Avoiding a new legacy "ball of mud":

Recipes for a successful cloud strategy

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# Avoiding a new legacy "ball of mud": Recipes for a successful cloud strategy

> *"If businesses needed a reminder of how critical it is to be able to act quickly amid volatile conditions, the coronavirus pandemic has certainly provided it."*

For all the distress the coronavirus has caused, most businesses would agree that it is not the last crisis they will have to face.

In many respects it has magnified pressures that already existed but were perhaps easier to ignore. The need for flexible and secured cloud-based computing architecture, and the resilience and responsiveness it can deliver, has never been more apparent. Impact being:

- Coping up with demand spikes and collapse during the pandemic
- More interactions are forced online, technology resources come under strain
- Global network slowdown and outages
- #washyourcyberhands - dramatic increase in cyber security attacks and global threats

COVID-19 revealed gaps in visibility into Cybersecurity threats
Source: VMware Carbon Black Global Threat Report

| Country	Percentage
Italy	74%
USA	63%
Singapore	73.5%
UK	70%
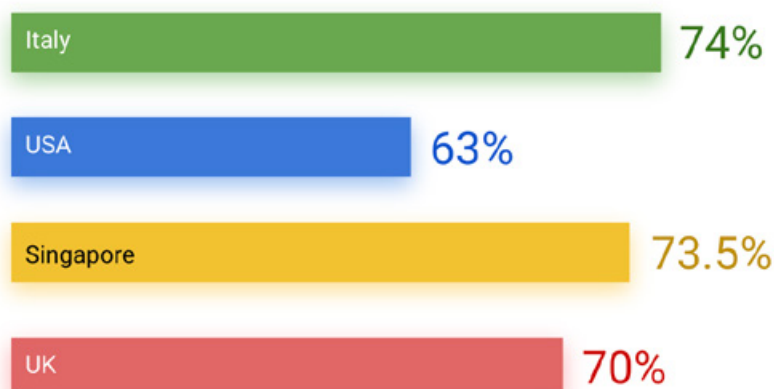
Why is cloud success so elusive (sometimes)?

For all the rapid growth in cloud adoption and high-profile success stories, it has to be acknowledged that cloud investments do not always deliver the expected benefits.

Research has shown that up to a third of companies see few to zero organizational improvements as a result of cloud adoption. In some cases cloud may create more problems than it solves; in one recent study, 74% of enterprises reported moving an application into the cloud then back into their own infrastructure, primarily due to concerns about security and performance.

Organizations that moved applications back from the cloud

Source IHS Markit

● Yes   ● No   ● Unsure

No

Yes
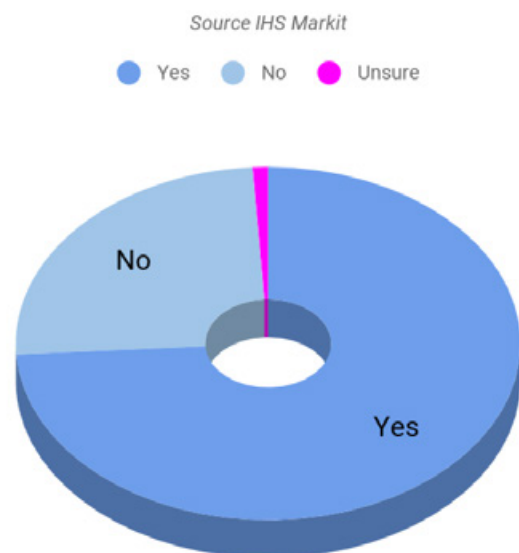
Yet the **coronavirus** outbreak has also highlighted the ability of some companies - take Netflix or Zoom for example - to leverage the cloud to scale into unprecedented levels of demand, with minimal fuss and seemingly overnight.

So what differentiates a mediocre cloud adopter from a business that's cloud-centric, or a solid cloud strategy from one that stumbles? What are the secret sauces for a successful cloud strategy?

It is strategic, do not just outsource it!

"Moving to the cloud is not just a change in infrastructure. It is a strategic enabler for a modern digital business and requires cultural and technical change in your organization" says Enrico Piccinin, Principal at ThoughtWorks. It is a key enabler for speed in delivery, elasticity and resilience.

One major misunderstanding is that when we throw stuff on the cloud, we would delegate the ownership to some other vendor. "The cloud isn't simply a change of infrastructure from on-premise to a virtual environment you no longer have to maintain yourself," says Scott Shaw, Director of Technology at ThoughtWorks. Because everything becomes software-defined, you have to manage it as software. It requires more ownership and demands you to grow internal capabilities within development teams to understand networking, security and infrastructure and perhaps use software engineering practices to code and maintain infrastructure.

Cloud: Beyond Infrastructure Thinking

"Lift and shift" is often used as a deliberate migration strategy, rather than a derogatory comment that someone isn't thinking carefully about their migration. This strategy mostly considers cloud as a hosting solution, resulting in the replication of existing architecture, security practices and IT operational models in the cloud. This fails to realize the cloud's promises of agility and digital innovation. A cloud migration requires intentional change across multiple axes toward a cloud-native state, and depending on the unique migration circumstances, each organization might end up somewhere on the spectrum from cloud lift and shift to cloud native. Systems architecture, for example, is one of the pillars of delivery agility and often requires change. The temptation to simply lift and shift existing systems as containers to the cloud can be strong. While this tactic can speed up cloud migration, it falls short when it comes to creating agility and delivering features and value.

One of the fundamental misunderstandings is the belief that the cloud is just a virtual form of hardware or an alternate form of infrastructure. But the cloud isn't hardware. Rather, it's 100% software. This fallacy makes Cloud as the responsibility of the infrastructure or operations division who previously managed data centers and physical networks. Typically, these teams manage capital assets as a service to the rest of the organisation. When infrastructure teams become the custodians of corporate cloud resources, those facilities become — in effect — an extension of the existing infrastructure. This approach is widespread and often results in "hybrid" cloud implementations, where the public compute resources seamlessly (in theory) extends the on-premise assets. "Hybrid" may sometimes be a good idea, but it often is an accidental result of organizational structure, rather than a conscious architectural decision.

360-degree approach to change and take ownership

Adopting cloud holistically has four dimensions. It goes beyond replatforming and instead incorporates a 360-degree approach to change. You might be lucky enough to lower costs by considering infrastructure alone, but to see an impact on top-line revenue, market share or innovation, your response must be broader.

Shifting from on-premise infrastructure to cloud hosting is only the first step. Maximising the business benefit from a move to cloud requires attention to the following four dimensions:

Technical excellence

Provisioning resources and managing their operations entirely though API's is a defined characteristic of public cloud. The interface allows a consistent way of defining pretty much anything/everything in the most complex hosting environments. While the reality about someone, somewhere, sometime must eventually rack servers, run cables, configure switches, build kernels etc, still holds true - but for most of us, creating a hosting environment for our applications is entirely a software development activity that can be done from our desk. Admittedly, there's a vast body of knowledge over and beyond ordinary programming that must be mastered to do this well, but most infrastructure creation is now fundamentally a software development activity.

As a software development activity, it requires certain discipline around code modularity, coupling, clarity of intent, and testability. These practices are vital because the valuable corporate asset being created is no longer the infrastructure itself. Instead, it's the code that defines the infrastructure. If that code's not written and evolved according to good engineering practices, it will be unsustainably costly to maintain.

Autonomy with alignment

Moving from a world of physical resources — maintained by specialists and housed in a remote colocation facility — to software-defined network, compute, storage and support is a significant organisational disruption. Delivery teams are now responsible for defining and maintaining their own hosting environments. Security, compliance, strategic alignment and support responsibilities all shift to the left.

Of course, empowering teams to build, own and operate their own assets doesn't mean they're completely free of governance or alignment to overall business goals. Cost management, staffing flexibility, predictability, security and compliance are all reasons to have an overarching vision and architectural decision making framework to govern public cloud usage. This organisation-wide architectural direction should equip teams on the ground

with the tools and knowledge to achieve a standard of technical excellence and to make good decisions about which cloud services to use — and which not to use.

Self-service platforms.

Much of the practice and tooling for defining public cloud infrastructure as code was invented by the open-source community in response to what was, at the time, a revelatory new ability to manipulate arbitrarily-complex infrastructure setups entirely through APIs. This capability put power and productivity directly into the hands of developers in a way they'd never experienced before.

This self-service infrastructure on-demand is one of the key prerequisites in the very definition of public cloud. So it's ironic that when many enterprises adopt public cloud, the first thing they do is remove this self-service capability from developers' hands. Perhaps It's important for the organization to leverage this self-service platform capability in order to see the step change in productivity that cloud affords.

Cloud Vendor choice

The industry now has a handful of public cloud vendors to choose from, all of whom have a relatively similar set of basic services on offer. This presents a problem for cloud vendors in that their primary product is really a commodity that can be differentiated only on price. There's nothing proprietary built in to the basic cloud infrastructure as a service (IaaS) model. The vendors' response to this conundrum is to offer an ever-expanding variety of proprietary, differentiating services. While many of these services are quite attractive and can lead to enormous cost savings and enhanced developer productivity, their use creates a strong affinity for, or dependency on, a single provider. If this is a conscious choice made rationally and intentionally then it may very well be appropriate. However, our observation is that the entanglement with a single cloud provider usually happens incrementally and unconsciously.

> *"By the time a customer realises they no longer have a choice of cloud providers it's too costly and time-consuming to port their most critical assets to another vendor."*

If you're building a core system that you're going to have to maintain for 20 years, you have to understand the relationship you're entering into. Do you really want to put all your eggs in that one basket? Or put structures in place that lower the risk of having to move the asset to a different vendor some place down the road? You're going to pay now to build in the portability necessary, or pay later to re-platform, which almost never goes well.

Multi-cloud strategies can also benefit the business by providing access to a particular vendor's strengths, or better pricing arrangements. At the same time, as many firms have discovered, juggling or switching between multiple vendors can significantly complicate the many challenges of cloud deployment and management.

"Don't put half your e-commerce system on one platform and half on another based only on the notion that you might get mad at a cloud provider and walk away. Engineering leaders tell us all the time they spent millions of dollars and hours to be portable and never left - and now they look back and see it as a waste." says Ranbir Chwala, Principle Infrastructure Consultant

Worldwide IaaS Public Cloud Services Market Share
Souce: Gartner

Company	2017 Market Share %	2018 Market Share %
Amazon	49.4	47.8
Microsoft	12.7	15.5
Alibaba	5.3	7.7
Google	3.3	4.0
IBM	1.9	1.8
Others	27.4	23.2

Your delivery platform requires a different organization

Nearly 50 years ago, [Melvin Conway](#) wrote that "organizations which design systems … are constrained to produce designs which are copies of the communication structures of these organizations". Now known as Conway's Law, this insight dictates how we should allocate responsibility to increase our application delivery capability, and the role that cloud and PaaS offerings play.

Siloed functional teams... … leading to siloed application architecture (Conway's Law)
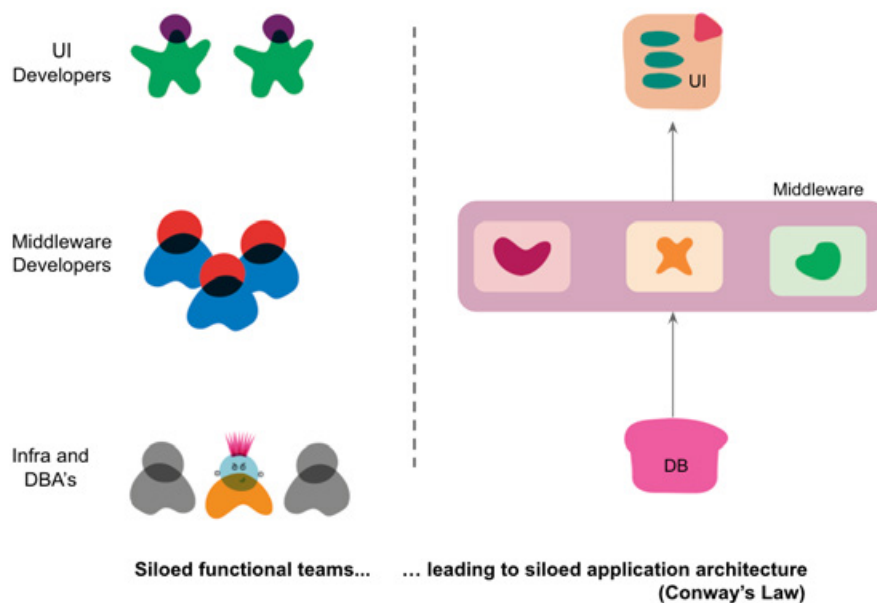
If you want to leverage the benefits of the cloud, you need to embrace some key principles
- DevOps as an organisational change
- Autonomous cross-functional teams
- Loosely Coupled Architecture

The primary reason so many organizations find it challenging to embrace these principles is due to their rigid communication structure as predicted by Melvin Conway 50 years ago, for e.g., the ticketing system used for infrastructure provisioning.

We've had clients spend millions on a major cloud investment or buy API-driven, cloud native software, and then put a whole team and tickets in front of access to those systems. All of a sudden all those benefits of innovation, of immediate accessibility, of experimentation are gone.
In the past, once an application was delivered it was handed over to an operations group, which would have ways of escalating incidents, and it wasn't until the very end that the team responsible for maintaining that application might get involved. Development teams had been taught to focus on on-time and on-budget delivery, which they often did at the expense of stability and maintainability, because they knew they wouldn't be measured

on the latter, never mind held accountable. Operations teams, on the other hand, were measured on stability and cost of operations, which made them uncomfortable with any new release and led them to introduce complicated formal processes, resulting in less collaboration and long cycle times.
Time to Market is the key that requires a flexible and easy to change Architecture which eventually promotes autonomous cross functional teams. The demand for faster cycle time would require adding operations skills to development teams so they understand how to build software and support it.

Needless to say, any attempt to embrace these principles requires a C-level buy-in that drives the benefits within the organization.

Cloud is not just about optimizing cost but more about speed and resilience

Business leaders should be aware of the changes cloud can bring to operating cost models. The assumption is often that cloud will generate savings by reducing the expenses associated with maintaining (and constantly expanding) on-premise infrastructure, but the reality is more complex. What's more, excessive focus on costs may blind companies to cloud's more compelling opportunities.

"Cloud delivers primary value as an accelerator, not as a cost savings engine," says Ryan Murray (Director of Digital Platform Strategy, ThoughtWorks). "Many enterprises will see rising costs unless it's carefully managed - some due to lack of oversight and some due to seizing delivery acceleration opportunities that use more resources than would have been available on-premise. But given that the cloud provides such a wide range of utility services, talking about ROI on a cloud investment is a bit like trying to calculate ROI on your electricity investment."

Forrester wrote about these tradeoffs in a report called [Faster Software Delivery Will Accelerate Digital Transformation](#), starting with the advice to "go fast or go home." The authors point out that "application delivery capability has now become the essential enabler of an organization's digital business strategy".

Forrester's analysis is backed up with top-line business results. For the past few years, Puppet Labs has used surveys backed with statistical analysis to look for correlations between application delivery approaches and various technology and business results. Their [2015 State of Devops Report](#) showed that "high-performing IT organizations deploy 30x more frequently with 200x shorter lead times; they have 60x fewer failures and recover 168x faster".

That's a stark contrast to McKinsey's popular [two-speed IT](#) advice that you have to choose between speed and stability. The Puppet Labs report found no statistical significance to differences in results between greenfield systems of engagement and back-end systems of record (including COTS

packages), further challenging McKinsey's assumptions. The [previous year's report](#) showed even more eye-opening top-line business correlations: "firms with high-performing IT organizations were twice as likely to exceed their profitability, market share, and productivity goals". This reinforces the results seen in the effective-IT quadrants of the Alignment Trap, but provides additional insights into the tradeoffs we make to get there.

Based on such data and its own analysis, [Forrester recommends abandoning the idea of two-speed IT](#). It argues that DevOps, combined with loosely coupled architectures and cross-functional organizational structures, are the keys for improving both the speed and quality of delivery. These are the building blocks of a solid execution engine for innovation. These are the principles of your delivery platform.

Cross functional teams...   **... cohesive loosed coupled architecture by business capabilities**
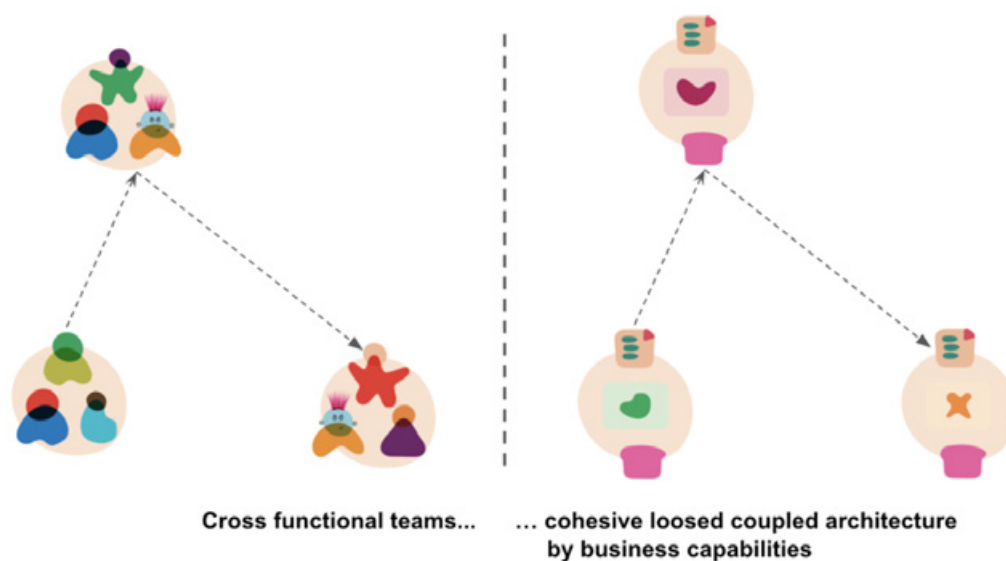
Far too many organizations focus on cost optimizations, which ensures low IT effectiveness despite their best efforts. Business and technology leaders need to start by optimizing for speed and quality first, and cost second, if they want to improve the performance of technology. Lost opportunity costs you more than increased unit costs of delivery activities. This simple tradeoff has important implications on how we define our cloud strategy in our delivery platform.

Enabling Techniques and Technologies

While organizational changes are extremely important, it's important to note that a number of breakthroughs in technology and software engineering techniques should go hand-in-hand with the organizational changes.
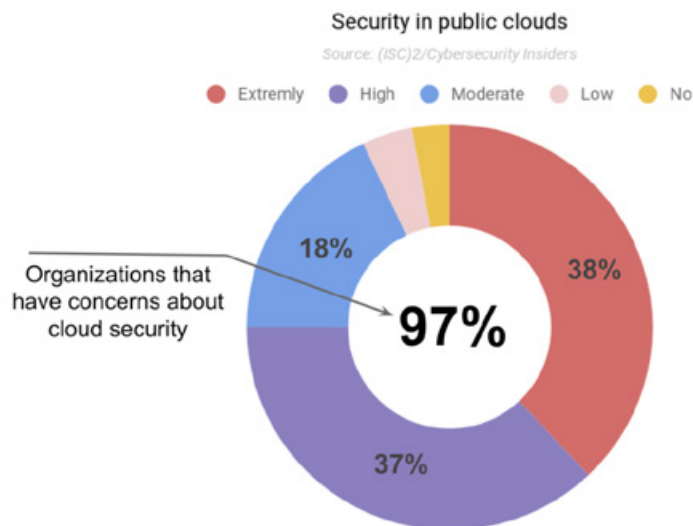
The practices collected in eXtreme Programming, most notably test-driven development (TDD) and continuous integration (CI), gave development teams the necessary boost in confidence to release software more frequently and, because of the absence of unpredictable merges, made the process more reliable.

Service-Oriented Architectures (SOA), later refined by the concept of microservices, provide independent evolvability. With such an architecture the small, cross-functional teams described above can each work independently on their part of the overall IT landscape. Techniques such as consumer-driven-contract testing and micro-frontends often allow teams to release services into production without testing them in an integration environment first. In fact, for organizations that release software many times a day, it's simply not possible to run extensive integration tests in a pre-production environment.

When developers and operations people started working closely together, the developers brought more automation with them. Rather than configuring servers manually, they saw infrastructure as code. Scripts that can set up the entire deployment infrastructure, including software-defined networking, are managed just like the source code of the services running on them. Rebuilding the infrastructure is treated in the same way as releasing a new version of a service, and it can be done with the same speed and reliability.

Learn to look at "Security" differently

The cloud also necessitates new security practices - though perhaps not in the way business leaders expect. Research shows security vulnerabilities remain by far the biggest concern for companies contemplating a cloud transition, particularly when it comes to the public cloud (that is, cloud services provided by third-party vendors via the public internet). Most fears center on possible data loss and breaches of confidentiality. Enterprise security in the cloud is fundamentally different from traditional perimeter-based security through firewalls and zoning, and it demands a journey toward zero trust architecture.

Security in public clouds
Source: (ISC)2/Cybersecurity Insiders

● Extremly   ● High   ● Moderate   ● Low   ● No

Organizations that have concerns about cloud security

18%
38%
97%
37%

Either baking in traditional security people with developers or uplifting security capabilities within development is an important ingredient. In the old world of hardware and large monolithic assets, it was considered more secure to throttle change with toll gates and security reviews under the assumption that your existing site was secure and any change might introduce a vulnerability. "In the cloud-native world, the faster you can move, the more secure you are" says Scott Shaw, Director of Technology at ThoughtWorks. The assumption is that you're fundamentally vulnerable all the time and an attacker may have already gained access. By continually renewing and rebuilding your hosting environments, you're always returning to a safe state and able to quickly roll out patches when vulnerabilities are discovered.

The way to respond is organizational education, delivery teams structure and making sure operating models get updated for the speed of delivery and tooling cloud provides. You should never look at the cloud as a risk to security - only an opportunity.

Gear up for more change - for the better

As cloud vendors push the envelope with newer innovations, opportunities for business will multiply.

After the coronavirus pandemic has passed, businesses are almost certain to face further upheaval. It is critical to have a successful cloud strategy to move towards value creation and support the gains in resilience, speed and performance that enterprises need to stay ahead. And, remember, cloud is strategic; do not just outsource it!

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Recommended Reading

Macro Trends In tech Industry 2020
https://www.thoughtworks.com/insights/blog/macro-trends-tech-industry-may-2020

Path to DevOps
https://www.thoughtworks.com/insights/articles/path-devops

The traits of serverless architecture
https://www.thoughtworks.com/insights/blog/traits-serverless-architecture

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