WHITE PAPER

Quality by Design:
Accelerated automation for enhanced business value and speed

Jennifer Thomson, Vanda Soeiro and Gabriel Coimbra

March 2019

Sponsored by:

CONTENTS

EXECUTIVE SUMMARY 1

MARKET SITUATION AND TRENDS 2

- CIO BUSINESS PRIORITIES 2
- ENABLING DX CAPABILITIES 3
- THE PIVOT TO DEVOPS: 3
- GETTING TO ENTERPRISE SCALE DEVOPS: THE ROLE OF QA 4
- QA FOR DIGITAL: QUALITY BY DESIGN 6
- SMART / INTELLIGENT AUTOMATION 7
- INVESTING FOR QUALITY BY DESIGN 9
- QA SET-UP IN A DEVOPS DRIVEN WORLD 11
- ESSENTIAL GUIDANCE 12

THE NOESIS APPROACH 15

- SERVICES AND SOLUTIONS THAT PROVIDE A "QUALITY CULTURE" 16
- QUALITY COMBINED WITH EFFICIENCY 17
- AUTOMATION IS KEY FOR QM EFFICIENCY 18
- DEVOPS: INTEGRATE PROCESSES TO MANAGE SOFTWARE EVOLUTION 19
- QUALITY RESULTS ARE OBTAINED BY QUALITY PEOPLE 20
- LOOKING TO THE FUTURE 21

CASE STUDIES 23

- TV GLOBO: QUALITY MANAGEMENT THE AGILE WAY 23
- SONAE MC: QUALITY MANAGEMENT STILL HAS ROOM TO GROW 24
- NOS: A PARTNERSHIP WITH NEARLY TWO DECADES OF SUCCESS 26

ABOUT IDC 28

Copyright Notice
External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.
Copyright 2018 IDC. Reproduction without written permission is completely forbidden.

EXECUTIVE **SUMMARY**

European organizations are now under strong pressure from stakeholders and investors to drive and deliver a successful digital strategy. Top business priorities are focused on bringing business and customer innovation to the organization.

Successful digital transformation begins with applications that are built to deliver a truly digital-native experience. The digital economy's requirement to deliver high-quality applications at the speed of the business is the driving force to more rapidly develop, deploy and update applications and services. With the current emphasis on speed to innovation and the delivery of superior customer experiences Agile and DevOps tools and approaches become the default for all enterprises.

DevOps cannot happen in isolation. Scaling DevOps requires progress across multiple segments of the software delivery pipeline with a laser focus on optimization of QA and testing. Traditional QA was about balancing time, cost and quality, whereas today QA is about speed (test-as-you-build or before), experience and iterative development (working to a minimum viable product (MVP)). Shorter release cycles and a central focus on delivering superior customer experience shifts the priority of QA towards embedding quality by design / test-as-you-build. QA therefore becomes the glue that binds the organization.

In the transition to "quality by design" accelerating automation becomes a clear focus, as this provides the potential to combine quality with business value and speed. From project initiation through automating the deployment pipeline and testing, change management and continuous delivery serve as critical foundational elements for DevOps. The key to success is the ability to measure automation across the application life cycle.

To support these challenges, enterprises seek full assistance throughout the application lifecycle, from consulting and integration to implementation and end-user support services. Higher levels of process automation, fast delivery of high--performance solutions, integration of advanced analytics, securing complex value chains, and accelerating DevOps practices are key focus areas.

Application testing services providers must become true partners in a DevOps world; relationships and contracts will need to be more fluid and these providers must become more intimately intertwined with their customers application services pipelines. It is not just the services providers that need to adapt, the focus for the client should also shift to managing the partnerships and how to integrate these partners seamlessly within the application pipeline / value stream.

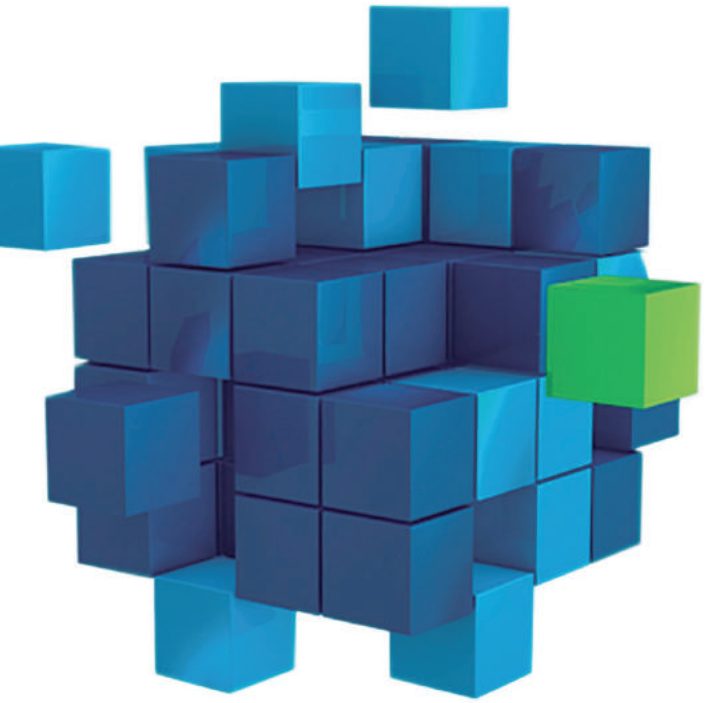
European organizations must make appropriate quality assurance strategy decisions for their businesses in response to both increased technology complexity and competitive and innovation pressures. The ability to accelerate transformation of application delivery will be one of the most critical business objectives for organizations in the next half decade.

Noesis, with 20 years providing IT services and solutions, soon began to focus on Quality Management (QM) as one of its key business units, and is now a leader in this area for the Portuguese market. Recently, it began to address QM as a built-in practice in all other services. Supporting a DevOps approach, quality is proposed as an element that links all stages of the software development lifecycle, leading to an ongoing process of quality assurance and "quality culture". Focusing on automation, customized structures and specialized mixed teams, Noesis is following the most current approaches to quality management.

MARKET SITUATION AND TRENDS

CIO BUSINESS PRIORITIES

CIOs and IT organizations are constantly challenged to support business units with innovation initiatives as they respond to persistent threats and opportunities in the digital transformation era. Organizations of every size and in every industry must adapt to new technologies, new players, new ecosystems, and new ways of doing business. IDC predicts that by 2021, at least 50% of global GDP will be digitized, with growth in every industry driven by digitally enhanced offerings, operations, and relationships. Today, survival of the fittest is linked not to size or strength but to the ability to change — to move quickly, adapt, seize opportunities, and be agile.



IDCs CIO summit in September 2018 revealed that top business priorities are focused on bringing business and customer innovation to the organization. Customer experience sits firmly at the top of European CIO business agendas; for many organizations it is no longer about mass standardization, but it is about the delivery of the right and unique customer experiences at speed. Improving operational efficiency through process transformation also features high up on CIO agendas, with many organizations now looking at how they can blend digital technologies, automation and talent to meet future business requirements. Innovation is in third place, and emphasis is on driving innovation through digital product and service development; this requires a relentless focus on providing the right architecture to drive innovation at speed. Finally, there remains a continued focus on the ability to increase organizational productivity (see Figure 1).

CIO BUSINESS PRIORITIES 2018

FIGURE 1
Source: IDC, European CIO Summit 2018

1. CUSTOMER EXPERIENCE
Improve CX of customers & trading partners

2. PROCESS TRANSFORMATION
Improve Operational Efficiency through Process Transformation

3. INNOVATION
Drive innovation through Digital Product & Service Development

4. PRODUCTIVITY
Increase Oganizational Productivity

ENABLING DX CAPABILITIES THE PIVOT TO DEVOPS:

In 2017 IDC reported that Digital Transformation had firmly reached the boardroom; with data confirming that 90% of European organizations had Digital transformation (DX) as a corporate priority. In May 2018, we found that for 65% of European organizations interviewed by IDC, the CEO is now under strong pressure from stakeholders and investors to drive and deliver a successful digital strategy. The consequence of a failed digital transformation is far greater than a project failure. This changes the game in terms of organizational, technological and financial decisions. The ability to accelerate transformation of application estates will be one of the most critical business objectives for organizations in the next half decade. Enterprises failing to transform digital/application creation ability in that timeframe risk closure.

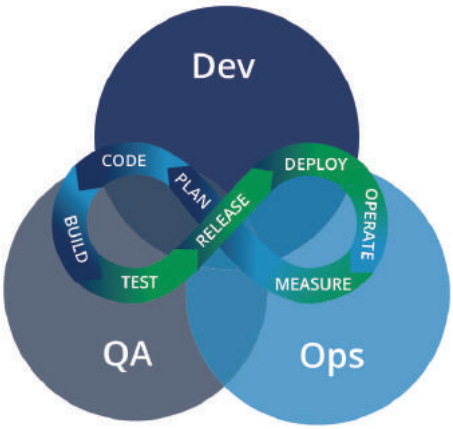
Digital transformation begins with applications that are built to deliver a truly digital-native experience. The digital economy's requirement to deliver high--quality applications at the speed of the business - or better still, at the speed of the consumer - is the driving force to more rapidly develop, deploy and update applications and services. We are experiencing a revolution in what applications are, and how they are built, deployed, and updated. IDC refers to these new kinds of apps as "hyperagile apps" that are highly-modular, distributed, continuously updated, and leveraging cloud-native technologies such as containers and serverless computing. We start to see an increasing percentage of apps developed using these technologies and methods, built on microservices architectures. In this context, IDC sees a coming application explosion. We estimate that in the region of 500 million first platform applications have been built in the past 40 years (this number refers to installed instances and not unique apps). However, with the acceleration to cloud and microservices architectures, IDC estimate that in the next 4 years approximately 500 million new "logical" applications will be built worldwide, in EMEA this equates to approximately 100 Million.

One thing is for sure; lengthy, cumbersome, and restrictive software development and testing cycles are no longer acceptable. With the current emphasis on speed to innovation and the delivery of superior customer experiences Agile and DevOps tools and approaches become the default for all enterprises. It is no longer about if organizations should adopt DevOps, it is now about getting DevOps right and scaling it across the enterprise.

DevOps represents the integration of application development, test and IT operations at many levels including culture, process workflows, and infrastructure management, as well as application creation, deployment and delivery. DevOps is not a tool or a technology but a methodology that joins together cross-functional teams across the business and IT (Dev, QA, Ops) to continuously deliver business solutions.

DEVOPS DEPICTED

Source: IDC, 2018



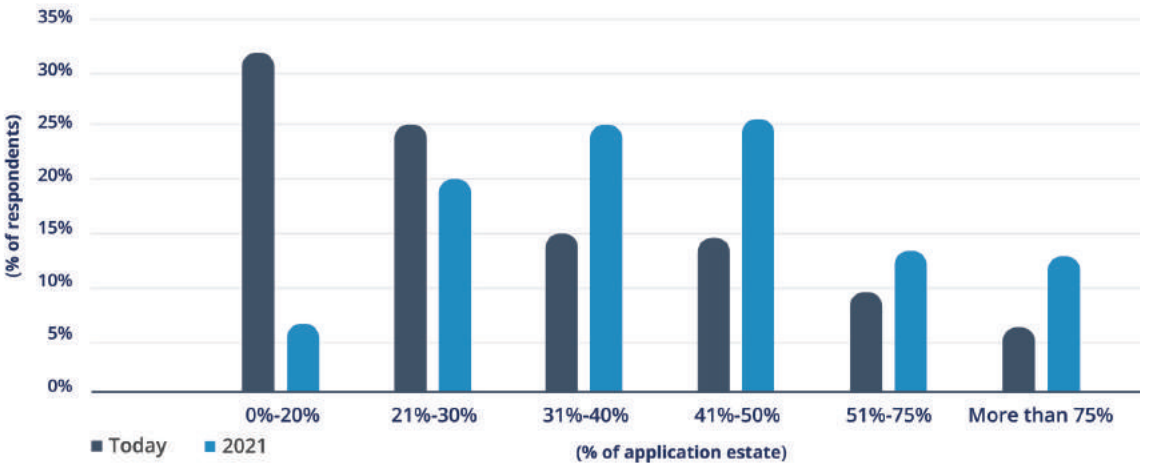
IDC's recent European DevOps and Developer survey across 420 large European organizations, indicates that 60% of large European organizations utilize DevOps, and a further 29% plan to adopt DevOps practices in the coming 12 months. Without doubt DevOps is mainstream and delivers both business and technology benefits. These extend beyond faster deployments and higher quality software; European enterprises now cite increased business agility, enhanced customer experience and business innovation as a direct result of the pivot to DevOps.

On average just under a third (31%) of the application estate is developed and deployed using a DevOps methodology today, with aspirations to scale DevOps to 43% of the application estate in the next three years (see Figure 2).

STATE OF DEVOPS ADOPTION IN EUROPE

FIGURE 2
Source: IDC European DevOps and Developer Survey, 2018. N=420

Q. WHAT PERCENTAGE OF YOUR APPLICATION ESTATE IS DEVELOPED AND DEPLOYED USING A DEVOPS METHODOLOGY TODAY / IN THREE YEARS' TIME?



GETTING TO ENTERPRISE SCALE DEVOPS: THE ROLE OF QA

Aspirations to scale DevOps are high, however, successfully scaling DevOps requires an approach that adopts new KPIs spanning the cultural, business, process, technology and talent/staffing changes required for any digital business transformation that utilizes DevOps. Essentially DevOps in Digital requires a blueprint that consists of five elements:

1. **Collaborative, agile teams:** DevOps teams take visible ownership of the development, testing, deployment and maintenance of applications;
2. **The use of new cloud environments:** Phased approach to modern application architectures;
3. **Continuous integration and delivery models:** The ability to understand and optimize the flow of value across the delivery pipeline;
4. **The use and expansion of automated processes:** Have an "automate everything" attitude and use automation tools across development

and operations teams, with agile adoption for continuous iterations;

5. **Strong business leadership:** Strong business leadership focused on optimizing the budgeting process for technologies that drive products and innovation.

DevOps cannot happen in isolation. Scaling DevOps requires progress across multiple segments of the software delivery pipeline with a laser focus on optimization of QA and testing. IDC asked large European organizations where they are most likely to invest in the next two to three years to support DevOps success (see Figure 3).

INVESTMENT STRATEGY IN SUPPORT OF DEVOPS SUCCESS

FIGURE 3
Source: IDC European DevOps and Developer Survey, 2018. N=420

Q. TO SUPPORT DEVOPS, IN WHICH OF THE FOLLOWING AREAS WILL YOUR ORGANIZATION LIKELY INVEST THE MOST/SEEK TO IMPROVE OVER THE NEXT TWO TO THREE YEARS?

Security testing and analysis is a pressing concern and target area as businesses must address risks and vulnerabilities proactively. Automated code quality analysis links to and overlaps with security analysis to coordinate centers of excellence and security for improved quality and software resilience across groups. There is also a strong appetite for DevOps governance, monitoring and management as organizations look to manage risk and understand lines of defense in an environment where developers are continuously pushing code to production. Focus is on ensuring that code being produced is safe and well governed.

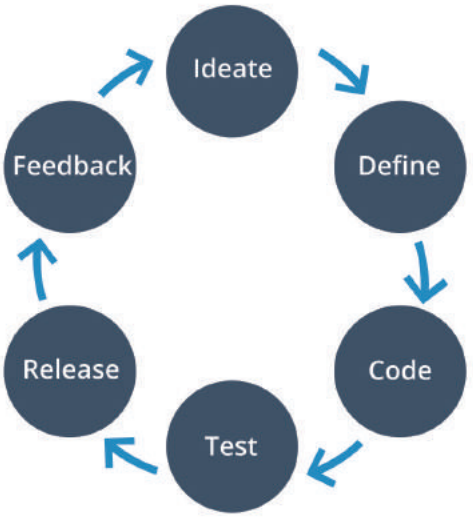
Survey results underline the importance that organizations are attaching to environment provisioning and management. For any organization to successfully test and release new applications or application versions, the appropriate environment needs to be in place. Typically, an organization

follows different routes for supplying environments to applications. It may be manual or automated, or a combination of both.

The bottom line is that organizations need to speed software release schedules, and test environment provisioning and management is a key part of a continuous delivery process. Organizations need to not only build, test and deploy application code, but also the underlying application environment.

QA FOR DIGITAL: QUALITY BY DESIGN

DevOps is not only delivering clear business benefits, it changes the nature of QA and testing. As organizations shift gears in their DevOps journeys and look to achieve Enterprise Scale DevOps, getting quality right, the first time is essential. Faster code deployments only make sense for the business if quality is high; the intent with DevOps is fast, business-relevant releases of high functioning and resilient software.



QUALITY BY DESIGN

FIGURE 4
Source: IDC, 2018

DevOps allows organizations to wrap their arms around multiple silos (Dev, QA, Ops), and continuous "quality" testing becomes a pre-requisite; this means focusing on the ability to bake quality into the entire value stream from ideation to production. This allows organizations to not only work towards superior user experiences, but to accelerate delivery, velocity and throughput.

QA therefore becomes the glue that binds the organization together. In this context QA shifts beyond data quality; it is now about extending business value and assuring business and customer experience (CX).

Traditional QA was about balancing time, cost and quality, whereas today QA is about speed (test-as--you-build or before), experience and iterative development (working to a minimum viable product (MVP)). Shorter release cycles and a central focus on delivering superior customer experience shifts the priority of QA towards embedding quality by design / test-as-you-build (see Figure 4).

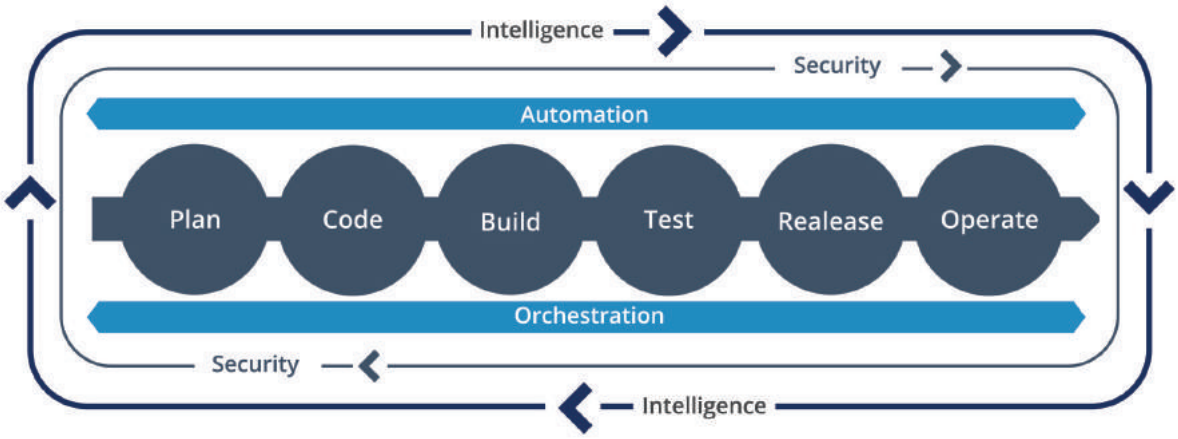
- Am I deploying consistently good software?
- Does it meet user needs?
- Will it work as expected whilst delivering a good user experience?

SMART / INTELLIGENT AUTOMATION

In the transition to "quality by design" accelerating automation becomes a clear focus, as this provides the potential to combine quality with business value and speed. More advanced DevOps users have a laser focus on getting past islands of automation that have spun up across various pockets of the organization towards - in an ideal world - a "Pipeline of Pipelines" scenario (see Figure 5). From project initiation through automating the deployment pipeline and testing, change management and continuous delivery serve as critical foundational elements for DevOps. The key to success is the ability to measure automation across the application lifecycle.

BEYOND ISLANDS OF AUTOMATION: PIPELINE OF PIPELINES

FIGURE 5
Source: IDC, 2018



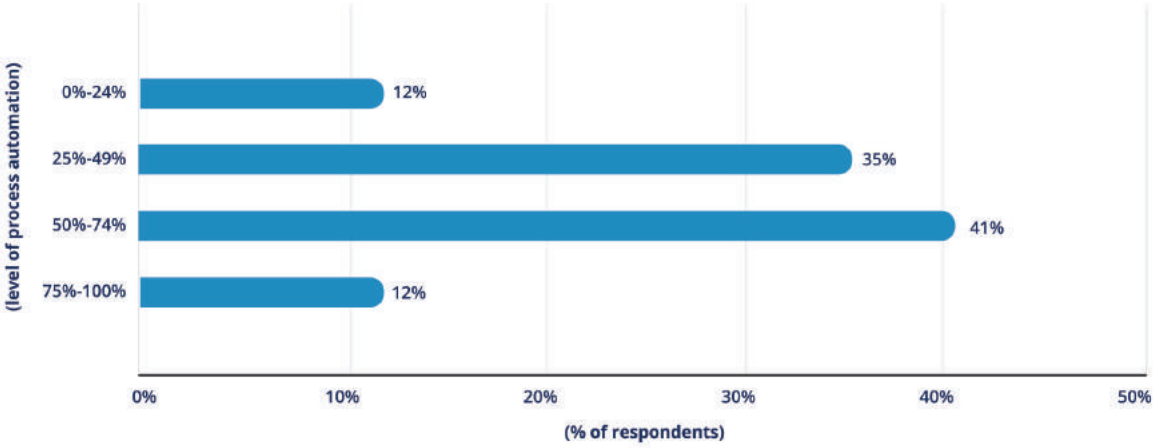
Asks from automation are no longer about just driving down costs and delivering ROI. Instead, success factors account for customer experience, product reliability and speed. Recent IDC research underlines that gains have been made in terms of process automation across the build test, deploy pipeline (see Figure 6).

▼

LEVEL OF PROCESS AUTOMATION ACROSS BUILD, DEPLOY, TEST PIPELINE

FIGURE 6
Source: IDC, 2018

Q. CAN YOU ESTIMATE THE CURRENT LEVEL OF OVERALL PROCESS AUTOMATION ACROSS YOUR BUILD, DEPLOY, AND TEST PIPELINE?



Without doubt, organizations must focus on QA process efficiency and the ability to manage change at scale. This requires driving efficiency and maximizing the QA impact on the business while identifying risk effectively.

The cloud is making the creation of test environments easier and more dynamic, while microservices are upending the entire notion of software architecture, including the QA component. Meanwhile, IoT is unleashing an entirely new wave of digital data and services on the world, all of which must be tested and reviewed on a continual basis.

It is therefore no surprise that managing the size of test data sets, creating and maintaining test data sets and complying with the data regulations for the test data are among the top challenges facing European organizations today. There is a definitive shift by organizations towards virtualized environments than having permanent environments. Enterprises are increasingly demanding an integrated QA solution that can address issues of data, environments and virtualization.

The complexity of cross-platform, multimodal deployment and global sourcing for software development drives organizations to increasingly adopt machine learning (ML) and analytics for agile DevOps execution. Driven by the business need to automate and optimize processes to deliver faster time-to-market, there is a growing appetite across Europe for smart automation or automation coupled with analytics. The benefits include smart decision making, fast validation, and automatic adaptation of test suites. The scope of test automation has evolved from simply automating the test activities (plan, design and execution) to automating test environments and test data provisioning. For more advanced organizations it is about automating API validation and service integration.

Today, QA strategies must envelop an organization's "digital platform". This digital platform IDC defines as one that pivots around cloud-based APIs, agile application architecture, new customer experience, digital trust and an intelligent core. Data is exploding and now comes into organizations through connected assets, employees, connected processes, or as other data streams via APIs. But, data also comes in through ecosystem engagements by bots, mobile devices, augmented reality (AR)/virtual reality (VR), connected vehicles, IoT etc.

Automation and quality by design strategies play a central role in the ability of organizations to reduce risk, cost and time-to-value, while managing an ever-expanding ecosystem.

DevOps AI analytic capabilities evolving now will be a necessity by 2025 across the delivery pipeline. As two examples, we already see the emergence of tools that apply ML to testing and quality data, and tools that view source code as data that can then be leveraged by analytics. These solutions can help embed policy and processes into developer execution, improving change management, quality, and security. As organizations re-imagine and optimize the way that software is developed, deployed, and tested, and they tackle the challenge of achieving quality by design IDC sees the increasing use and influence of AI-related technologies and machine learning to help reduce continuous delivery timelines and positively impact speed-to-market. The QA function is well placed for considerable disruption from the application of machine learning and cognitive intelligence, based on its heritage of repositories of test cases, test suites, data formats, defects, changes, and so on.

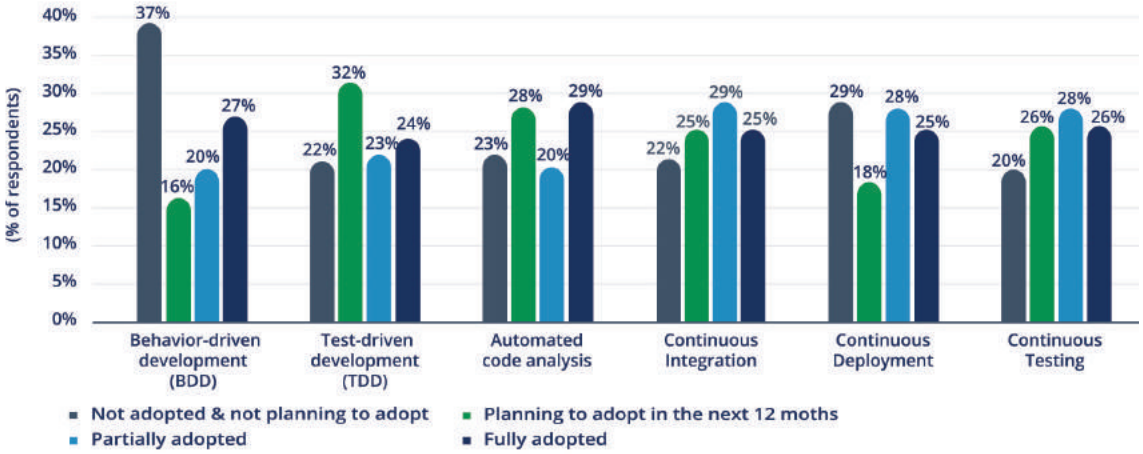
INVESTING FOR QUALITY BY DESIGN

This pivot to Quality by Design drives adoption in both behavior driven development (BDD) and test-driven development (TDD), as these methodologies help teams discover issues and problems and work collaboratively to find a solution before any code is created. In other words, BDD and TDD directly support Quality by Design strategies.

PRACTICE ADOPTION

FIGURE 7
Source: IDC European DevOps Survey, 2017

Q. HOW MUCH HAS YOUR ORGANIZATION ADOPTED THE FOLLOWING PRACTICES?



BDD is increasingly being adopted by European enterprises (see Figure 7), as it helps cross-functional teams focus on describing the application in terms of behavior, with the aim to create a shared understanding of what feature should be developed and why (i.e. there is a central focus on the business problem). Behavioral descriptions can be shared with business users or customers to have early feedback and iterate if needed; this ensures that business value is always top of mind. In the words of Adidas "velocity means nothing if what you deliver has no business value."

In a DevOps context, the speed of feedback loop is key. Continuous testing provides a great framework for baking quality into the entire process from idea to production. Testing does not stop at continuous integration (CI) and organizations are increasingly combining BDD with product analysis to help mitigate the biggest risk organizations face in innovation and design: making something that nobody wants.

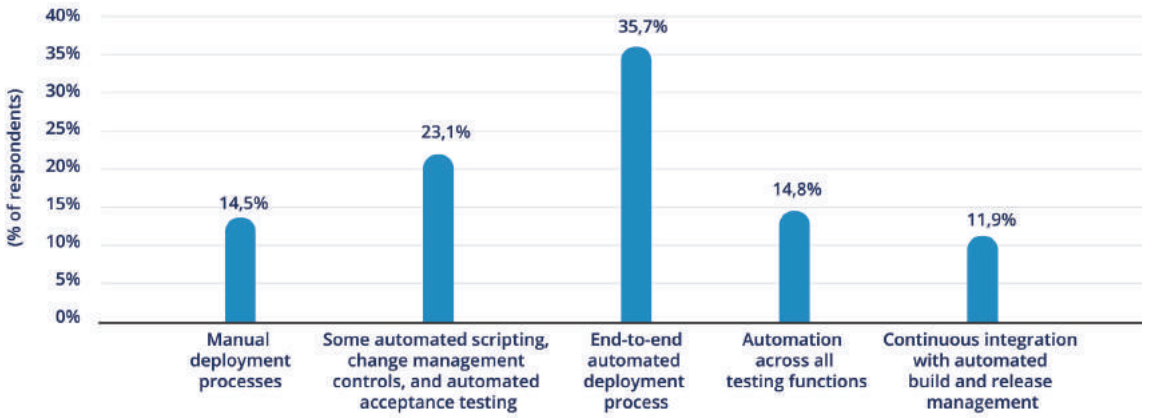
The discipline of automation is a core foundation of enabling DevOps capabilities; test, deployment, and release automation are common DevOps starting points that offer high-value returns.

BDD is often used together with TDD as organizations look to ensure a good design of the code and correctness of the feature, and test automation (unit, service, end2end) and continuous integration (CI) provide the safety net to make rapid change possible. However, when digging into the details of how organizations are approaching continuous delivery and integration, only 15% of European organizations have today achieved automation across all testing functions (See Figure 8).

APPROACH TO CONTINUOUS DELIVERY AND CONTINUOUS INTEGRATION

FIGURE 8
Source: IDC, 2018

Q. WHAT BEST DESCRIBES YOUR APPROACH TO CONTINUOUS DELIVERY (CD) AND INTEGRATION (CI)?



QA SET-UP IN A DEVOPS DRIVEN WORLD

The popularity of Agile and DevOps influences how QA and testing operations work and the way they are structured to keep pace with digital transformation. European organizations are creating nimble, integrated and highly specialized teams to drive their digital programs. Increasingly, central governance and control is being reduced, offering greater freedom to individual teams to change their methodology and technologies for development, as well as their approach to QA and testing. In the past decade, we saw organizations industrialize testing in Test Centers of Excellence (TCoEs), but in the Agile and DevOps model we see testing move from central teams to decentralized units. This shift suggests that test organizations of the future will combine flexibility and agility with efficiency and reuse.

In practice, the test centers across organizations are transforming into decentralized test operations (or centers for test enablement) within IT teams of the various lines of business supported by the TCoE that provides the environments, test data, test expertise and skills. The TCoE is what organizations will invest in for a unified guidance and coherent choices of technologies. This model supports a nimbler, collaborative, and automation--driven approach that leverages design thinking concepts, all with a goal to achieve better product quality and enhanced customer experience.

To support these challenges, enterprises seek full assistance throughout the application lifecycle, from consulting and integration to implementation and end-user support services. Third-party testing services are amongst the most sought capabilities in the next 24 months as digital roadmaps continue to drive QA agendas.

Key focus areas are:

- Higher levels of process automation;
- Fast delivery of high-performance solutions;
- Integration of advanced analytics;
- Securing complex value chains;
- Accelarating DevOps practices.

Over 50% of European organizations indicate use of external application testing services today, with a further 30% planning to use external testing services in the next two years.

We see a shift from reliance on external application development and migration services to application testing services as organizations look to propel business transformation strategies and deliver enhanced customer experiences. Through DevOps is having an impact on sourcing strategies as organizations evaluate future set up. Application testing services providers must become true partners in a DevOps world; relationships and contracts will need to be more fluid (open and redefinable) and these providers must become more intimately intertwined with their customers application services pipelines. It is not just the services providers that need to adapt, the focus for the client should also shift to managing the partnerships and how to integrate these partners seamlessly within the application pipeline / value stream.

In this context Quality as a Service (QaaS) gains ground as the increasing structure of choice for service engagement and delivery. European organizations are increasingly opting to consume on-demand platform-based testing services, to deliver QaaS with on-demand access to testers, mobile/IoT devices, tools, and environments. QaaS allows organizations to take advantage of the latest technologies while eliminating direct expenses.

ESSENTIAL GUIDANCE

Moving forward, it is essential for existing QA teams across organizations to understand current testing trends and innovate the way they provision effective QA and testing solutions. European organizations must make appropriate quality assurance strategy decisions for their businesses in response to both increased technology complexity and pressure from competition and innovation. The ability to accelerate transformation of application delivery will be one of the most critical business objectives for organizations in the next half decade.

We have seen that DevOps supports better collaboration across development, testing and operations teams, and allows the transition to unified, scalable and intelligent automation and monitoring throughout the application delivery pipeline. QA teams now have the opportunity to build quality at every stage of the software delivery lifecycle and successfully achieve and implement quality by design. Improving the quality of software products will have the biggest overall impact on business and financial performance. Remember, survival of the fittest is linked not to size or strength but to the ability to change — to move quickly, adapt, seize opportunities, and be agile. Resources for both

development and quality assurance remain highly constrained, therefore adapting and optimizing the approach to application delivery is critical. IDC recommends that organizations:

- **Create and build an inclusive and collaborative culture:** To focus on "Quality by Design" and instill and encourage an approach that builds quality in and moves away from testing after the fact requires creating and building an inclusive and collaborative culture, with a convergence in both KPIs and strategy across IT (Dev, QA, Ops) and the business. Collective ownership engages the entire team in quality delivery. The customer, product owner, analyst, architect, developer, tester, and operations roles form a cohesive team, laser-focused on delivering customer value. This will help to drive a test-first development approach, accelerate the adoption of TDD and BDD, and lay the foundation for unified automation.
- **Shift to "Automate everything mentality":** Focus on delivering business value and superior customer experience through unified and measurable automation that integrates and connects all activities across the delivery pipeline. Automation strategies go hand in hand with the journey to continuous delivery. Automation of manual steps is essential to overcome issues related to increasing number of defects, latency and rework. Focus on starting automation right at the beginning of the SDLC and ensure nearly all test cases are automated.
- **Think Continuous:** The continuous delivery pipeline represents the workflows, activities, and automation needed to guide a new piece of functionality all the way from ideation to the release of value to the end user. With the coming app explosion the ability to speed up time to market while improving quality is critical. Focus on reducing cycle time through QA approaches like continuous testing. This approach provides much-needed flexibility and enhanced user experience by incorporating user feedback early in the iterative development process. Define what "done" means; by defining "done" clearly specifies the criteria necessary to move an increment of value forward in the pipeline. Work to understand where value is being added in the delivery pipeline and encourage teams to optimize the process that they control. This enables organizations to understand how fast they are moving, how much value is generated, and whether they are doing the right things.
- **Make quality objectives visible:** Focus on visualization and dashboards to drive communications and measure progress with metrics. Make sure that quality objectives are measurable, documented, reviewed and tracked; these objectives can relate to reliability, performance efficiency, security, maintainability, rate of delivery, testability, or usability.
- **Evaluate the application of AI/cognitive.** Leverage AI/cognitive for effort elimination and productivity gains. Intelligent test automation and smart analytics will become essential to support quality assurance services augmented with innovations focused on artificial intelligence and machine learning.
- **Think about cultural fit first when engaging with third-party services providers.** Evaluate carefully the provider's ability to mesh well with your organizations' business and QA/DevOps teams. Many large organizations tend to integrate service providers as part of their overall IT operations, including those that outsource development and/or testing activities. To run a lean and effective IT operation, organizations must possess a strong cultural dynamic that fosters teamwork, collaboration, trust, and communication across all delivery teams (whether internal or external — or a combination of both). Along these lines, it becomes critical to partner with a service provider that works in harmony, culturally, with your business and IT teams for continuous delivery to ensure that the anticipated value of applications comes to fruition once they reach the hands of users. Relationships and contracts will need to be more fluid (open and redefinable) as providers become more intimately intertwined with your application services pipelines.

THE NOESIS APPROACH

Noesis has been providing IT services and solutions for over 20 years. One of its main focus has been Quality Management (QM), and is now a leader in this area for the Portuguese market. Noesis is a credible provider, with all the conditions to be considered as a potential partner for the organizations committed with innovation in the application life cycle and to implement quality by design, aiming to obtain better software products. Noesis services provide organizations with support to:

- Create a culture of quality;
- Implement automation strategies;
- Incorporate continuous testing;
- Measure and communicate results with KPIs and dashboards;
- Implement DevOps methodology.

The Noesis approach to the customization of frameworks and technologies, according to the needs of the client, is also a key factor for a fluid and successful transformation process.

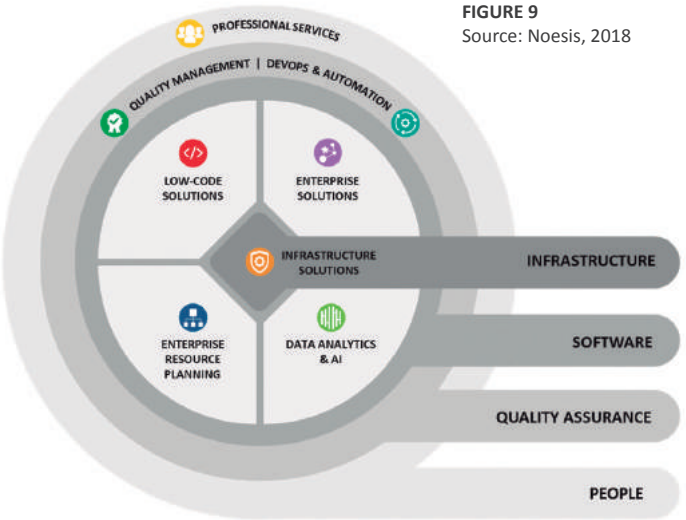
Noesis has around 850 consultants and 20 strategic partners. In recent years, Noesis has increased its presence in the international market, particularly in the area of Quality Management services, where they now have over 180 dedicated consultants. The company has offices in five countries: Portugal (Lisbon, Porto and Coimbra), the Netherlands, Brazil, Ireland and the United States of America.

Noesis offers solutions and services focused on: infrastructure, software, quality and people, backed by technology and innovation. Noesis' offer falls into five specialized business areas, linked by Quality Management (QM) services (see Figure 9). The QM services can be offered independently, but Noesis advocates an approach in which Quality Management is embedded in all the other services.

Noesis provides services across several vertical markets, with a key focus on telecommunications, banking, retail and media.

NOESIS OFFER

FIGURE 9
Source: Noesis, 2018

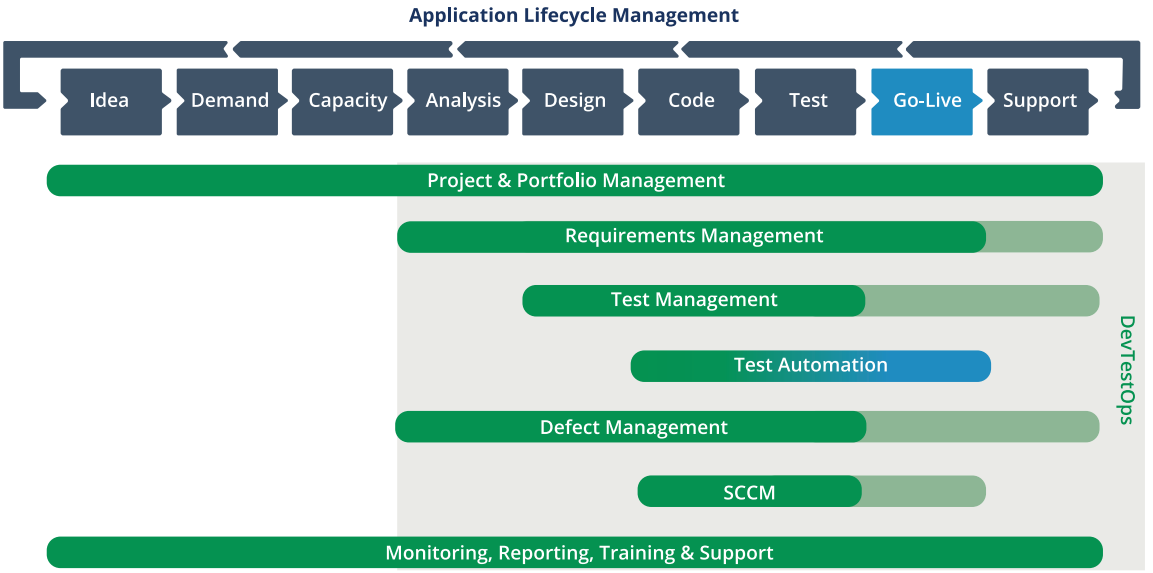


SERVICES AND SOLUTIONS THAT PROVIDE A "QUALITY CULTURE"

Noesis' QM services offer has evolved significantly in recent years, in keeping with trends and market needs. Noesis addresses the concept of QM much more comprehensively than just the quality of the software development. It has introduced practices that begin by defining requirements and are aimed at the quality of the final solution. Supporting a DevOps approach, quality is proposed as an element linking all the stages of the software development lifecycle, driving an ongoing quality assurance process (see Figure 10).

QUALITY CULTURE THROUGHOUT THE SOFTWARE DEVELOPMENT LIFECYCLE

FIGURE 10
Source: Noesis, 2018



Noesis QM services are grouped into the following main components:

- Software Quality Assurance: process definition and implementation, process monitoring and reporting;
- Test Management: test strategy, test and defect management, functional testing services (automated and manual), non-functional testing services (performance, load, security, compatibility, etc.);
- Software Change & Configuration Management: test environment management services, change management services, deployment management services.

Noesis also offers Quality Health Check services, which include analyzing existing processes and recommendations for improvement.

Various methods of service delivery are possible, including managed services and turnkey projects. Services and projects are managed based on agreed SLAs and incorporate a continuous improvement approach, based on a set of KPIs (level of satisfaction, value for money or service stabilization).

QUALITY COMBINED WITH EFFICIENCY

The Noesis QM value proposition focuses on superior client confidence, reduced cost of testing and reduced time-to-market. The aim is to ensure the clients maintain the viability and sustainability of their businesses, while exploring the various opportunities in the era of digital transformation.

Noesis has a client-centric approach to QM: an initial client engagement involves designing and implementing a framework for quality management, supported by technology and adapted to the reality of each client. This framework aims to support change management in order to create a quality culture, starting early in the software design, and focusing on continuous quality throughout the software lifecycle.

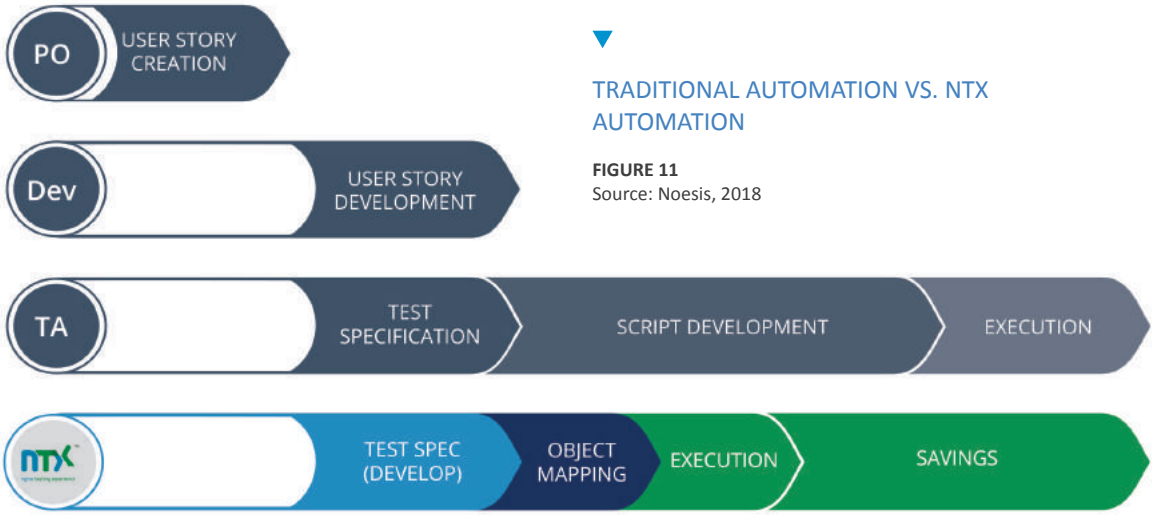
According to the Noesis approach, testing begins before the start of development. The requirements are tested before the developers start working, to ensure that effort is placed on what is important to the end user. Development should only begin when it is clear what is to be developed, with the appropriate level of detail and considering the ultimate goal. This methodology helps to reduce the effort of subsequent corrections and contributes to the agility of the software development cycle.

Client and business user confidence is obtained by using a few KPIs, listed in dashboards that support communication about what is happening throughout the established framework, and about the gains achieved at each stage. As business users are educated on how to define their requirements, this leads to ongoing improvements in terms of reducing the solution design cycle and reducing the number of defects and nonconformities in the final product.

AUTOMATION IS KEY FOR QM EFFICIENCY

Automation is an area that Noesis has been developing continuously over the last 10 years, and the company has attained a recognized level of competence. Noesis has built alliances with technology partners who are leaders in the automation market space and has also developed its own product - NTX (Ngine Testing Experience).

NTX is a test automation platform, which can be used by anyone in the organization: testers, developers, or business people. In addition to its simplicity of use, and the fact it does not require any technical knowledge, Noesis highlights - as one of the main advantages of NTX - the option of specifying the automated testing before development. The specifications introduced in the tool can be reused in future releases of the applications. Figure 11 illustrates a comparison between the traditional automation method and automation with NTX.



TRADITIONAL AUTOMATION VS. NTX AUTOMATION

FIGURE 11
Source: Noesis, 2018

In addition to test automation (functional and non-functional), the Noesis offer in this area also includes Robotic Process Automation (RPA) technology, which enables the creation of robotic software capable of interpreting and carrying out routine tasks, thus making it possible to obtain high performance processes.

The automation solutions have various applications in the context of Quality Management. Noesis highlights the following: creating and comparing data, comparing actual results against projected results, creating scripts that are run overnight, confirming the software is "up and running", stress testing, volume testing and capacity testing.

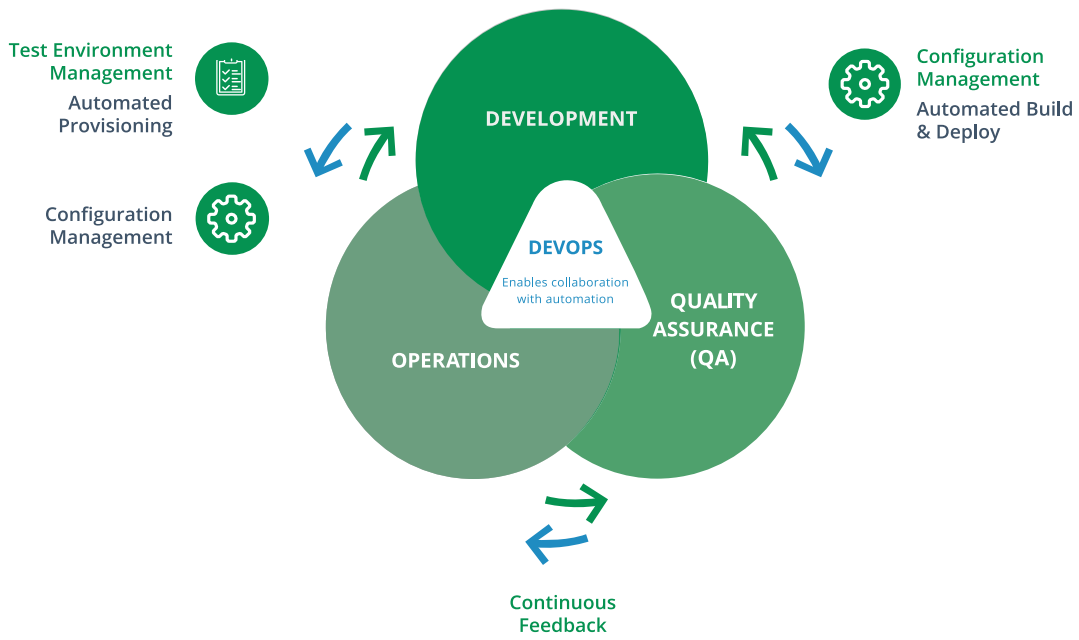
Noesis' strong commitment to automation solutions aims to support and simplify the entire quality management process, optimize the time-to-market of a solution, reduce development cycle costs, increase quality and consequently ensure greater end user satisfaction. Noesis highlights that the investment that organizations make in the implementation of processes and technology, returns on improved efficiency and quality.

DEVOPS: INTEGRATE PROCESSES TO MANAGE SOFTWARE EVOLUTION

Noesis introduces the concept of DevOps to its offer, in a bid to improve Software Change and Configuration Management (SCCM) services. The proposed approach is to automate bureaucracy and increase transparency in order to bring steps and people closer together. This can only come about through advanced automation technology. Test Environment Management Services (TEM) are also part of the DevOps approach; the aim is to implement agile processes in non-productive environments to enable frequent releases, while maintaining or improving the quality of deliveries for production. See Figure 12.

DEVOPS AND SCCM OFFER

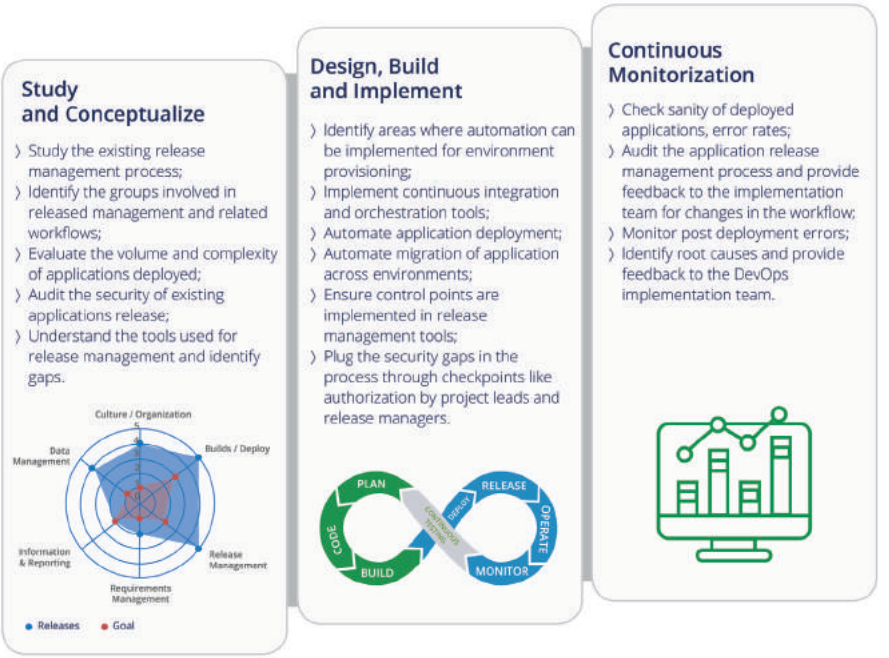
FIGURE 12
Source: Noesis, 2018



To support its customers in the adoption and application of DevOps, Noesis uses a maturity roadmap that can be adapted to each client. This roadmap covers various stages; the first stage includes understanding individual client needs and conceptualization; the second stage covers the design, build and implementation with a focus on putting in place an automation strategy; and the third stage encompasses continuous monitoring of the application release cycle, with continuous feedback mechanisms in place. (See Figure 13).

DEVOPS MODE

FIGURE 13
Source: Noesis, 2018



QUALITY RESULTS ARE OBTAINED BY QUALITY PEOPLE

One of the mainstays of Noesis' value proposition is its investment in qualified people, as the organization believes that not just anyone can be a software tester. The Quality Management team is mainly composed (almost 75%) of software--related professionals with basic training in this field. Noesis also focuses on combining technical and business skills, particularly in sectors such as telecommunications, retail and energy.

100% of Noesis testers hold ISTQB Foundation Level certification. Consultants are encouraged to study for and sit the final certification exam. Once they have obtained initial certification, consultants can develop their capabilities through further ISTQB certification.

Noesis developed its Noesis Academy Programme, which includes in-house and external training activities. With respect to in-house training, consultants are encouraged to share their specific knowledge of different areas of information technology with other colleagues in the organization. External training takes place when there are no internal skills and may include technical or professional training.

In automation, the approach is to have people with mixed skills - technical and functional skills along with business knowledge, so that they themselves can accelerate process automation. Noesis has training programs in automation tools, in order to increase technical knowledge. In areas like RPA, SCCM/DevOps, staff need to have very specific skills, which is why Noesis looks to partnerships to provide the training and certification.

Noesis has launched an internal programme called Talent Management to identify the most promising talents within the QM area, as well as the different skills and motivations of consultants, in order to facilitate each consultant's career development.

In terms of team set-up for a project or service to a client, the most common composition is a combination of people on-site and people working remotely (nearshore and offshore). Noesis believes this is the model that most benefits clients, not only in terms of cost optimization but also in terms of the ability to offer a more complete combination of skills. Remote teams are organized into centers of excellence, preferably close to universities, where it is easier to hire and retain qualified people. These teams have a rich mix of complementary technical and functional skills, which facilitates knowledge dissemination and makes it possible to respond more seamlessly to the different needs of the service.

LOOKING TO THE FUTURE

Noesis' investment for the near future will continue to evolve along the same strategic lines, strengthening skills in the current core business and seeking out the best technology partners to support its offer, or business partners to support entry into new markets.

Noesis intends to continue to **focus on internationalization**, although this only can be done in a sustainable manner by ensuring it has the people, processes and technology to enable it to offer the same service levels. Entering new markets can be done via commercial partnerships, such as that recently created with Fujitsu, through which it promotes the QM services, and in which the company has invested in terms of training the partner team and new processes.

Noesis will **continue to seek the best technologies** available in the market that can best support its services and customise them to different client situations. In the technological framework, there is also the goal of continuing to improve the NTX solution.

Investment in people must be maintained and developed. Noesis aims to maintain strong links with universities, as they provide access to skilled professionals with the essential know-how required to become part of the team and to complement the center of excellence, which is expected to continue growing in the coming years. Noesis will continue to seek consultants who are able to reconcile technical and functional components and will continue to invest in interpersonal skills.

Noesis believes it has achieved major breakthroughs in terms of quality management frameworks and intends to **continue developing its own frameworks** supported by technology and innovation, to enable it to keep pace with market trends and offer a customized response to different client needs.

CASE STUDIES

TV GLOBO: QUALITY MANAGEMENT THE AGILE WAY

TV Globo, well known in Brazil and all over the world, with 50 years of history and a presence in around 190 countries, is one of the major providers of original media content in Latin America. With an audience over 200 million viewers, both in Brazil and via Globo Internacional, this is the second largest commercial television network in the world, second only to the ABC network in the United States.

The Quality Management (QM) project, leveraged by a partnership with Noesis, began in 2015 and currently includes all the areas run by the application management department:

- Corporate systems (finance, sales etc.);
- Content production systems (journalism, sports and entertainment);
- Viewing systems.

The setup of this partnership included the creation of a quality framework, adapted to the specificities of TV Globo. Noesis started to deliver quality services for a few specific projects but has evolved to provide a broad range of services:

- Quality Assurance;
- Functional Testing (manual);
- Automated testing;
- DevOps.

To provide this, a mixed team model was adopted, with a team working at the client premises (baseline) and another remote team in Portugal.

Noesis uses several technologies, tools and methods to ensure that the service is efficient:

- **Automation Tools:**
  - The test automation tool NTX
  - Behavior Driven Development (BDD) – Cucumber tool
  - Selenium WebDriver

- **For DevOps:**
  - Automated test environments
  - Automated deployment (TFS tool)

- **For Quality Assurance:**
  - Definition of quality KPIs and SLAs
  - Implementation of quality dashboards using PowerBI

- **Manual testing:**
  - E2E testing (business process approach)
  - Implementation in Waterfall and Agile models
  - Continuous Testing

The project also enabled the design of a framework for DevOps, customized to the needs of TV Globo. It is a comprehensive framework that points out possible continuous improvement paths, encompassing test environment management, release management, team culture and organization, among other things. Three areas were created based on the DevOps format:

- an area to enhance entertainment;
- an area to sales force mobility;
- and an area for the sports content workflow.

Noesis' professionals also provide training and guidance on best testing practices and quality management to the TV Globo development team.

The work carried out has brought significant benefits to the day-to-day activities of TV Globo:

"Historically speaking, it was always very difficult to obtain up to date information about the business. It required a substantial methodological layer in terms of mapping scenarios, test cases, etc. This was very expensive. By merging the development team with testers, we now ensure a much richer level of expertise in the people working with us".

Matheus Americano, Digital Transformation and Business Development Manager at TV Globo

The quality management work developed with Noesis and the use of methodologies like DevOps has provided several benefits. Highlights include:

- The capacity to **carry out more complex and comprehensive tests;**
- The ability to ensure a **lower level of dependence between the stages of software lifecycle,** as the developer is integrated in the team;
- Achieving a **more fluid work process**, which ultimately generates additional knowledge.

In early 2018, TV Globo has evolved the Quality Management project by adopting agile methods on a large scale, thus ensuring comprehensive transformation:

"We made a major change at TV Globo by adopting an agile model. We implemented a model to transform a structure fully oriented towards projects so that it now operates with a focus on products. We set up a production line that develops technology and business, ensuring the integration of a cross-functional team and using KPIs to measure the success of the results."

Matheus Americano, Digital Transformation and Business Development Manager at TV Globo

Over the course of 2019, TV Globo aims to have 90% of the company working according to agile method and to closely involve Noesis in the model adopted. In fact, the media company is working on a fully-fledged internal digital transformation model that has served as an example to other organizations in the field and is becoming increasingly relevant among its peers. Noesis has supported TV Globo in all aspects related to Quality throughout this evolution, with positive results:

"Noesis' concern goes beyond a mere client/supplier relationship. The aim is to assist with the digital transformation process and the delivery of results to the business areas."

Matheus Americano, Digital Transformation and Business Development Manager at TV Globo

SONAE MC: QUALITY MANAGEMENT STILL HAS ROOM TO GROW

Sonae is a multinational group managing a diversified business portfolio in the areas of food retail (Sonae MC), specialized retail (Worten, Sonae Sports & Fashion), financial services (Sonae FS), technology (Sonae IM), shopping centers (Sonae Sierra), and telecommunications (NOS). With a footprint in around 90 countries and over 45 thousand employees, Sonae had a turnover of 5.5 billion Euro in 2017.

Innovation and continuous improvement are key elements of Sonae's culture, and are embedded in their information technology and telecommunications companies, as well as in the other companies that form part of the portfolio. This focus on technological modernization makes it possible to promote the business, encourage a closer relationship with the client and maximize results in day-to-day operations.

Sonae MC is the leading food retail company in Portugal, with a set of different formats offering a broad range of products. The offer is distributed across hypermarkets, supermarkets, convenience supermarkets, coffee shops, local shops operating as franchises, restaurants selling healthy food, bookshops and stationery shops, shops focused on health, well-being and optical services, dental and

aesthetic medicine clinics, as well as pet products and services. Within this diversified and complex context, there has been an increase in the level and number of projects with impact on all information technology platforms. Seeking speed and effi Sonae MC processes require as many defects as possible to be resolved during the development of new features and services, before they are made available to end-users.

These challenges were the starting point for the partnership with Noesis, which aims to implement processes that help to ensure the software becomes operational under the best possible conditions.

The Quality Management project, which has progressed in partnership with Noesis, dates from 2011 and has evolved over the years. This work currently allows Sonae MC to invest in continuous efficiency improvements, along with:

- Adopting **automation methodologies;**
- Adopting **test management methodologies;**
- **Anticipating the start of the entire quality process** in the development cycle;
- Improving **process efficiency.**

In 2011, Noesis begun to carry out an assessment of the various components of the quality area within Sonae MC. Since then, this technological area has evolved and by time of this study, an on-site team consisting of around **40 members with experience of different tools and technologies** was working in direct partnership with the Sonae MC team. The team creates, maintains and executes:

- Test automation scripts;
- Stress tests;
- Performance tests.

The service is supported by the following tech-nologies:

- Test automation with NTX on Web and Mobile, fully JIRA integrated;
- Selenium WebDriver;
- Logigear Test Architect;
- IBM Rational Functional Tester;
- IBM Rational Performance Tester;
- IBM Appscan;
- HP UFT;
- Worksoft.

Noesis also provides access to its Software Factory, with offices in Lisbon and Coimbra, which can be used by any company. Sonae MC occasionally takes advantage of this to meet the need for additional resources.

Although this project is already mature, within Sonae MC, the final maturity stage is far from being within sight:

"In the technological context, the definition of maturity is having the capacity to adapt quickly to new challenges. Technologies are evolving almost on a daily basis and we need to be able to adapt to that continuing development"

Luísa Afonso, Strategic Partnerships, ISM & Quality Management Leader at Sonae MC

The outcome of this partnership depends largely on Sonae MC's ability to access clear indicators related to the company's capacity to maintain the stability of all the areas covered.

The benefits that Quality Management with Noesis brought for Sonae MC, include:

- **Fewer defects detected** in advanced stages of projects;
- More **efficient software development;**
- **Less time needed** to put the project into production.

Sonae MC considers the result of this partnership with Noesis to be positive in terms of Quality Management:

"Viewed from the perspective that we are following a path that will enable to improve efficiency levels for our proposed objective, it is positive"

Luísa Afonso, Strategic Partnerships, ISM & Quality Management Leader at Sonae MC

NOS: A PARTNERSHIP WITH NEARLY TWO DECADES OF SUCCESS

Created in 2014 through the merger of two of the largest communications companies in Portugal – ZON and Optimus – NOS is now an even stronger, more responsible, future-oriented company, always committed to excellence and the satisfaction of its customers. NOS provides subscription TV services, internet, landline telephone, mobile phone and multimedia content services. It is also a leader in cinema distribution and exhibition.

Recent company data for 2017 refers to 1.3 million households with NOS broadband and 1.6 million subscription TV clients. NOS also provides 99% of the 4G network coverage for the Portuguese population and their fiber network has been installed in 4.9 million households. It had a 1.6 billion Euro operating income, which amounts to a net income of 124 million Euro.

The reasons behind the decision of using a complete Quality Management service based on a model of managed services were mostly business motivations:

- Significant fluctuations in demand for information systems;
- Assure a minimum efficient scale;
- Manage the internal demand for quality for the software under production.

Noesis' collaboration with Optimus dates back to 1999, thus pre-dating the creation of NOS, and its scope has been constantly expanding. Initially, the partnership was more focused on the testing component, but it later evolved to encompass the area of configuration management, thus ensuring the resources and the capacity for centralized, cross-company overall software management.

"At the time of the merger between Optimus and Zon, it was natural to invest in the continuity of the partnership with Noesis, for support covering all services in the Quality area"

Duarte Nuno Diniz, IT Director at NOS, with responsibility for the Area of Quality, Operations and Support.

Over the years, this service has undergone several changes. Noesis and NOS are currently working on a transformation of the existing service model in order to respond to new challenges:

- **Structuring the teams** to clear define who are the operational members allocated to test phases, and the members who are uniquely and exclusively dedicated to automating processes;
- Reducing eff in manual tests and **continuously leveraging the entire automation component,** particularly testing;
- Changing the profiles of the Noesis team, ensuring the separation of functions, with some members focused more on development, and others, with different profiles, focusing solely on **creating and improving automation frameworks that will subsequently facilitate the instantiation of test cases.**

NOS is also currently increasingly adopting the Agile model as the development methodology in addition to the traditional Waterfall. Currently, **over 20% of its developments follow the Agile model**. In Agile, all the work is designed in sprint models. During the first sprint manual tests are performed, while simultaneously working on automating them; this allows you to repeat the same tests automatically during the second sprint, and so on, thus streamlining the service.

In the quality environment, there are currently two deliveries a day, each including a base set of tests performed on the software. Noesis' provision of teams geared towards change was crucial to ensuring the success of this model.

And, because the demand for technological resources in this area is complex, NOS relies on Noesis' team, working partly on site and partly remotely, to ensure they are able to provide the best service:

"Most of the team works on site, but for most of the more technological tasks that often arise in

this field of innovation, we've been using Noesis' remote model, with resources in Coimbra, and this has worked very well. Thus, within NOS, we have internal resources who define our quality strategy and manage priorities. All the operational management is carried out by Noesis"

says Duarte Nuno Diniz

The professionals with know-how and expertise in Agile and DevOps tools are in high demand. This means that retention of these resources is crucial for NOS. Noesis has made enormous efforts on this front, in partnership with NOS, to retain staff by using a model that involves training Noesis employees in NOS systems and work environments.

"Noesis trains some of the staff in the NOS work environment, whether or not they are involved in the scope of the contracted services. This enables us to quickly increase the number of resources assigned to the service whenever necessary, and with higher quality, because they're already familiar with our systems"

Duarte Nuno Diniz explains

The latest results from this partnership relate to higher quality in the delivery of projects. Highlights are:

- **Efficiency:** A centralized software release model that enabled more than 150 software releases last year;
- **Agility:** Switching from large monthly releases to a set of weekly releases. Currently at a stage where we already have more than one release per week, across different software;
- **Risk mitigation:** Auditing the software to detect issues relating to deployment and security. Last year, more than 700 defects were detected prior to the testing stage, thus mitigating risks.

In 2018, more than 97% of the software was tested in the framework of the service contracted from Noesis. More than 1500 defects were identified at the testing stage, thus avoiding them being carried over to the production environment and impacting NOS users and clients.

Always looking ahead, NOS seeks to develop this partnership with Noesis in form of end-to-end process automation, i.e. automating the delivery of software, auditing and test automation, which will later be integrated into the DevOps strategy.

In collaboration with Noesis, the automation tools were selected in 2017, which are now being used to unify the entire ecosystem: continuous integration, continuous deployment and continuous testing, thus broadening the model.

In terms of test automation, four strategic paths were chosen through the partnership with Noesis:

- Creation of an automation framework relying on NTX. The main objective is to allow access to automation by non-technical staff;
- Development of an accelerator to automate all API tests, wherever the automation of testing of services and micro-services is essential;
- Service virtualization, at the level of test environment management. The idea is to ensure that the service virtualization learns the behavior of applications and emulates them in an intelligent manner to enhance the tests without any need for all the environments to work in tandem;
- Management of test data, always having to hand a set of accurate test data prepared to use in NOS scenarios.

This entire strategy is based on the agility and capacity to have the Agile and DevOps models fully operational in a more efficient manner within NOS.

ABOUT IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

inPrintout | Rita Gomes

IDC PORTUGAL
Centro Empresarial Torres de Lisboa
Rua Tomás da Fonseca, Torre G
1600-209 Lisboa
Portugal
Tel:+351 21 723 06 22
Fax:+351 21 723 06 75

http://www.idc.com