

Don't Let an Outdated Software Strategy Hold You Back

Learn best practices from the Masters of the
Modern Software Factory

Freeform Dynamics, 2017

Introduction

Whether you think of it in terms of digital transformation, improving the customer experience, enabling new business initiatives, or simply keeping up with ever more dynamic markets, many organizations have realized that software is now crucial to their future success. That in turn focuses attention on improving the software delivery process, and indeed on the entire software lifecycle.

This paper presents an effective way for organizations to think about and operationalize software delivery processes. Referred to as the “Modern Software Factory” by our sponsor CA Technologies, and validated via a global research study carried out in early Summer 2017, it is a blueprint for weaving software into the DNA of your business. In practical terms, it is about embracing the principles of agility, automation, insights and security.

The Modern Software Factory is more than just technology and process, however: it is also about building an infrastructure and a business culture that enables and supports change. It means having an agile and collaborative working environment, and the people, processes and organization to support that. Unfortunately, our study revealed that only a minority of organizations today have those necessary disciplines and processes in place.

Meanwhile, those organizations which are already adept in these areas – we call them the Masters, as we believe they have mastered the principles that underpin the Modern Software Factory – are demonstrating superior capabilities across a range of business outcomes. They are more likely to deliver better software quality and security, attract the right talent, better align IT with the business, and compete more effectively. So it is not surprising that the Masters have a 70 percent higher profit growth and a 50 percent higher revenue growth than their mainstream peers.

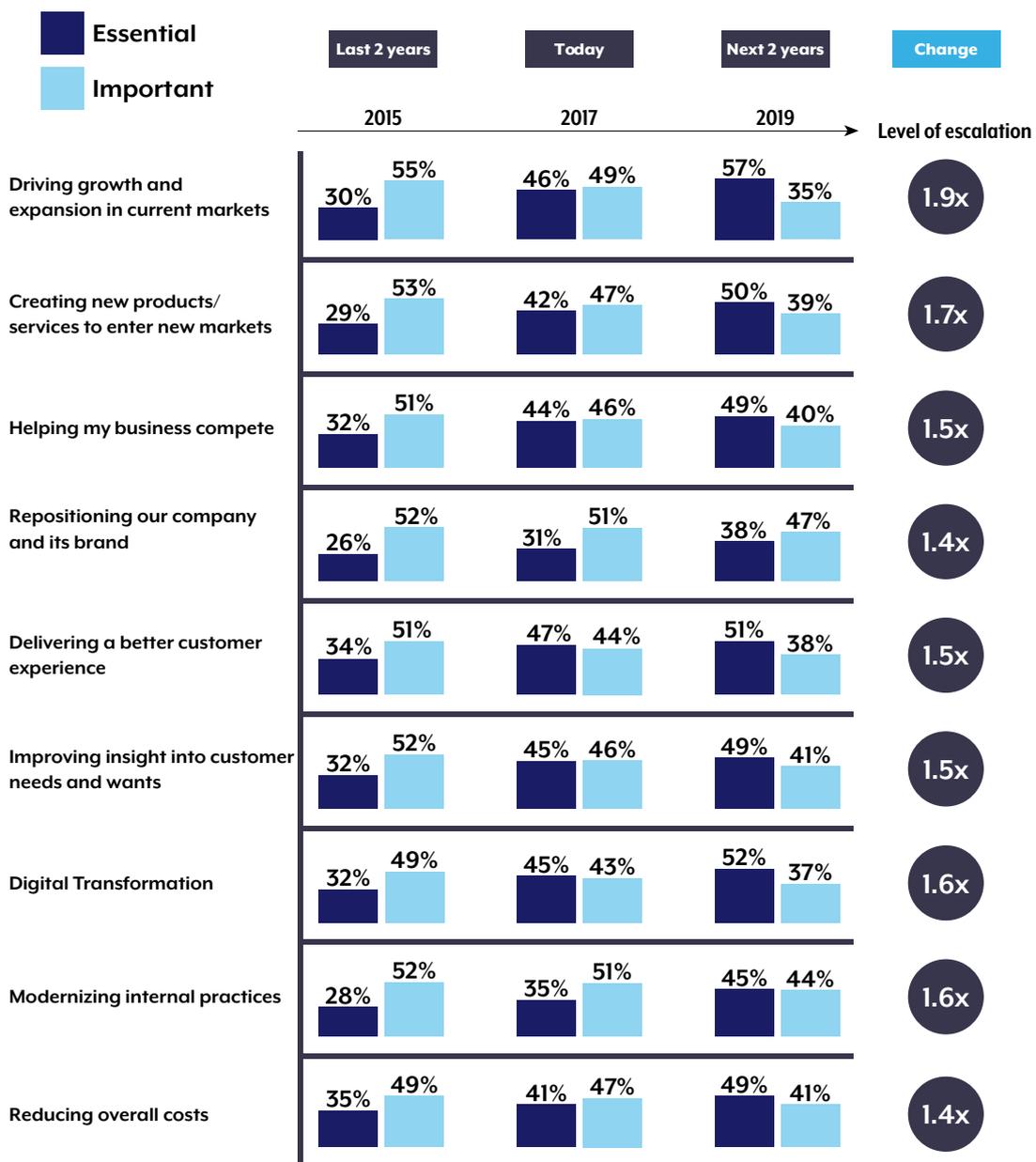
Sound interesting? Well, read on. In the remainder of this paper we lay out a compelling, evidence-based case for ensuring that your software delivery processes can help you adapt to the rapidly accelerating pace of change. We’ll finish by providing some practical advice on where to prioritize when looking to drive improvements so you really can leverage software effectively for competitive advantage.

Software has become an essential business enabler

The demand for innovative applications is growing relentlessly

Software is vital to a successful modern business, both to enable digital transformation and to keep up with ever more dynamic markets and demanding customers. Yet software development has typically operated as either a craft workshop or bespoke heavy engineering. What the business needs is more of a formalized and automated approach, embracing concepts of predictability, scale and mass production/mass customization to deliver applications more rapidly and effectively, but not at the expense of quality, cost or business risk.

How important is software development for your organization to succeed in the following areas?



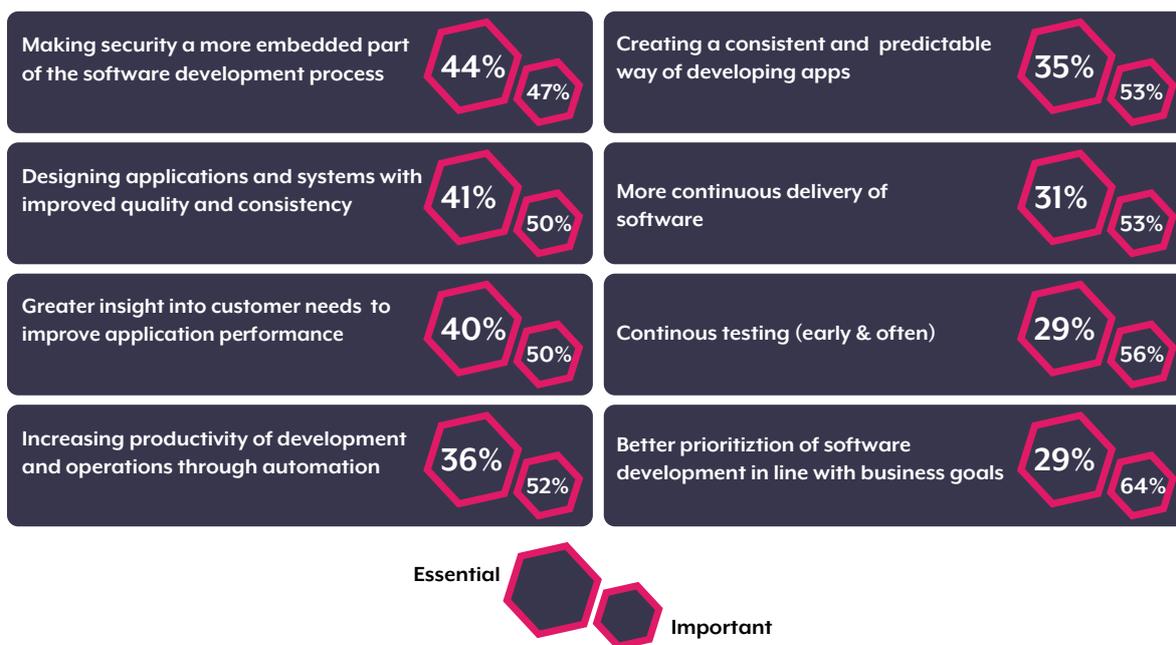
In a global study sponsored by CA Technologies, Freeform Dynamics surveyed 1279 senior staff – both managers and practitioners – in a range of medium-sized to large organizations across 15 countries, eight industry sectors and five continents. Their insights and opinions provide a clear view of the challenges and opportunities facing the software industry, and of the potential for the Modern Software Factory.

Software delivery imperatives

Keeping up with demands means getting smarter about delivery

The changing role of software in business today has driven organizations of all kinds to drastically evolve how they deliver applications. In effect, they are industrializing the software process, using techniques such as continuous testing, automation, customer feedback and user analytics to improve the likes of security, consistency and quality. As a result, they can update and deliver their software far more frequently.

How important are the following priorities for improvement in the business?



An ongoing journey

However, less than a third of respondents across the board rated their organization as ‘Very effective’ on key measures such as gaining customer insight, improving quality and consistency, embedding security, and the use of automation to increase productivity. Clearly, in many organizations there is quite a lot of progress to be made before we can genuinely call software development a factory-like process.

Achieved the goal in key areas?



Percentage of organizations regarding themselves as “Very effective”

Introducing the Modern Software Factory

Principles for driving success

Improving how you deliver software capabilities to the business is not about moving from one fixed process to another fixed process. It is about building and planning for change throughout the software lifecycle: in other words, building a Modern Software Factory that can create, develop and deliver applications more efficiently than before. As a useful framework for building this factory, we will adopt here the four principles model offered by the sponsor of this study, CA Technologies, with the addition, discussed later in this report, of a fifth foundational layer: skills and culture.



The ability to adapt quickly and respond fast to new and changed demands, both upstream and downstream, is key to modern software development and delivery. As a result several methodologies and techniques – often closely interrelated – have evolved to support this, such as DevOps, continuous delivery and agile.

As software becomes ubiquitous, it is no longer practical for it to be hand-crafted and then manually tested, implemented and maintained. The entire lifecycle from the capture and modeling of user needs onwards, needs to be as automated as possible, with consistent and standardized ways of working and, of course, standard feedback processes from users, other stakeholders and operations, to the developers.



Developers need processes in place to monitor, sense and respond effectively. Within that, they can use a variety of analytical tools to gain feedback from users and customers, improve the software, and then track the effectiveness of the changes. They include behavioral analytics and AI-related techniques such as machine learning, for example.

Historically, security testing came late in the development process. But as development becomes more automated – and with attackers also becoming ever more agile – that approach is both too expensive and far too risky. Instead, security thinking must be integral to the entire software creation, manufacturing and delivery process.



So, how much progress have organizations made towards implementing all of the above? In the following pages, we look at the state of play for each of these principles in turn.

The state of play: Agility

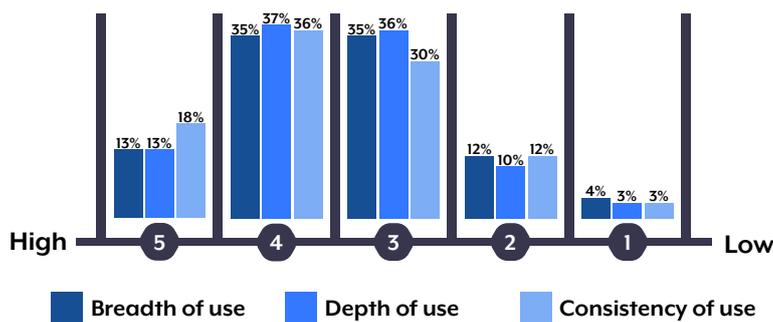
Move fast, but in the right direction

Agility will not enable digital transformation or solve software delivery problems by itself, but it is essential to solving the wider problem of how to engage more effectively with customers and other business stakeholders, and keep up with an unpredictable business environment. Agility is therefore fundamental to the Modern Software Factory – not just formal agile methods, although those are important, but agility throughout the software lifecycle. It’s no surprise then that we see here a picture of companies in all industries in transition, with considerable variation in progress between organizations.



How would you rate your use of [modern methods] in relation to the following?

AGILE

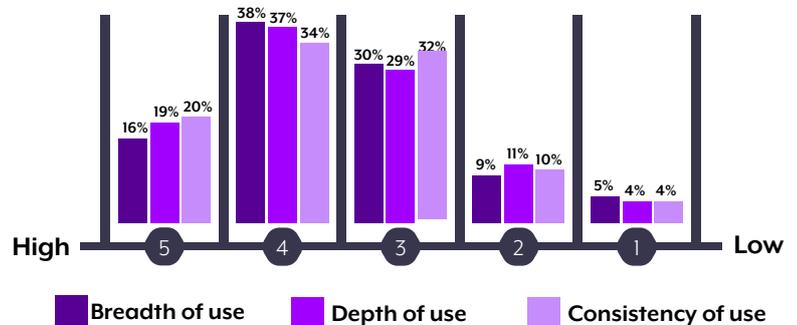


When we asked specifically about agile methods the response was promising, though clearly still with plenty of scope for improvement – and of course with a continual need for more and broader training.

How would you rate your use of [modern methods] in relation to the following?

DevOps

DevOps is defined as operations personnel and developers working together throughout the software lifecycle, both to ensure software is developed with operations in mind and to make use of operational feedback to deliver fixes and improvements more quickly. Again, there is significant usage but there is scope for more.



The Master Perspective “We always said, right at the start, that we want to push a wide variety of ideas through our funnel, prove them with customers, and test to see whether they add value or not.”

Senior Architect, Energy

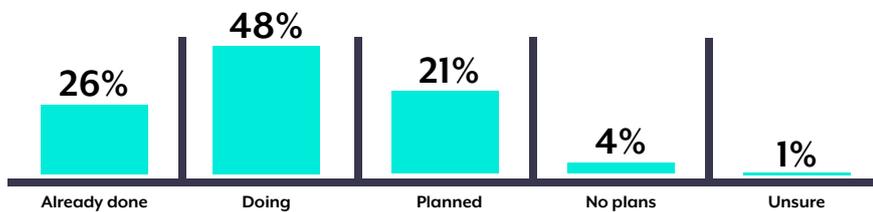
The state of play: Automation

If it's repetitive, automate it

Automation, along with orchestration, is what turns manual processes into continuous delivery. As soon as an activity needs to be done repetitively, or just frequently, it should probably be automated. That's why automation is also a key feature within several of the tools and methodologies used in the Modern Software Factory. For instance, continuous delivery aims to automate activity across the software lifecycle, from build to deployment, and then the feedback loop back to development.



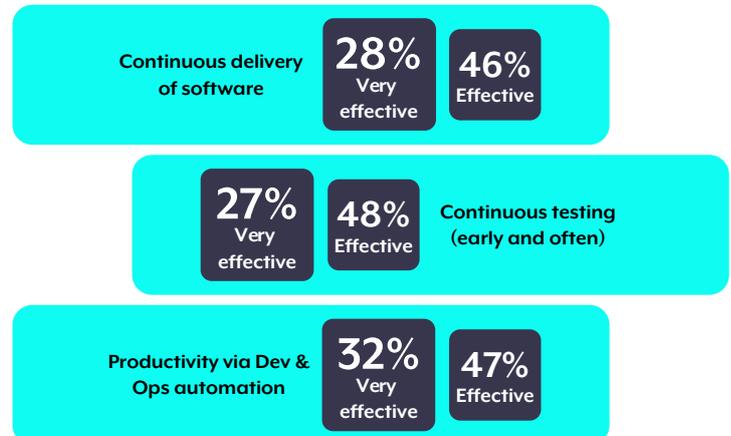
Are you increasing automation within development to address delivery challenges?



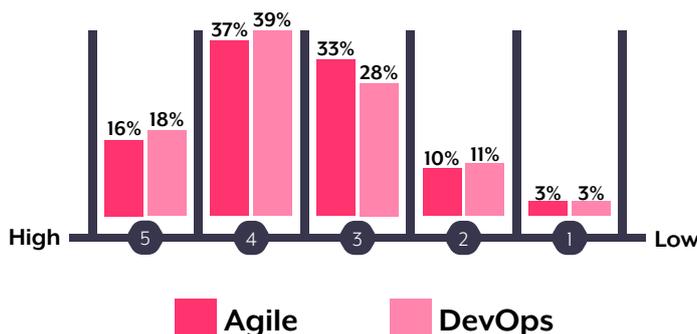
Increasing the breadth and depth of automation is a target for most software development organizations, not least because it is usually much easier to scale up an automated process than a manual one.

Automation is also key to modern methods such as continuous delivery and continuous testing. It follows that an organization practicing those methods very effectively will have already automated much of its software lifecycle, while those who are less effective may still be trying to do too much manually.

How would you rate your use of [modern methods and tools] in relation to the following?



How would you rate the richness and maturity of your tooling to support the following??



A rich and mature toolset is important when it comes to implementing the likes of DevOps and agile. The tools also need to be readily available in ways that promote collaboration – see our [‘DevOps and Cloud Computing’](#) report for more on this.

The state of play: Insights

No business can operate efficiently without insight. It might be the vision that drove you to create the software in the first place, or the understanding of customer needs that tells you that you are on the right track. Then it is the feedback from users that enables you to make the next version better and more reliable, and the insight into your own processes that enables you to streamline and improve them, for both your own benefit and that of your customers and users.



Feeding back the feedback

In today's demanding and often highly competitive business environments, improving the customer's or user's experience can be vital – and since that experience is increasingly software-based, that means continually trying to improve your understanding of their needs and behaviors. However, it is one thing to get feedback from users, but quite another to make sure that this feedback both reaches the right people and is acted upon appropriately and in a timely fashion.

Are you implementing measures or initiatives to address the following?

Improving how we obtain feedback from customers and users to feed back into development

28%
Already done

45%
Doing this now

24%
Plan to do this

Increasing use of analytics, machine learning and AI to enrich insights into customer needs and behaviours

27%
Already done

45%
Doing this now

23%
Plan to do this

How much would you agree or disagree with the following statements?

A learning process

The available tactics and techniques for gaining and applying insight are constantly evolving. Keeping abreast of the opportunities here is itself a continuous process, whether it is the use of analytics and business metrics to measure and boost the effectiveness of your DevOps practice, or the adoption of AI-based technology such as machine learning to help you better understand the user experience.



The Master Perspective "We are now getting real time feedback from our customers at the point of transaction, which is throwing up new insights, real time, on a daily basis, that we've never had before."

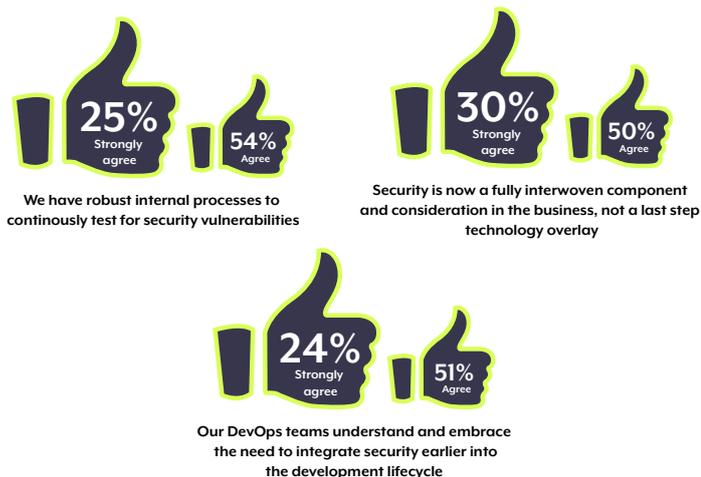
Digital Marketing Exec, Oil & Gas

The state of play: Security

The days are long gone when software security could be seen as a bolt-on, added to the product just before delivery. That view was risky even then, but now it is extremely reckless. With organizations and even whole countries dependent on software in so many ways, and the attackers getting ever smarter, security must now be built in from the very start.

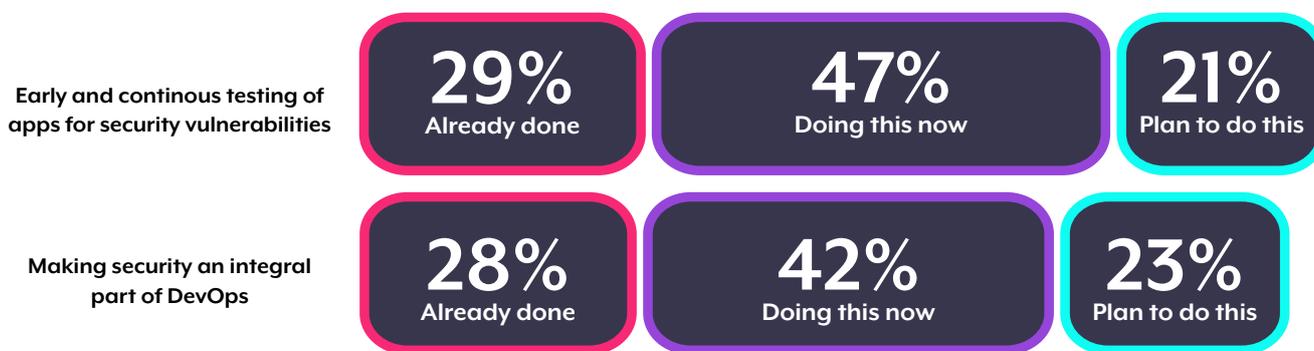


How much would you agree or disagree with the following statements?



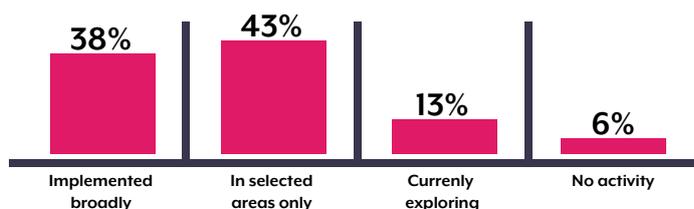
That means integrating security into the entire software DevOps lifecycle, and indeed into the entire business, because it is often people who are the weakest link in this chain. As well as ensuring that developers have the necessary skills and knowledge to design and build applications that are secure, it might mean using code scanning tools or services to continuously test for vulnerabilities. The continuous element is important because new vulnerabilities are constantly being found, while every application update could introduce a new bug or reintroduce an old one.

Are you implementing measures or initiatives to address the following?



Fortunately, much of this vulnerability scanning can be automated – it is a classic example of the kind of repetitive work that should not be done manually, both for efficiency reasons and because automation reduces the risk of human error.

How much is security vulnerability testing embedded into your end-to-end software delivery processes?



The Master Perspective “Our head of security instigated a cultural program to make people aware of their responsibilities. He said, ‘We exist to enable the business without compromising security.’”

Head of Strategy, Pharmaceutical

The Masters of the Modern Software Factory

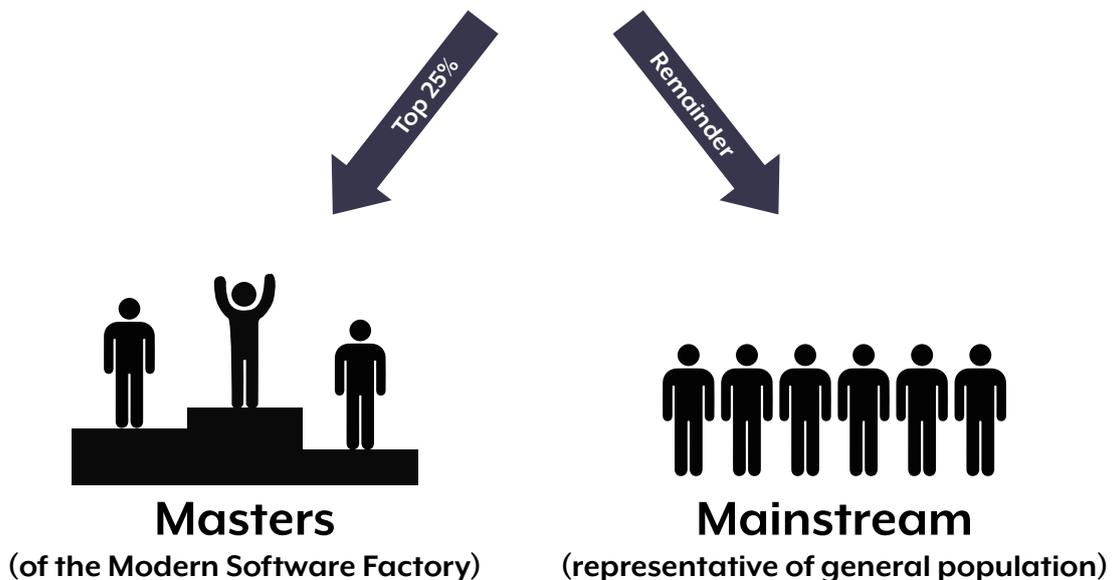
Homing in on those with superior capability

To get a better understanding of the difference it can make when you get these four key principles in place, we aggregated our respondents' indications of how well they are doing on each one, and then separated off the top 25 percent as our Master performers.

CURRENT CAPABILITY



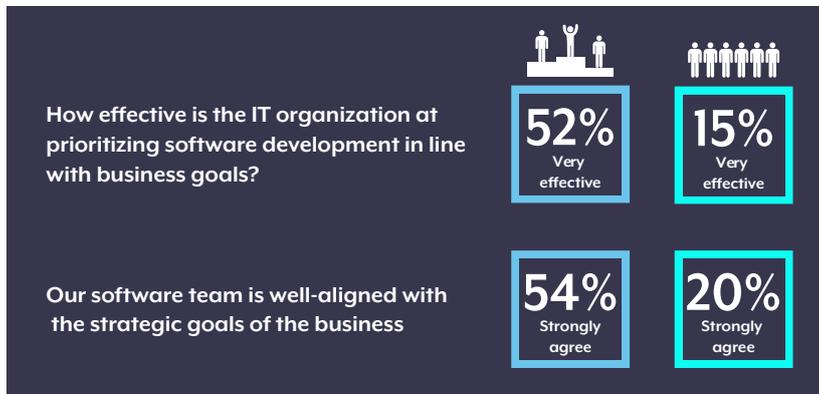
Scored based on “current state” indicators



The figure of 25 percent was not picked at random – we observed distinctive groupings of 25 to 30 percent throughout our survey, for example when respondents rated their effectiveness on meeting software delivery goals. Nor are the 25 percent necessarily the top performers on every measure – some may have rated themselves highly on three counts but not on the fourth, for example.

The Master advantage

Where is superior performance achieved? Across a wide range of metrics, the Masters are far more likely to rank in the top performance category, with all the apparent benefits that follow from that, while the Mainstream typically splits across the medium to medium-high categories.

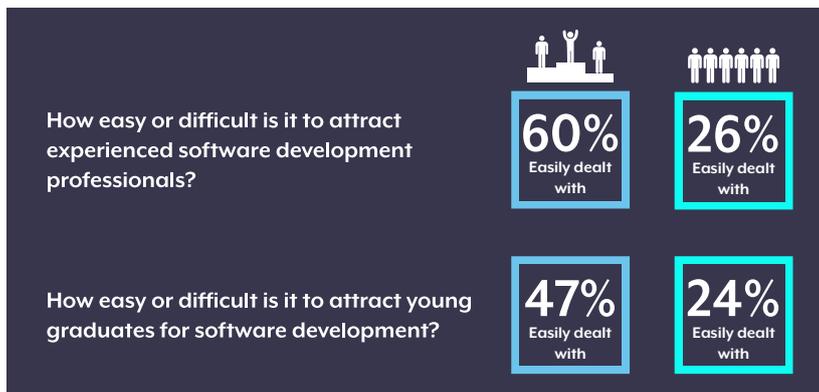


Better alignment with the business

This isn't rocket science, and people have talked for decades about the need to better align IT with the business, and apps are the public face of IT. What's important is that the Masters are at last achieving this.

Better software quality and security

The Masters' greater focus on those key capabilities of Agility, Insight, Automation and Security correlates to better software quality, security and consistency, and a greater ability to keep up with demand.

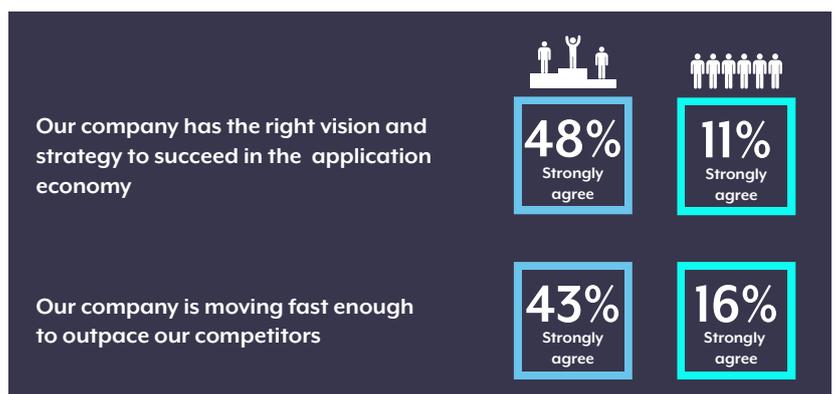


Better able to attract the right talent

Another vital thing that the Masters do well is attract not just the best programming talent, but the right talent – the people that fit with their culture and will deliver the best results.

Better able to compete and succeed

The application economy requires a different approach to software and software delivery. The Modern Software Factory, which the Masters are building, is just such an approach.



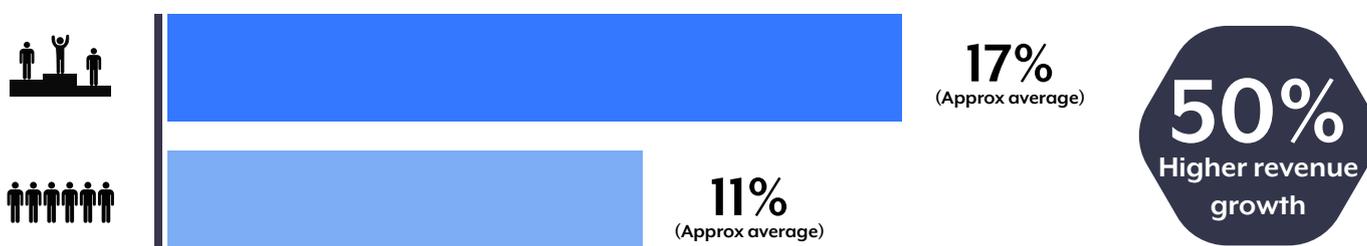
Association with fundamental business outcomes

At its most basic, we do all these things – software delivery, process industrialization, etc – because they benefit the organization. In some organizations, we might measure that in terms of stakeholder engagement and satisfaction or some other metric such as influence achieved. In most commercial organizations, though, it comes down to revenue and profit, and in particular to how those are changing, with growth implying a business that is succeeding in its competitive environment. It is quite striking then just how far ahead of the mainstream our Masters subset appears to be on both measures.

Revenue growth

As well as reporting 50% higher revenue growth rates overall, Masters were 2.7 times more likely to report revenue growth last year in excess of 20 percent.

Approximately how much has your organization's revenue changed over the last year?

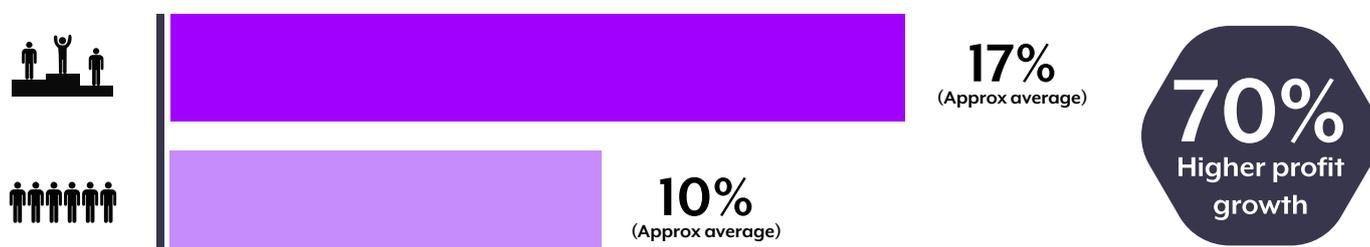


Growth in profit

Similarly, as well as having 70% higher profit growth, our Masters group was 2.6 times more likely to report profit growth of over 20 percent last year.

We cannot infer causality from these kinds of correlations, and indeed there are many other factors involved in revenue and profit growth. However, it is clear that high-performing organizations are more likely to apply the four principles of the Modern Software Factory.

Approximately how much has your organization's profit changed over the last year?



The Master Perspective "We now have a mobile first e-commerce platform for our small customers in one of our largest markets. There, you can draw a pretty direct line to commercial performance. You can track a direct financial benefit from that – we're seeing people place more orders more often."

Digital Marketing Exec, Oil & Gas

Embracing and exploiting the digital world

Having looked at the advantages that our Masters enjoy over those who have yet to fully embrace the concepts and ethos of the Modern Software Factory, let's look at how they came to be in that fortunate situation. How much of it was down to making the correct choices or doing the right things, and how much to wider organizational factors, for instance?

Leadership and customer focus

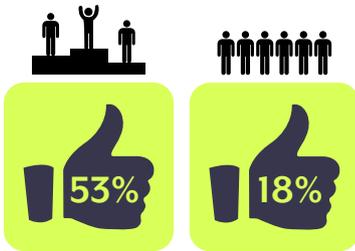
None of this can work without executive backing. That means not just having a C-level business sponsor for the software factory, but deep understanding of the customer needs and expectations, and commitment across the organization to delivering the best possible experience for everyone involved.

Our company understands what customers need and strives to deliver the best customer experience



(Strongly agree)

Our top leaders are ready to exploit new software driven strategies



(Strongly agree)

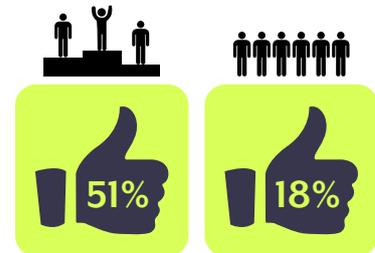
An experimental, software-driven approach

Successful organizations and their leaders recognize the importance of software, and the opportunities it offers. But they are also willing to take risks – within the business context, of course – because iteration and experimentation are vital, and they cannot happen without at least a degree of risk.

Breaking down IT/LOB barriers

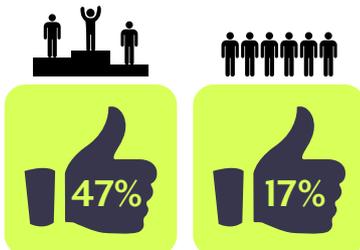
It is not just a matter of building bridges – they have to be the right bridges. It is freedom, but within boundaries. It also needs IT to have 'soft skills' as well as software skills, while the business units must adapt their thinking too, for example to recognize that in an agile world, there may no longer be a recognizable finishing point.

Our software teams and business units need to collaborate effectively on priorities



(Strongly agree)

The organization's culture and practices supports collaboration across development, operations and IT security



(Strongly agree)

Breaking down IT silos

Silos are not just a cultural menace though. They also pose real business risks, for example if security is seen as 'somebody else's problem', or if your people can't learn from each other and instead repeat old mistakes.

The Master Perspective "One fundamental change that has taken place was a bigger focus on usability of services, and looking at the success factors from the business perspective, and not only from an IT perspective."

Workplace Transformation Lead, Telco

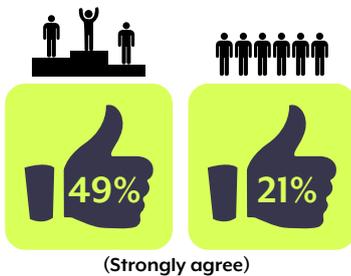
Remembering the fundamentals

Having looked at the advantages that our Masters enjoy over those who have yet to fully embrace the concepts and ethos of the Modern Software Factory, let's look at how they came to be in that fortunate situation. How much of it was down to making the correct choices or doing the right things, and how much to wider organizational factors, for instance?

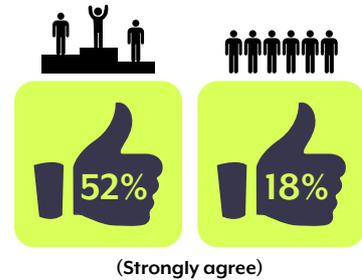
Make sure people know what's expected of them

An important contributor to a successful project – both directly and via improved job satisfaction, which in turn contributes to quality – is making sure people get clear direction up-front, and have clear processes to support them and realistic timescales.

Our current software development processes are always followed



Our current software development processes are documented and well-understood



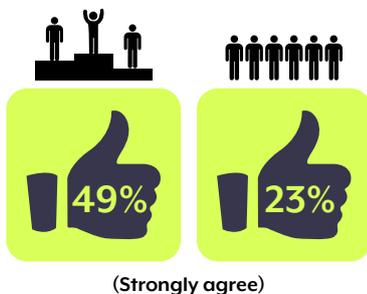
Make sure IT teams adopt the appropriate discipline

By definition, a factory needs processes – they are core to consistency, repeatability, automation, and of course quality control. The Masters understand this, and they ensure that processes are followed.

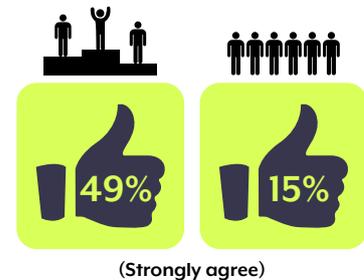
Make sure senior management plays its part

It should never be necessary for software teams to resist pressure from above to compromise software quality or security for the sake of a faster time to market. Senior management also needs to behave responsibly because, as our Masters' experience shows, it is the right thing to do for the business.

Our company's culture supports collaboration



Senior business management understands the importance of not compromising software quality or security for time-to-market



The right culture

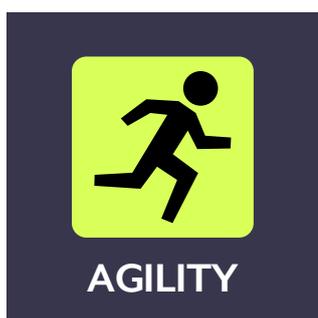
Whether at conferences or online, people talk to their peers. For example, one company might be lauded by its staff for its openness and the willingness of colleagues to collaborate. By contrast, another company's programmers might talk of everything being in silos and hard to find, and of colleagues having their own objectives and agendas. Which one do you strongly want to work in?

The Master Perspective "I think one key thing we're identifying is, much as we all like new tech, if you don't actually complement that with helping the business to change their way of interacting with technology, then all you've done is give them a new tool that sits on their phone or desktop." *Head of Strategy, Pharmaceutical*

Practical tips for driving success

Why the Software Factory matters

The four key principles of the Modern Software Factory – Agility, Automation, Insight and Security – provide a framework for assessing an organization’s ability to succeed with software, and therefore with digital transformation. The Masters who best implement these principles achieve better outcomes on IT-business alignment, software quality and security, and talent acquisition. They also compete more effectively in the digital economy, and have higher revenue and profit growth. Other key success traits of the Masters include the right leadership and culture, and a keen eye on maintaining the right level of process discipline.

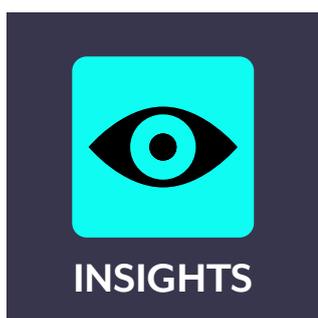
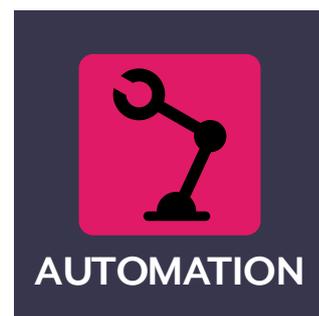


Top 3 priorities to drive better agility

- ➔ Create a culture of trust and cooperation
- ➔ Design in scope for risk and experimentation
- ➔ Involve operations to avoid downstream logjams

Top 3 priorities to drive improved automation

- ➔ Move to DevOps, with Cloud-based tooling for efficiency
- ➔ Implement continuous delivery and continuous testing
- ➔ Standardize wherever it’s possible without limiting agility



Top 3 priorities to achieve better insight

- ➔ Use behavioral analytics and AI to improve customer input
- ➔ Get the processes in place to iterate fast as feedback comes in
- ➔ Build the right bridges between IT and the business

Top 3 priorities to ensure secure delivery

- ➔ Implement security with the user experience in mind
- ➔ Get development, operations and security working together
- ➔ Integrate security into the entire business, not just IT



Final thoughts for achieving success

Digital transformation means building for change

When we talk about digital transformation, we usually think in terms of using software to do things faster and more efficiently. It is a lot more than that though – it is also about opening the organization up to feedback and to change. Like our Modern Software Factory, the organization of tomorrow is built to be adaptive, insightful, consistent, opportunity-oriented and secure.

But while some organizations can buy all the necessary software off the shelf, many will need to develop or commission at least a portion of it themselves – especially those applications that can deliver a competitive edge. A key consequence is that software processes are now fundamental to the health and the future of the business, and need to be recognized, managed, respected and resourced as such.

Culture and talent

All of the above depends on having the right skills, in an open working culture that supports and encourages trust and collaboration between teams and across the former silos of development, security, operations, and the business. Too few organizations – just 24 percent overall – have this in place now. Yet whether you are trying to attract experienced software development professionals or young graduates, having the right culture will go a long way towards making it easier to attract talent to your organization and keep it there.

Software matters, but users matter more

The media, senior management and even governments all keenly debate the information economy and the app economy. But while data and software have indeed become the life essence of many organizations, what really matters for success is – as ever – your users and customers. So yes, your data is vital, as is your ability to process it into information, but you still have to deliver that with the best possible user experience. That in turn means capturing insight that helps you continually offer new and better services.

Iteration and experimentation are vital

Part of digital transformation is the willingness to take risks and try experiments, in order to find those new opportunities and develop those better user experiences. But it is not just a matter of being open to trying new things, you also need processes in place – defined and documented, of course – so you can iterate quickly but with control and oversight.

The Business must adapt too

At the same time, line-of-business colleagues may need to adapt their thinking to recognize that this is how software delivery works now – that software projects may no longer have a fixed finish point, but are instead living and evolving entities. Indeed, for some organizations the technical side of the Modern Software Factory will be the easy part: the hard bit will be the business change that must accompany it.

About the Research

The research upon which this report is based was designed, executed and interpreted by Freeform Dynamics Ltd in collaboration with CA Technologies. Data was collected from 1279 senior IT and business professionals via a global online survey across 15 countries during June and July 2017. The respondents were from organizations with a minimum of 1,000 employees or \$200m revenue and from a variety of industry sectors - Manufacturing, Financial Services, Telecommunications, Retail, Healthcare, Transportation/Logistics, Energy/Utilities and Public Sector (National only).

About Freeform Dynamics

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CA Technologies (NASDAQ: CA) creates software that fuels transformation for companies and enables them to seize the opportunities of the application economy. Software is at the heart of every business in every industry. From planning to development to management and security, CA is working with companies worldwide to change the way we live, transact, and communicate—across mobile, private, and public cloud, distributed and mainframe environments.

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