiles trained in the technology to take advantage of its full potential and gain autonomy.

According to the interviews conducted with companies that had adopted the Low-Code, the most common ways of providing training to the workforce are through consultants who are in charge of contacting vendors and sometimes provide additional services (33%) or directly through the vendor (58%), both for ICT and non-ICT profiles.

Low-Code training pathways used by companies



6

Vision and expectations for the future of Low-Code



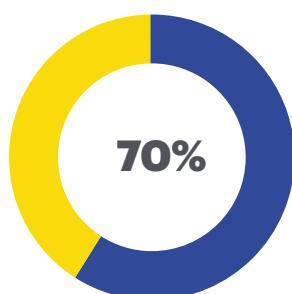
Vision for the future of Low-Code

Investment in Low-Code is expected to increase in the short- to medium-term, but in a linear, sustained and secure way

Despite the adoption barriers detected, we have found that the high degree of satisfaction with the Low-Code platforms available on the market is clear and is accompanied by a generalised forecast of increased investment in this type of tool for ICT developments in the short- and medium-term.

The companies surveyed agree on this point, i.e. most of them, regardless of their sector of activity, expect to increase Low-Code use. However, they consider linear rather than exponential growth to be the most appropriate, because although they are convinced of its potential and consider it a fundamental technological investment to meet their digital transformation challenges, they are committed to sustained and secure growth during which they can work on different use cases and evaluate different platforms.

The technology adoption stage will determine the pace of expansion, as companies that are still evaluating the results of early use cases are more cautious. In contrast, those that are more mature in their use of the technology will be more likely to increase investment in Low-Code in the short term.



**70% of those surveyed are
convinced that in the next
3 years**

All predictions point to solid growth potential for Low-Code. It is expected to cover much of the global application development business, reaching \$187 billion by 2030

The predictions of analysts and vendors reflect that Low-Code is here to stay and to be a key player in the digital transformation process in which companies and society are immersed.

[Research & Markets](#) in November 2020 predicted that the global Low-Code market will generate revenues of up to USD 187 billion by 2030 with an average annual growth of more than 31% for all years of the current decade (2020-2030).

For its part [Gartner](#), maintains the hypothesis that by 2025, 70% of new applications developed by companies worldwide will use Low-Code and No-Code technologies (a percentage that represented less than 25% in 2020).

In the same vein, [Gartner](#) predicted that by 2023, the number of Citizen developers in large companies will be at least four times the number of professional developers.

Leading Low-Code manufacturers expect 100% growth rates in the Spanish market in the coming years



7 **Low-Code Roadmap**

Main conclusions for the adoption of the Low-Code

After analysing the new paradigm in the automatic development of code leveraged on Low-Code tools, the context of the digital talent market and the opportunities and challenges involved in its adoption by companies, we set out a series of critical points to bear in mind to ensure the successful implementation of these platforms and their usefulness as a relevant mechanism for the generation of digital talent.

1

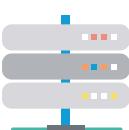
Establish proper ICT governance



The development of Low-Code applications and the involvement in the development of functional profiles that are not in the ICT area needs the extension and maturation of the control and governance systems implemented by the ICT areas. These areas must take responsibility for the control of developments to be framed within the company's application portfolio, facilitating their management, monitoring and avoiding Shadow-IT. Businesses will have to take an active role in this transformation by providing the necessary resources and defining the rules of the game. In addition, it will be necessary to define which projects require multidisciplinary teams, working in a joint and coordinated way, selecting those where this diversity means a truly differential value contribution.

2

Having digital Labs in which to experiment



A clear strategy is needed to know how and for what cases the use of Low-Code is proposed. To this end, we propose the creation of experimental spaces where the first applications can be tested and where their use can grow in a controlled manner. One of the success factors in the implementation of Low-Code is the availability of spaces such as the so-called Digital Labs to test and experiment with use cases of the different platforms, together with other associated technological concepts such as, for example: IA, RV/RA, RPA, etc.

3

Profile reconversion



- The Low-Code, through training schemes, would help the companies can incorporate initially non-ICT profiles into their workforces for software development and production. To this end, it will be necessary to set up a line of training and certification adapted to the different groups and articulate the appropriate support mechanisms.

4

Low-Code training



The lack of trained talent is a challenge for Low-Code to continue to scale up its adoption in organisations. People and professionals who know how to work with these platforms are needed.

In this sense, it is imperative that sufficient and diverse training is available so that people (whether or not they come from the ICT field) can acquire new skills and become familiar with these platforms. This training nowadays is, at least in Spain, mostly led by vendors, and there is a lack of private or public institutions to promote these training activities as a vehicle to carry out the reskilling and upskilling of certain employees and contribute to solving the gap in digital terms. For this reason, it is considered a unique moment for vendors, institutions, companies and IT service providers to work together to generate this digital talent.

5

More experience from the business areas in Low-Code tools



Low-Code opens new doors to talent, offering the possibility of participating in the development of code to people with profiles that are more diverse than ever. This is why it is already on the agenda of organisations and professionals, as a democratising trend in technology, which responds to the shortage of specialised talent in the ICT field. Nevertheless, organisations must make progress on their Low-Code programmes to increase their employees' use and knowledge of Low-Code. This will achieve the long-awaited capillarity in software development, being autonomous to respond to the demands of the business with self-developed digital solutions.



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