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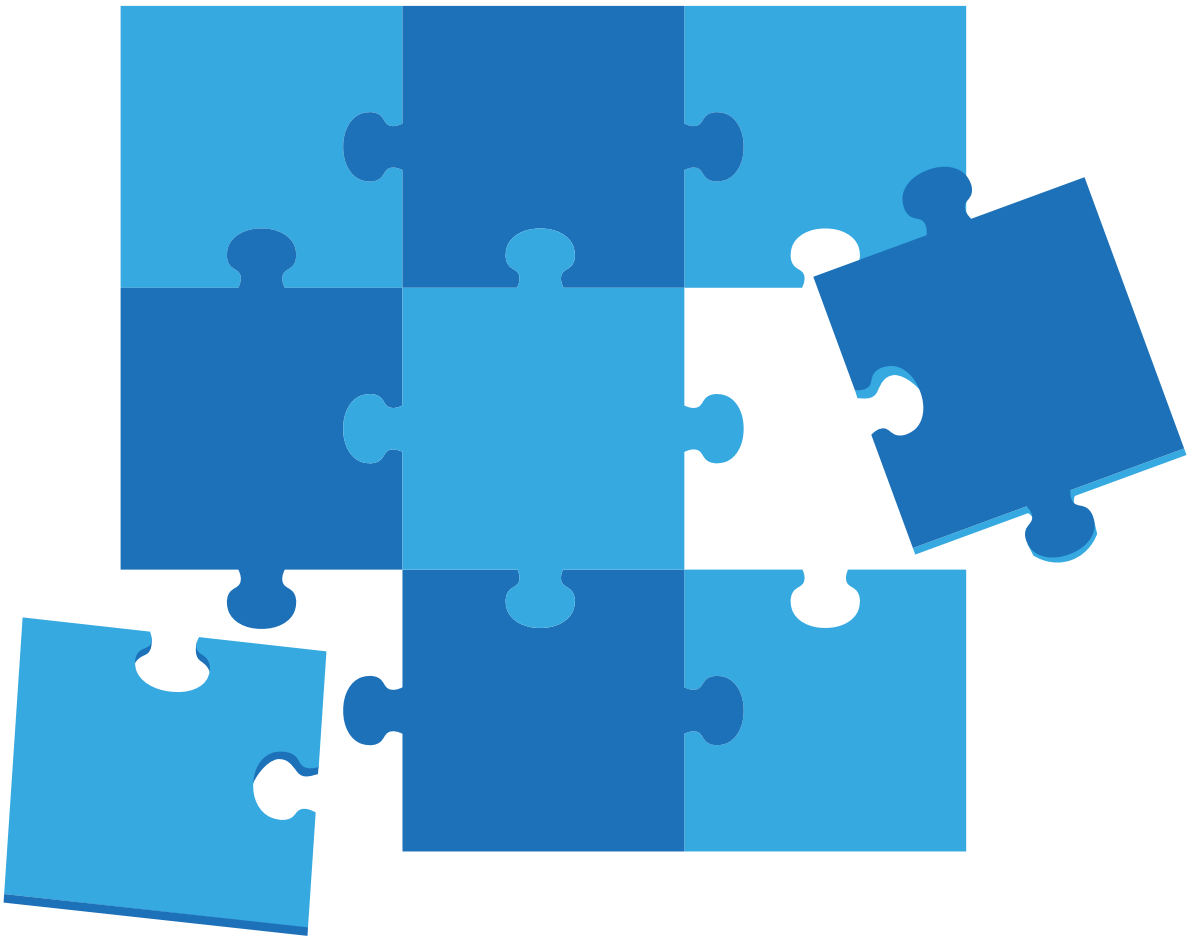

Assembling the DevOps Jigsaw

Do you have all the right pieces in place?

Freeform Dynamics, 2015

Thriving in the Application Economy

The world we live in is increasingly digital. As the smart use of technology leads to markets speeding up and becoming ever more unpredictable, a strong set of established offerings and execution capabilities only gets you so far. Feedback from 1,442 IT and business professionals gathered during a recent global research study suggests continuous innovation, lean delivery and effective leverage of the software advantage are now essential pre-requisites for ongoing success.

Emerging digital imperatives

Continuous innovation

We must be prepared to experiment and fail quickly on the road to success		We need to shift from fixed product cycles to more continuous innovation	
33%	38%	33%	38%
Strongly agree	*Agree*	*Strongly agree*	*Agree*

Relying on traditional planning and delivery cycles that take months or years to execute risks failing to keep up with customer expectations and falling behind in an ever evolving market. A spirit of continuous innovation is required, enabled through a more fluid and experimental approach to product and service development. Even if a core offering requires a high level of structure and stability (e.g. for regulatory reasons), this should not prevent you innovating around customer engagement, delivery processes and even alternative business models.

Organizations accumulate legacy processes and systems over time. These are generally optimized to deal with yesterday's needs and constraints rather than today's and tomorrow's imperatives. Apart from acting as a drag on the business, sub-optimal ways of working tie up valuable resources that could be better employed elsewhere. Eliminating inefficiencies and waste, and focusing on the things that create real value, is therefore key. In today's business environment, the leaner you are, the more effectively you can exploit opportunities or counter potential threats.

Lean delivery

We must streamline business ops to free up resources for digital investment		We must streamline IT to free up resources for digital investment	
29%	39%	32%	39%
Strongly agree	*Agree*	*Strongly agree*	*Agree*

Leverage of software

We need to become more of an app-centric, software-driven business		In addition to our core business, we are also now a software company	
29%	38%	23%	31%
Strongly agree	*Agree*	*Strongly agree*	*Agree*

Whether it's driving continuous innovation or the lean agenda, technology is a key enabler, and this in turn makes software critical to success. Some even argue that software delivery should be considered a core competence for any company nowadays, regardless of their main business. The logic of this is clear when you consider the degree to which digital interaction with customers, partners and suppliers now takes place through applications, apps and online services. It is against this backdrop that we explore the rapidly emerging role of DevOps.

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DevOps as a Critical Enabler

Software development and delivery has traditionally been achieved through projects lasting months or years that step sequentially through a series of fixed phases - analysis, design, build, integration, testing and deployment. DevOps is an alternative approach enabling much more rapid and continuous delivery of value to create competitive advantage, while simultaneously allowing IT to become more responsive and efficient.

Drivers for DevOps adoption

DevOps breaks down the traditional barriers between development and operations teams. By harmonizing processes, tools and activities across the delivery cycle, new applications, fixes and enhancements can be produced and deployed more quickly. Together with continuous feedback and optimization, this translates to a range of competitive drivers around creating better customer experiences, reducing time to value, and generally enabling IT to contribute more proactively.

Competitive advantage

Creating new and innovative customer experiences

48% *Driver now* 38% *Future driver*

More proactive contribution of value by IT

44% *Driver now* 41% *Future driver*

Rapid time to value from development effort

42% *Driver now* 41% *Future driver*

Responsiveness and efficiency

Keeping pace with escalating customer demands

50% *Driver now* 36% *Future driver*

Rapid response to requests from the business

48% *Driver now* 37% *Future driver*

Greater efficiency / lower costs within IT

48% *Driver now* 37% *Future driver*

Competitive benefits are reinforced through the inherent responsiveness enabled by DevOps, with the lean agenda served through an overall increase in efficiency. Seamless cross-functional integration to remove slow and costly hand-offs is part of this, as is an increase in the robustness of output at every stage in the process through frequent and continuous testing and remediation. The end result is faster throughput, higher quality, lower costs and fewer distractions for IT staff.

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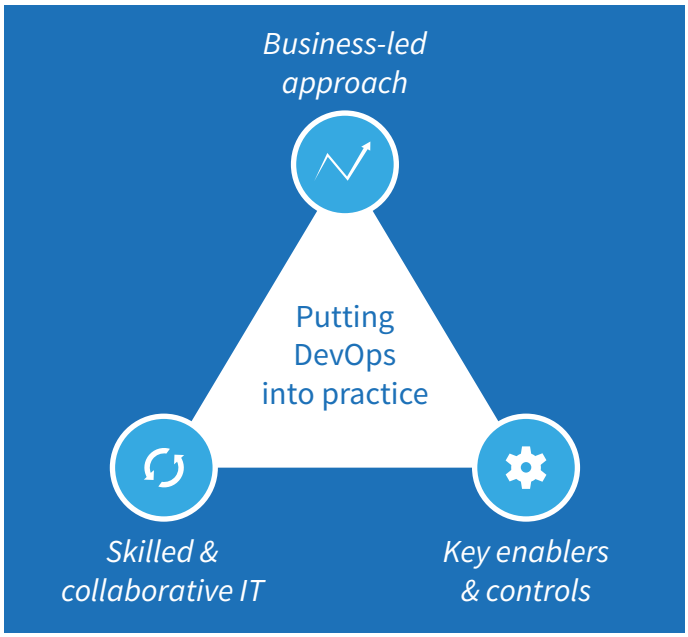
DevOps Practicalities

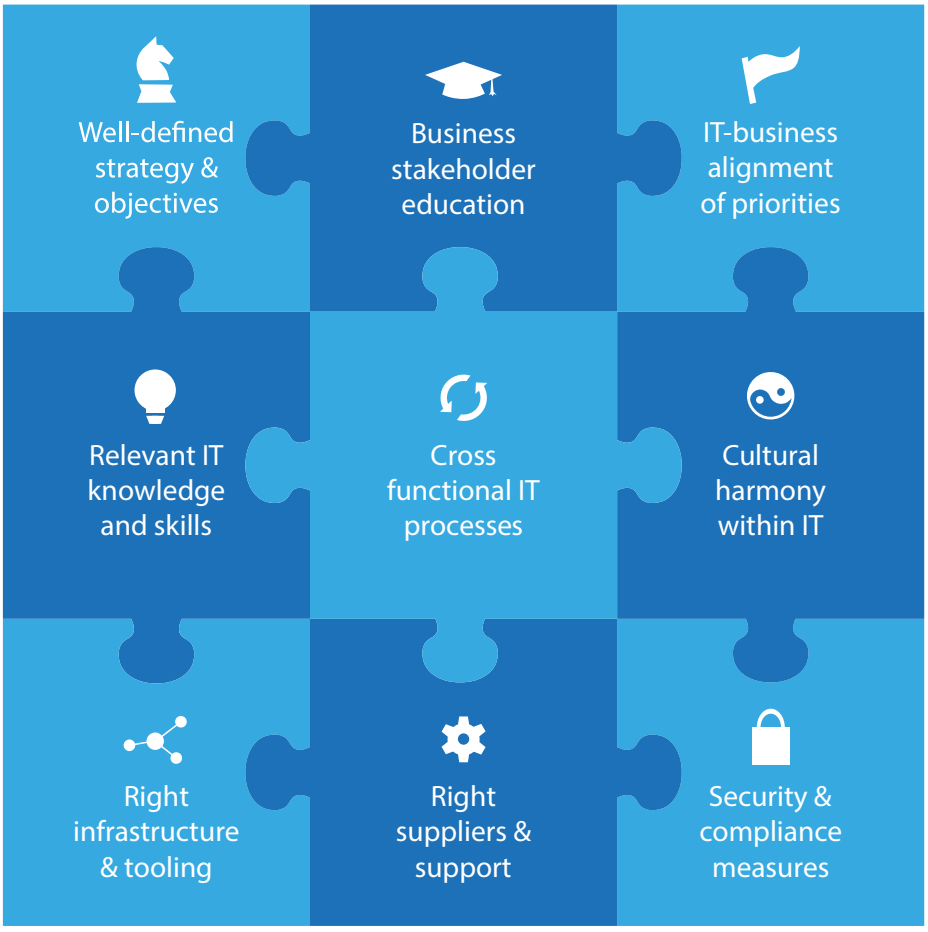
Unlike many IT-related concepts, DevOps doesn't revolve around a specific type of technology, and it can't be classed as a methodology either. Indeed, DevOps generally requires blending a number of different technologies, skill-sets, tools and methods.

A useful way to think of DevOps is as a philosophy, i.e. a way of life for those involved in software development, delivery and maintenance. In line with this, cultural transformation to create cross-functional alignment and harmony is key.

Success in practice requires a business-led approach, adequately skilled and collaborative IT teams, and the implementation of a range of key enablers and controls. If we break these out further, we end up with 9 key areas that are each confirmed by over 80% of study respondents as being important for maximizing DevOps effectiveness. This leads us to the DevOps jigsaw.



The DevOps jigsaw



Business-led approach

A well-defined strategy and set of objectives are required, but these have to reflect business priorities. Business stakeholders must therefore be included from the start, so be prepared to educate them on key principles.

Skilled and collaborative IT

Training may be needed on automation techniques and cross-discipline skills. Process must be put in place to support seamless workflow, collaboration and feedback mechanisms, but these will only work if cultural harmony is created.

Key enablers and controls

We'll be considering infrastructure, tooling and controls in more depth later. Suffice it to say for now, DevOps will deliver more value if you work with the right suppliers to create a strong and scalable enabling foundation.

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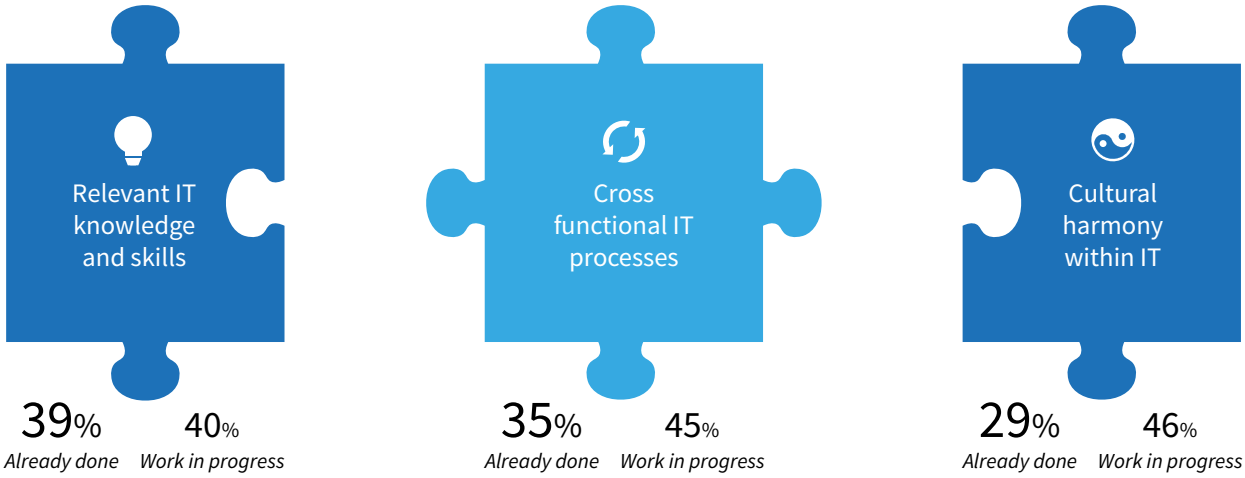
Implementation Progress

The great thing about the research we are reporting is that the study sample was very 'DevOps savvy' - much more so than the general mainstream business population. Over 70%, 1018 respondents, for example, said they had implemented DevOps to one degree or another. Focusing in on this group, we were able to explore just how far DevOps adopters have progressed in the areas highlighted. Let's look at this by considering each row of the DevOps Jigsaw.

A business-led approach

The numbers we see here immediately highlight that when someone says they have adopted DevOps, this doesn't necessarily mean they have done it comprehensively. Most say they have done what's necessary around strategy and objectives, for example, but this is still a work in progress for many. The evidence also suggests that even where a strategy exists, business stakeholders are not always bought into it, which in turn impedes effective priority alignment. Looked at overall, the picture is consistent with many DevOps initiatives being driven 'bottom up' from within IT.

Skilled and collaborative IT



DevOps capability is even more patchy in relation to the internal operation of IT. As we might suspect progress on knowledge and skills acquisition is ahead of other areas, as this is arguably a pre-requisite for defining what's needed in terms of cross-functional processes and collaboration requirements. The percentage of DevOps adopters saying they have fully dealt with cultural transformation is noticeably the lowest in this row of the jigsaw. Getting past traditional lines of demarcation, ingrained mind-sets and long-established turf wars takes time and patience.

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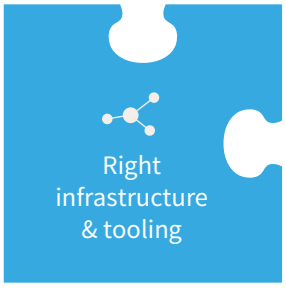
Implementation Progress - Continued

Key enablers and controls



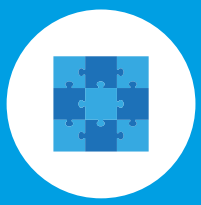
37% *Already done* 42% *Work in progress*

33% *Already done* 46% *Work in progress*

35% *Already done* 46% *Work in progress*

Despite the fact that both development and operations teams may have individually implemented modern methods and automation techniques, the majority of DevOps adopters say there's still work to be done in relation to infrastructure and tooling. With significant work in progress also evident in the areas of security and compliance, it's clear that a lot of DevOps activity is not well supported from an enabling platform and risk management perspective. Finding suppliers to do more than simply sell you point solutions is also still on the 'To Do List' for many.

Overall Level of Adoption

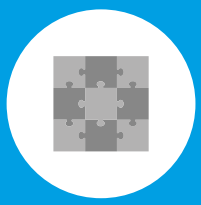


Advanced DevOps adopters

Implementation activity in all parts of the puzzle

Full implementation in relation to at least 6 pieces

20%
of adopters
(201 respondents)



Early or limited adopters

Gaps in coverage (no activity in some areas) and / or implementation still a work in progress in over 3 areas

80%
of adopters
(817 respondents)

If we pull all of the above together, it is possible to make an overall assessment of how comprehensively those claiming DevOps adoption have implemented the approach. Tellingly, among over 1,000 citing current use of DevOps, there wasn't a statistically significant number (<30) that had every piece of the DevOps Jigsaw fully covered. Relaxing our criteria slightly, however, as indicated above, we can reasonably regard 1 in 5 adopters as having comprehensive enough capability to be considered 'Advanced DevOps adopters'. If we turn this around, though, that means 4 out of 5 DevOps adopters still have significant capability gaps. And remember, this is in relation to requirements they themselves told us were important for success. One lesson here is that it can be misleading to take claims of DevOps adoption on face value - it's not just about whether you have adopted, but how comprehensively you have done so.

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Assessing the Impact

Assessing progress based on what respondents say is important is one thing, but is there any corroborating evidence to confirm that the DevOps Jigsaw view of imperatives is valid? Actually, there's quite a bit. If we bring our non-adopters back into the equation, we see strong alignment between DevOps capability and the benefits yielded by digital initiatives in relation to market competitiveness and fundamental performance indicators.

Competitive / market performance

How much would you say your digital initiatives have benefited the business to date in the following areas?

	Advanced DevOps adopters		*Early or limited adopters*		*No DevOps adoption*	
	Major contribution	*Good contribution*	*Major contribution*	*Good contribution*	*Major contribution*	*Good contribution*
Ability to act quickly on opportunities	63%	21%	35%	39%	17%	34%
Ability to attack and defend quickly	61%	28%	28%	43%	18%	25%
Opening up of new markets	57%	31%	34%	37%	19%	28%
Creation of new business models	52%	36%	33%	36%	15%	31%
Creation of new routes to market	51%	38%	33%	40%	17%	31%

Business scorecard impact

As a result of your digital initiatives, have you achieved significant measurable benefits against any of the following KPIs?

		Advanced DevOps adopters		*Early or limited adopters*		*No DevOps adoption*	
		Achieved	*Expecting*	*Achieved*	*Expecting*	*Achieved*	*Expecting*
Lead indicators	Customer retention	77%	20%	45%	42%	31%	40%
	Customer acquisition	72%	22%	44%	40%	34%	32%
	Customer profitability	70%	24%	41%	43%	27%	38%
	Share of key markets	65%	28%	36%	46%	19%	42%
	New income streams	63%	29%	39%	44%	25%	34%
Financial outcomes	Overall revenue	69%	23%	45%	42%	32%	39%
	Overall profit	70%	23%	40%	45%	29%	39%

Of course other factors impact the metrics here, but given the role of software as a critical enabler in today's digital business context, the outcomes listed represent a good proxy for the impact of DevOps adoption. An important observation is that the delta between the first and second groups is greater than that between the second and third. Limited adoption clearly yields limited results, but the real payback comes from taking a comprehensive approach.

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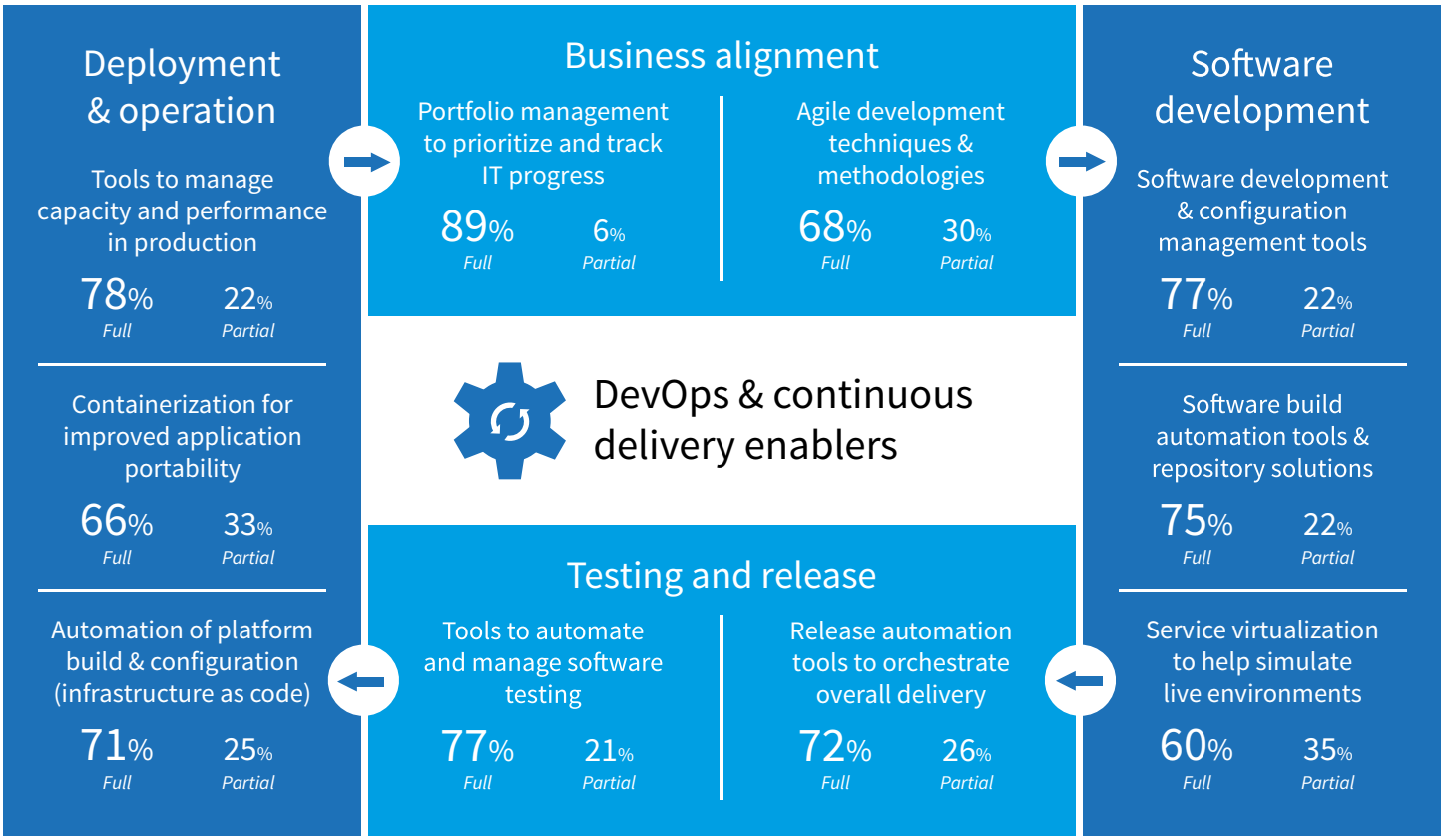
Learning from Advanced Adopters

Having identified our advanced adopter group and verified their achievement of superior results, what can we learn from them beyond the importance of having all or most of the DevOps Jigsaw covered? Well on average they are significantly more likely to have key tools and methods in place, and looking at their capability at the next level down provides a good indication of what's needed in terms of specific enablers and controls across the DevOps cycle.



Percentages relate to the level of capability declared by advanced DevOps adopters

Starting at the top, portfolio management is critical as you scale up your DevOps activity. It's hard enough keeping track of traditionally phased projects, but when each work-stream is iterating continuously, visibility and management are critical to making sure that investment activity stays in tune with business priorities. Agile methods also help to maintain alignment, as ongoing checks and balances against business objectives are fundamental to these.

Turning to software development, many familiar tools and techniques are applicable in a DevOps environment, though more emphasis is placed on automation and collaboration to handle rapid iteration and more seamless activity within and between teams. The same can be said of testing and release, though an area often requiring particular attention is release automation. Solutions here help you to orchestrate the way software builds flow from development, through testing, staging, etc., ultimately to deployment in the production environment. This can include controlling automated provisioning and configuration of platform resources required to support each scenario. A good release automation solution will allow you to orchestrate hundreds of parallel work streams.

But from an operational perspective, you also need the automation tooling in place to actually execute the process of physically allocating server and storage capacity, then making sure an appropriately configured layer of platform software is in place to receive the build. At the time of writing, this is also where the potential role of container technology is being actively explored by many. Finally, in the operational domain, tools to allow effective monitoring and management of production and pre-production environments are critical for both maintaining service levels and closing the overall feedback loop.

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Putting it into Practice

Build on grass roots enthusiasm

One of the great things about DevOps is that adoption often starts at a grass roots level within IT departments. Developers and operations staff see a more automated and collaborative approach as a way of dealing with some of the frustrations they have traditionally had to endure. The broad availability of open source tools which can be adopted without the need to go through normal approval processes means that practitioners have been able to drive incremental efficiency and effectiveness in a free and open manner. All of this leads to a high degree of commitment and enthusiasm among IT teams.

Strike the right balance between control and freedom

This bottom up approach has its downsides, however. Activity can evolve in a piecemeal and inconsistent manner across, and even within, different teams. This allows practitioners to drive local step changes in performance and quality, but can impede scalability when you look to scale-up your DevOps activity. Those who have been through this scale-up process often highlight the balancing act required. While standardization of some elements is necessary, too much dictation of what practitioners should be using and how can undermine the very creativity, productivity and commitment that motivated teams in the first place.

But make sure you standardize where it matters

In terms of practicalities, it makes sense to drive consistency in areas that benefit from central coordination, such as security and compliance, orchestration of the delivery pipeline via release automation, production systems monitoring, etc., but allow freedom by default in other areas. It is important, for example, to give developers freedom to choose the right frameworks and tools to address the needs of specific projects. In today's multi-platform, multi-device world, too much standardization can easily result in 'lowest common denominator' output - not ideal when so much emphasis is placed on the customer experience as we have seen.

Keep the strategic view in mind

Perhaps the most important requirement when considering the longer term, however, is to think of DevOps less as a way of simply optimizing the inner workings of IT, and more as a strategic business enabler. Coming back to where we started out in this paper, efficiency and responsiveness are critical, and DevOps can help immensely with these. But the overriding goal is to drive sustainable competitive advantage, and in an increasingly fast-paced, ever-changing business environment, this translates to a need for an ongoing flow of innovation and value.

Remember the real objective is continuous delivery

It is no coincidence that many speak about DevOps as an enabler of continuous delivery. This doesn't necessarily mean that you are constantly pumping out new software into the live environment, it's more making sure at any moment in time you are ready to deploy that next release or enhancement should business needs dictate.

Use the DevOps jigsaw as your guide

This constant state of readiness and responsiveness is fundamentally what DevOps enables, which in turn highlights the significance of the DevOps Jigsaw. If you are going to leverage the full potential, you cannot think and act parochially. You need to take a business-centric approach, make sure IT is properly skilled and working collaboratively, and put the necessary enablers and controls in place.

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About the Research

The research upon which this paper is based was completed in July 2015. Responses were gathered via an online survey from 1,442 IT and business professionals (70% and 30% respectively) working in a larger enterprise environment. In total, 16 countries were represented including the USA, Canada, Brazil, UK, France, Germany, Switzerland, Spain, Italy, India, China, Japan, Hong Kong, Singapore, South Korea and Australia, along with 9 industries spanning Automotive, Consumer Packaged Goods, Utilities and Energy, Financial Services, Healthcare, Consumer Electronics, Retail, Telecoms and the Public Sector.

The overall topic of the research was 'Digital Transformation' and questions on DevOps were asked in this context. A requirement for respondents to provide meaningful responses on the subject matter means the survey sample is skewed towards DevOps users. This is perfect for studying the nature of adoption as we have done in this paper, but it does mean that care must be taken when presenting results in another context.

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Further reading

If you have found this paper relevant to DevOps or digital transformation related plans and activities, we would recommend the following documents as further reading:

Exploiting the Software Advantage; Lessons from Digital Disrupters, October 2015
Orchestrating the DevOps Tool Chain; Continuous delivery for the enterprise, April 2015

These papers are available from both the CA Technologies and Freeform Dynamics websites.

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