A **DARK MATTER** FILM

CLOUDED

UNCOVERING THE CULTURE OF CLOUD

IN ASSOCIATION WITH

Hewlett Packard Enterprise | vmware

INTRODUCTION

In the last two years, our Dark Matter research team has been on a journey of discovery into the culture of cloud.

The public cloud trend undoubtedly encouraged an obsession with 'cloud' and achieving a 'public cloud-first' strategy.

Yet despite the rush to the cloud and the promise of its many benefits, why are so many organisations still caught in an unplanned state of flux between on-premises, public cloud, and the edge?

Has the shine worn off? A 2022 report by the IDC suggests that organisations are starting to move more of their workloads to on-premises infrastructure – from 29% of workloads in February 2021 to 35% just 6 months later.[1]

With cloud repatriation becoming another emerging trend, it seems that the tide is turning. Hybrid and multi-cloud strategies are increasingly being adopted to accommodate today's transformation challenges.

Our journey of discovery has uncovered some of the uncomfortable truths in cloud culture, the things that people perhaps think but do not say.

We've captured our findings in a feature-length documentary film in collaboration with Hewlett Packard Enterprise and VMware®. Through a series of comprehensive interviews, we gathered an extensive variety of insights from technologists, regulators, and cloud specialists. While the subject of cloud is certainly divided, there is one point almost all agree – there is no "one size fits all."

This is the story of what we learnt from the people that freely offered their time and opinions.

THE EVOLUTION OF CLOUD

To truly understand the cloud landscape today, we must first look at how it all began.

The commercial adoption of the Internet in the 1990s accelerated demand for e-commerce sites and a more efficient use of hardware resources that could scale to the demands of direct customer engagement. VMware began in 1998 with its Workstation product introducing the concept of the Virtual Desktop. Virtualisation in the organisational context was effectively the beginning of software-defined infrastructure and private cloud services with the ability to provision virtual machines, storage and virtual networking relatively quickly.

As early as 1999, Salesforce.com were leading the way for Software-as-a-Service, however a big player was about to disrupt the market.

In the early 2000s, Amazon.com was experiencing rapid expansion and growth of its e-commerce services and recognised the need to avoid continuously re-inventing the wheel by defining a standard set of APIs ("an operating system for the Internet") for external developers to consume. This became AWS (Amazon Web Services) in 2004. The first services that we would now recognise as public cloud infrastructure emerged in 2006 with the launch of Amazon Elastic Cloud Compute (EC2), Simple Queue Service (SQS) and Simple Storage Service (S3).

Surprisingly, it was another two years before competitors responded to Amazon's first move into cloud computing.

The introduction of 'public cloud' initially incited inertia and uncertainty. Even in the first half of the 2010s, many companies were sceptical about public cloud citing security concerns and a lack of maturity. However, the digital transformation boom increased the focus on agility and time to market, and with it on-demand cloud services. Before long, like all adoption curves, this fear gave way to mass adoption and the race was on to implement a 'public cloud-first' strategy.

Francesco Bonfiglio, CEO of GAIA-X, a federated cloud movement in Europe shared how many perceived cloud adoption as the need to become public cloud-first.

"Everybody was pushed to bring their data to this public cloud – this concept of a fluffy something up in the air, somewhere else. This seemed to be an interesting idea and some companies, outside of Europe, adopted it very quickly. There was a big hype in the beginning, everybody was moving to the public cloud."

Public cloud became fashionable – a trend that everyone aspired to adopt because everybody is doing it.

Scott Robertson, Cloud Architect at the Co-Operative Group said it was like 'joining a queue and not knowing why you're there.'

"Everyone is doing it, why are they doing it? What's it doing? What's it getting them? You have to take a step back as opposed to just jumping in. Why have you joined the queue? You don't really know."

Perpetuating an already confusing landscape, is the term 'cloud' itself, a point that was raised repeatedly in interviews. 'Cloud' is used interchangeably to describe different things and can mean different things to different people. The technologists, regulators, and academics we spoke with used 'cloud' interchangeably.

The National Institute of Standards and Technology (NIST) defines 'cloud computing' as 'a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.'

NIST defines 'public cloud' as one of four deployment models alongside community cloud, hybrid cloud, and private cloud. The exponential rise of public cloud and the domination of the market by a small number of players has led to an equivalence between the term "cloud" and what NIST defines as "public cloud", overshadowing the existence of other deployment models.

The distinction between these has, in some cases, led to organisations finding themselves caught in-between strategies, platforms, operating models and funding paths.

When Scott Robertson was asked for his thoughts about 'cloud' as a universal term, he replied:

"It's shocking and I hate it and it's in my job title, Principal Cloud Architect. We've got different folk who have different opinions of what that word means, right? For the majority, you think it's like a ubiquitous fluffy thing that's not tangible. And I think it probably was ten years ago. I mean, this is obviously where it all started, that kind of commodity compute services, of AWS. That's what sort of kicked all this off.

"So, whereas ten years ago, cloud was the thing, the infrastructure that those providers were giving to you, for me it's morphed into how you use that. So, automation delivery is code software definitions of stuff, right? All of that was born about because the likes of AWS and Microsoft have abstracted the tin, the wires, and the physicality of traditional infrastructure away from you as an end user. They've taken care of that.

They operated it, they maintain it and they deliver that to you as a service. Right? So, for me, cloud is that it's consumption and delivery of stuff as a service. And it's that definition of the 'service' that I think people are struggling with right now."

We asked Joe Baguley, Vice President, and CTO EMEA at VMware for his views:

"The cloud has become almost a meaningless word now in our industry. If I go back to when we were doing cloud camp back in 2007, when we were first starting, a lot of the arguments were about what is cloud, what isn't cloud, what should be cloud.

NIST comes out with a definition of cloud and everyone sort of clamours around that. But ultimately, it's become just an interchangeable word for something to do with computers that my phone and my laptop talk to. And the problem is now people are trying to do nuanced definitions of cloud. It's always been the fight around private cloud, hybrid cloud, public cloud, the continual misuse of on-premises, off-premises or whatever people want to do."

The definition of cloud is 'clouded'. With little ubiquity, it simply adds to the complexities and realities of public cloud and cloud-first ambitions.

However, the tide is turning. It seems that many organisations, whether their intention was to be 'public cloud first' or not, have found themselves in a hybrid state. For some, hybrid was a planned and carefully considered choice but for many it was not, and they have become 'unconsciously hybrid.'

Early migrations to the public cloud often involved a 'lift and shift' approach and were predominantly focused on shifting the easier workloads.

Russell Macdonald, Chief Technologist at Hewlett Packard Enterprise discussed the need to consider legacy migrations,

> Nobody would bet their entire IT Strategy based on the results from migrating the easiest workloads to cloud. What you really need to understand is what happens when we get to those gnarly sticky legacy high performance workloads that our core business is running on. How easy is it going to be to migrate those things?

Scott Robertson, Cloud Architect at Co-Operative group also shared his views on lift and shift migration,

> If you've got a compelling reason to shut your data centres down and you want to exit out, you lift and shift, it's the quickest way of doing it. But you're moving an application that was architected to run on on-premises infrastructure with a certain set of constraints, the public cloud doesn't naturally have those same constraints.

But you're taking a non-cloud native app and you're running it in a cloud platform. That comes with a cost overhead, so you re-engineer it. Well, if it's a compelling application like your e-commerce app, you might want to re-engineer it because that's your IP, right? There's value in doing so. It's specific to you.

If it's your ERP app, do you put that on public cloud? Well, if you do that with no engineering or change to the way that you operate and do stuff, it will be guaranteed more expensive because you can't make use of those other bells and whistles that the cloud provider gives you with its features and its functions. If you're not making use of the elasticity, then it will be more expensive.

Francesco Bonfiglio, CEO at GAIA-X went on to say,

> Why? Because we have too much legacy applications and data, and simply we cannot just move everything on the public cloud. It will not work anymore. So, what do we need? We need hybrid cloud. So, we need to combine on-premises, private cloud, and public cloud. And we can't adopt a single public cloud solution because we're going to get into another lock in and we cannot afford that. So, we need hybrid multi-cloud.

Many of our interviewees discussed the appeal of the hyperscalers being one of abundance – elasticity and scalability is certainly a draw for organisations keen to innovate. This abundance has changed the way we engage with technology, the cloud in particular. Many believe, if it's there and it's available, why not use it – with little concern or thought as to whether it's the most appropriate thing to do.

Kirk Bresniker, Hewlett Packard Enterprise Fellow, and Director at Hewlett Packard Labs, shared his views on this,

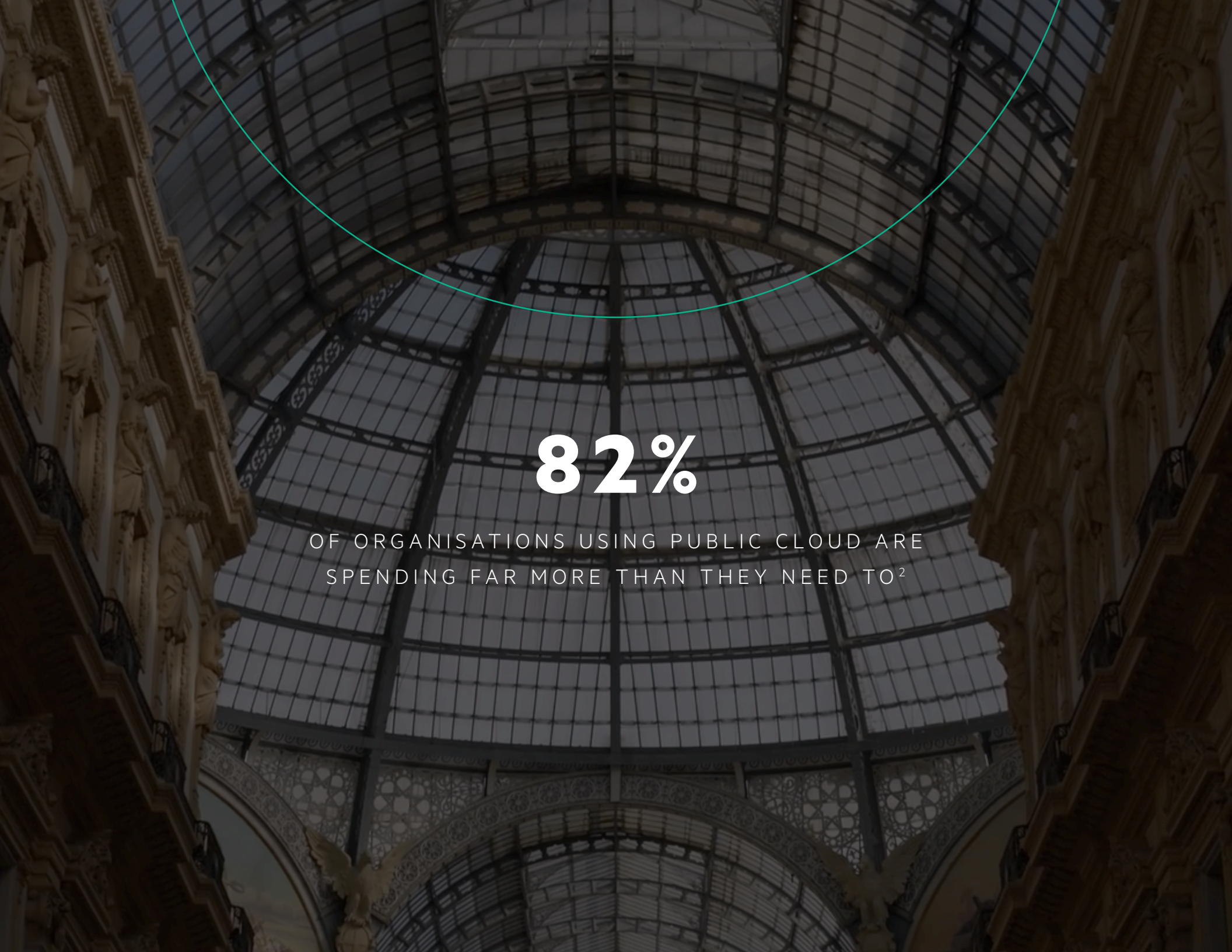
"We think of the efficiency of the hyperscale - we think it's so easy to push a button, to swipe a card. And here's all these computational resources and I can devour APIs. I can create applications super-fast, and then I can spin them up, I can spin them down.

I know I can do it rapidly but am I doing it as efficiently as I could back in the day when I had to go through more rigour, when I had to go and jump through more hoops, when I had to engineer.

We've taken the meter and we've slammed it all the way over to agile. It is so easy to express a thought and get infrastructure back quickly and easily. But you wonder, if I had designed a purpose-built system, how much more efficient would it have been? How fewer bytes would cross the network?

How fewer servers would have been spun up and spun down and how few cycles would there have been if I was back in the old days when I had a limit on my resources. So suddenly something becomes free, relatively free; it becomes abundant, and I use it abundantly. That makes economic sense. If something is scarce, I want to use it judiciously.

Well, now all these resources are abundant, and we just have to wonder, do we actually have the full understanding of the ramifications of consuming these resources abundantly and will we find out in a couple of years, turns out, we should have been a little bit more rigorous, a little bit more judicious in how we've used these resources, because there was an unintended consequence. We didn't realise they were leaving so much efficiency on the table. And we will come back and say, what were we thinking?"



82%

OF ORGANISATIONS USING PUBLIC CLOUD ARE SPENDING FAR MORE THAN THEY NEED TO[2]

CLOUD ECONOMICS

The topic of abundance also comes in to play when discussing cost because there is a cost implication to over-indulgence. Organisations were quick to rubber stamp their cloud strategy because they believed they would benefit from the agility and cost savings that the public cloud purportedly provided. However, the more individuals we spoke to that were actually architecting cloud infrastructures, the more it became clear that often isn't the case and cost savings is not clear cut and cost management is not easy.

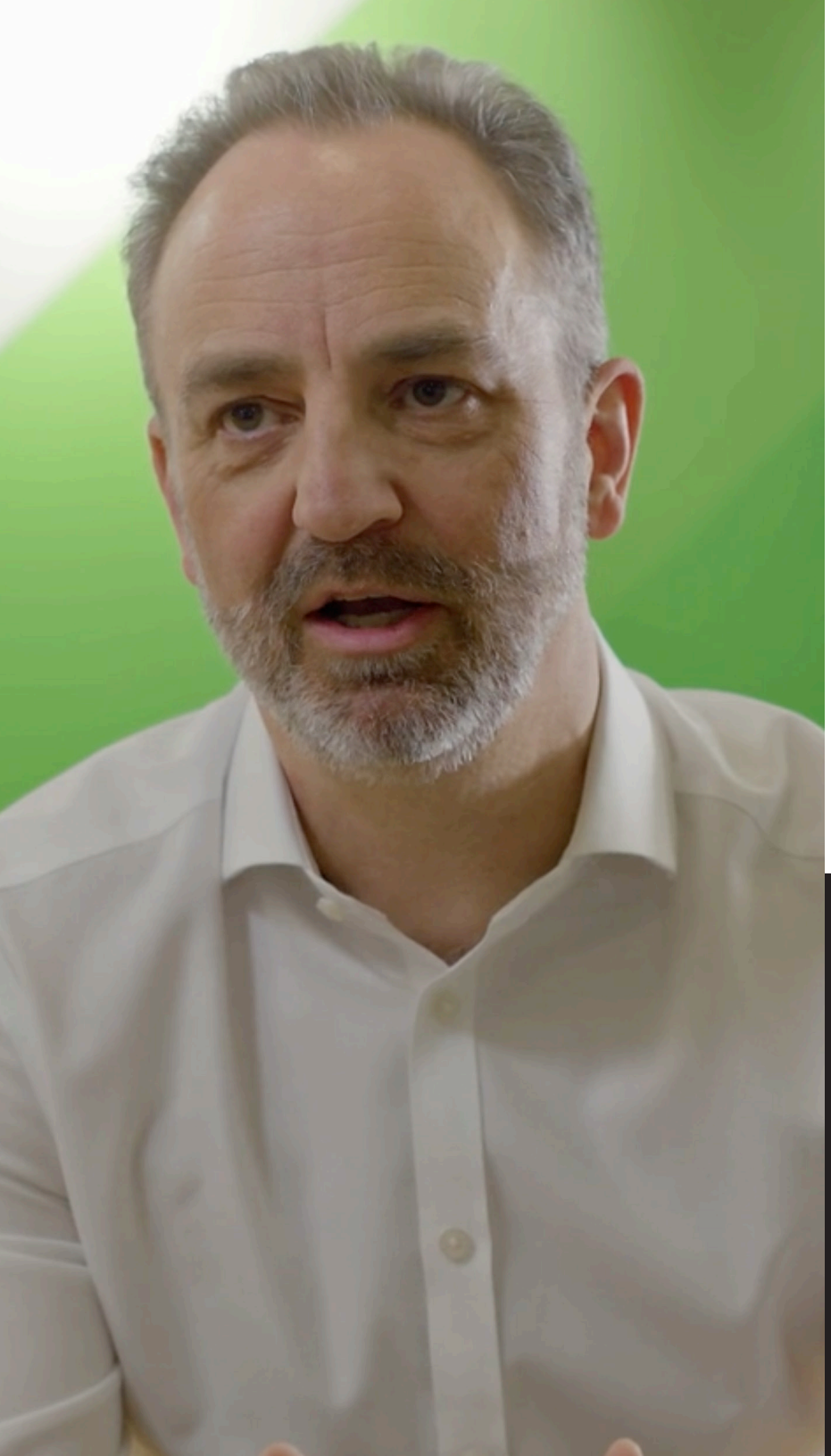
The complexity of public cloud cost management has seen a huge growth in the discipline of cloud economics which, simply put, is the study of cloud computing's costs and benefits and the economic principles that underpin them. As a subject, it looks at the total cost of ownership of public cloud and return on investment.

Cloud economists believe that 'bill shock' and unexpected cloud costs are a result of not considering public cloud holistically, being lured in by 'free' on-boarding and the ability to pay for only what you use. However, if you don't forecast ongoing run costs and organic business growth, costs can easily spiral.

There are many factors that contribute to cloud economics, that are repeatedly being overlooked. Perhaps surprisingly, more often than not, it's down to human behaviour. Cognitive and professional biases, for example, can significantly impact decision-making, and these biases often supersede logical, rational thinking.

The success bias is just one example. Bill Roth, Cloud Economist at VMware discussed this.

> "It all comes down to the basic biases in behavioural economics. A lot of people have a success bias. They think they're going to be more successful than they're going to, and we've seen that countless times. When people are doing migration to the cloud, they will think they can get all thousand workloads over to the cloud in a year. They tend to come back to us after about a year, and they've only got about 10% of that done because they haven't really looked at what was the cost of migration."



Joe Baguley echoed this,

> I've lost count over the last ten plus years of the number of senior IT leaders I've set up that said we're going to have 50% of our workloads in the public cloud within the next two years. I've not seen anyone do it.

Thomas Maurer, Hybrid Cloud Evangelist at Microsoft believes we are all prone to emotions when it comes to decision-making,

> I think that's what we all forget. We get all hooked up in emotions a lot. We have a vision and it's hard for people to change their opinion or their mind and agree that they might have been wrong on this.

We have also found that public cloud ambitions are often just that – ambitious. Influenced by the trend, the 'public cloud hype', organisations often assumed that cost savings were inevitable. Just how disparate are the perceived cost savings and the realities?

Blesson Varghese, Professor of Edge Computing at St Andrews University

> It might be the case that there are certain players in the industry who have now realised that making use of the cloud in itself is not a cheap option. It's a viable option. But it's not necessarily a cheap option.

Corey Quinn, an AWS Cloud Economist at DuckBill Group went on to say,

> Because it used to be that you would call a vendor, you would get a quote, you would be able to get that in writing and you'd prepay for things. Now, it's after the fact usage-based billing. And suddenly, whether you want to admit this or not, every engineer you have with access to a cloud account is able to incur cost. We are all procurement now, whether we know it or not.

This ease of spinning up cloud instances across the organisation can be detrimental without the right governance in place. Thomas Maurer, Hybrid Cloud Evangelist at Microsoft discusses his experience with cost implications at Microsoft.

> You basically have all these capabilities you get from the cloud, and you put these capabilities on the fingertips of every developer and IT person out there.

They can spin up new virtual machines, new services in seconds, right? So, for example, if you go up and you spin up one of our large and serious virtual machines, with hundreds of cores and a terabyte of memory, you can do that, and it will drain your credit card within seconds. So, you need to be careful, and you need to make sure that you have governance in place to keep your cost management on a certain level.

Dr Luc Julia refers to himself a former 'pro-cloud guy' – having run several start-ups when the public cloud was first introduced, he attests to a turbulent relationship with costs.

"So, at the very beginning of the of the cloud, all the billing and all the actual cost of the cloud wasn't very, very clear. And I remember, when I made the switch with one of my companies that we were having, you know, the cloud ourselves. And then we decided to move to the cloud. I mean, it was all very nice at the beginning because there is no maintenance. But we realised that the cost was actually beginning to get more and more because we were putting everything there.

It was so easy. So, there is definitely a realisation point, that it's not free. It looks cheap, very cheap, when you have a bill with only a fraction of a cent for storage or sending data. But when you see the full charge list at the end of the month, you see that it's actually costing a lot."

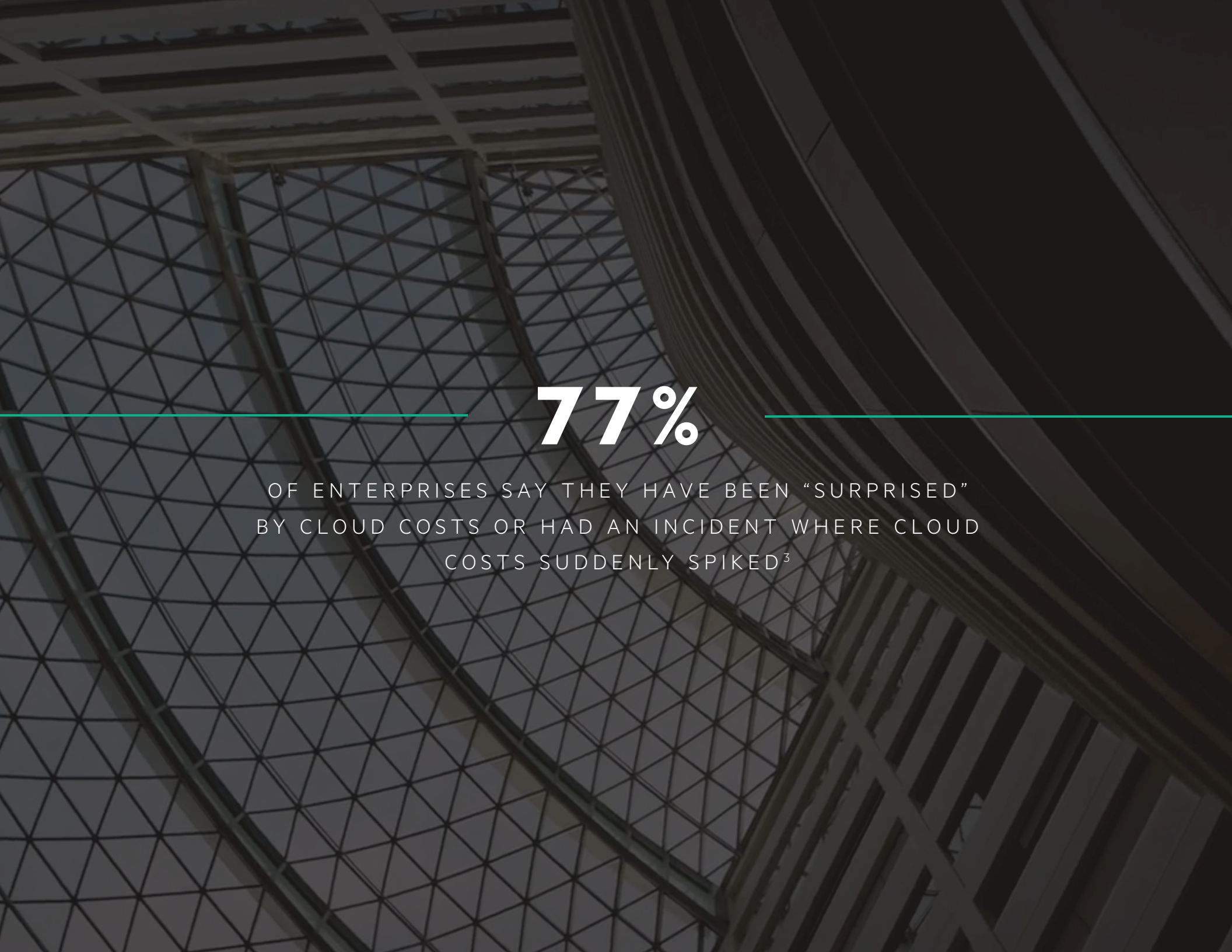
With cost management a significant challenge associated with the public cloud, Cloud Economist, Bill Roth shared how organisations can forecast costs – namely, being considered and mindful of the workloads that are suitable for a public cloud environment.

"I think you have to have a really good sense of what your workloads are. I agree that the turn it on, turn it off functionality, it's easy. You can migrate. It's easy. There's a number of fallacies sort of built into that. When you look at most enterprise class workloads, what you see is about 80% of them are on all the time. And so, if you buy at the tier where you can turn it on and turn it off, you're actually spending way too much money.

Now that runs at odds with the way that the cloud is being sold. They're telling you, turn it on, turn it off, you look at it, you see, for example, a particular type of VM cost $0.08 an hour. Well, that seems like hardly anything unless you leave it running for three years and then it becomes a decent amount of money.

There are some that believe that the cloud pricing isn't transparent enough. I think it's a difference between a white box and a black box. Black box you can't see in. It's sort of opaque. I don't think that's where we are with cloud pricing. We have a white noise generator. When you look at the average bill, the average cloud bill, it is this array of there are over 200 services just on Amazon and they're each going to have several line items on your bill every month.

So, the issue is one of complexity, not necessarily of transparency."



77%

OF ENTERPRISES SAY THEY HAVE BEEN “SURPRISED” BY CLOUD COSTS OR HAD AN INCIDENT WHERE CLOUD COSTS SUDDENLY SPIKED[3]

Cloud Economist Corey Quinn believes that there are multiple points at which the reality of cost becomes apparent.

> There are a couple of inflection points. One of the most obvious is right around $1,000,000 a year in spend when a company is now hitting that point and their account manager reaches out, "Hey, you're spending $1,000,000 a year. Would you like to commit to a longer-term contract with us in return for some discounts?" We're spending what?!

We've heard many a metaphor for the world's obsession with public cloud but one that was referenced on numerous occasions was one of 'crackware' and 'addiction'.

Bill Roth shared his view,

> You get locked into that easy on and off, and then after a while it becomes runaway costs, and that's where it costs. That's where IT cost management is having a field day because people have started small, but there's been organic growth and in that organic growth was a trap of all of the costs.
>
> In many ways, the entry level, and the way that the hyperscalers are asking us to get into the cloud, is like crackware, where first it is free or almost free. And then as they become addicted, you have further downstream problems. You could have an entire, I don't know, cloud anonymous. You know, you could have meetings. Hello, my name is. I have been three weeks since my last bad cloud decision.

RISING DATA, SOVEREIGNTY AND SECURITY

The data debate is one we are fascinated with and yet another key driver for our ongoing investigation into cloud technologies. There are many success stories of public cloud adoption, and they usually relate to the ability to scale, flex, and innovate quickly. All great benefits of course, but is anyone talking about, or even thinking about, the effect this could have on extracting national value from our data?

We've heard how data is the 'new oil'. How some countries' ambition is to mine it as a national asset. Yet, 90% of western data still resides in the US – seems contrary to the ambition? This is where data sovereignty becomes a cause for concern.

We explored the topic of data, data hoarding and sovereignty with our interviewees.

The consensus was that public cloud encourages innovation–architecting and testing with a fail-fast attitude – but this creates an abundance of data. Scalability being one of the public cloud's key selling points, organisations are falling into the habit of storing and hoarding all the data they create. There is an obsession with centralising.

Grant Challenger, Director of Edge Computing at VMware, said,

> "Because there's so much of it (data), it's often easier to just say, store it all. Someday we'll figure out if it's worth something or not."

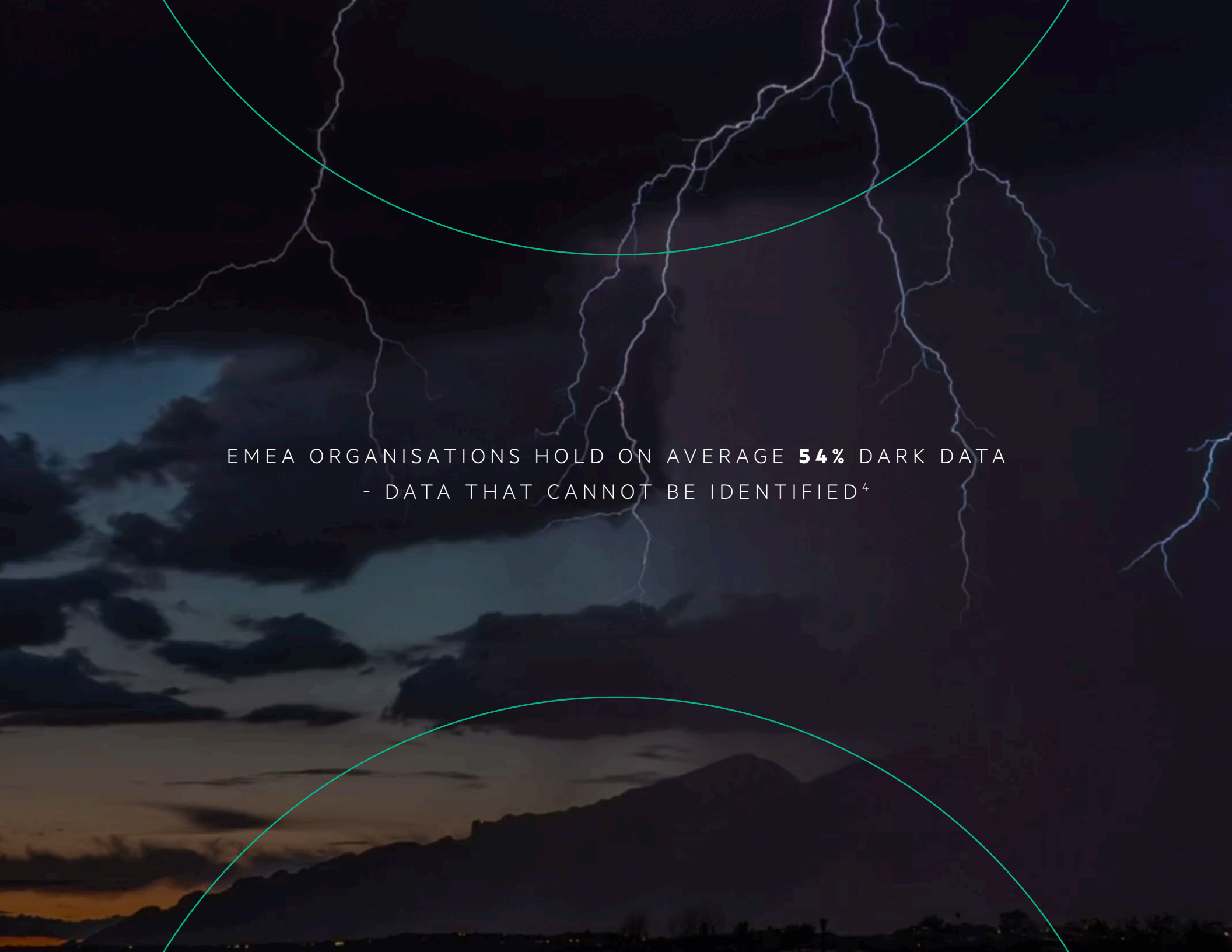
Corey Quinn, echoed this,

> We have companies that are effectively hoarding every scrap of data that they can get their paws on, and they say that this winds up benefiting them in different ways. And who knows? Maybe it does.
>
> But I know a lot more companies that figure, oh, the big hyperscale companies are doing it so we should do so too. They refuse to delete their load balancer access logs from 2012, for example, because as soon as they hire the right data science team, they're going to be able to crack that nut.

Grant Challenger, went on to say,

> I think again, the greater question is where's the value in this data? Some will say it's just all valuable because someday we'll figure out how to analyse it and it'll have purpose, right? I'm probably not one of those people. I fundamentally think that the data has value for a certain period of time, and then whatever that data is, will be reproduced somehow and we'll have new ways of analysing it.
>
> So, the question of is it accessible? Yeah. Can it be transmitted? Of course. Is it usable? I have my doubts on that.

This is becoming an increasingly prevalent issue when artificial intelligence is considered. The data that trains AI models is vital – if it is dated, ill-defined or categorised incorrectly, the intelligence AI can draw from it will be hampered.


EMEA ORGANISATIONS HOLD ON AVERAGE **54%** DARK DATA
- DATA THAT CANNOT BE IDENTIFIED[4]

Dr Luc Julia, shared the example of a credit card company utilising AI.

So, a very simple example is a credit card company that utilised AI to determine credit for clients. They used historical data, say 22 years old – they had these beautiful models, but after just a few weeks of operation they realised that the AI was giving women half of the credit of men. It doesn't make any sense in today's society. Right?

I mean, same age, same revenue, same everything. The only difference was the gender. Right? Why? Because, historically, this is what happened in the fifties, sixties and so on. So, the model was right. But the model was wrong for today's society, right? So, we need to be very careful because there is a bias in the data.

So, with all this hoarding of data, in the last decade, the volume of data across the globe has dramatically increased. We moved from a scarcity of data, a spike in the 1990s with the advent of the internet, to today, where 2.5 million terabytes of data are created every day.

Surely, the 'cloud', public cloud, cannot sustain the exponential growth in data?

Kirk Bresniker, HPE Fellow and Director at Hewlett Packard Labs believes the fragility of cloud infrastructure must be considered and talked about more openly.

Is the data going to outpace the growth of infrastructure? I think we are there now.

You know, our anticipation is that we will continue to double the total human information recorded, the amount we actually try and save, will continue to double every other year. Every other year we create as much new information as humanity has ever recorded. And so, we are already outstripping that.

According to Synergy Group there is forecast to be 1,200 hyperscale data centres across the world by 2026. Of this, a huge proportion is set to be owned by the United States. The US currently accounts for almost 40% of operational hyperscale data centres and half of all worldwide capacity.

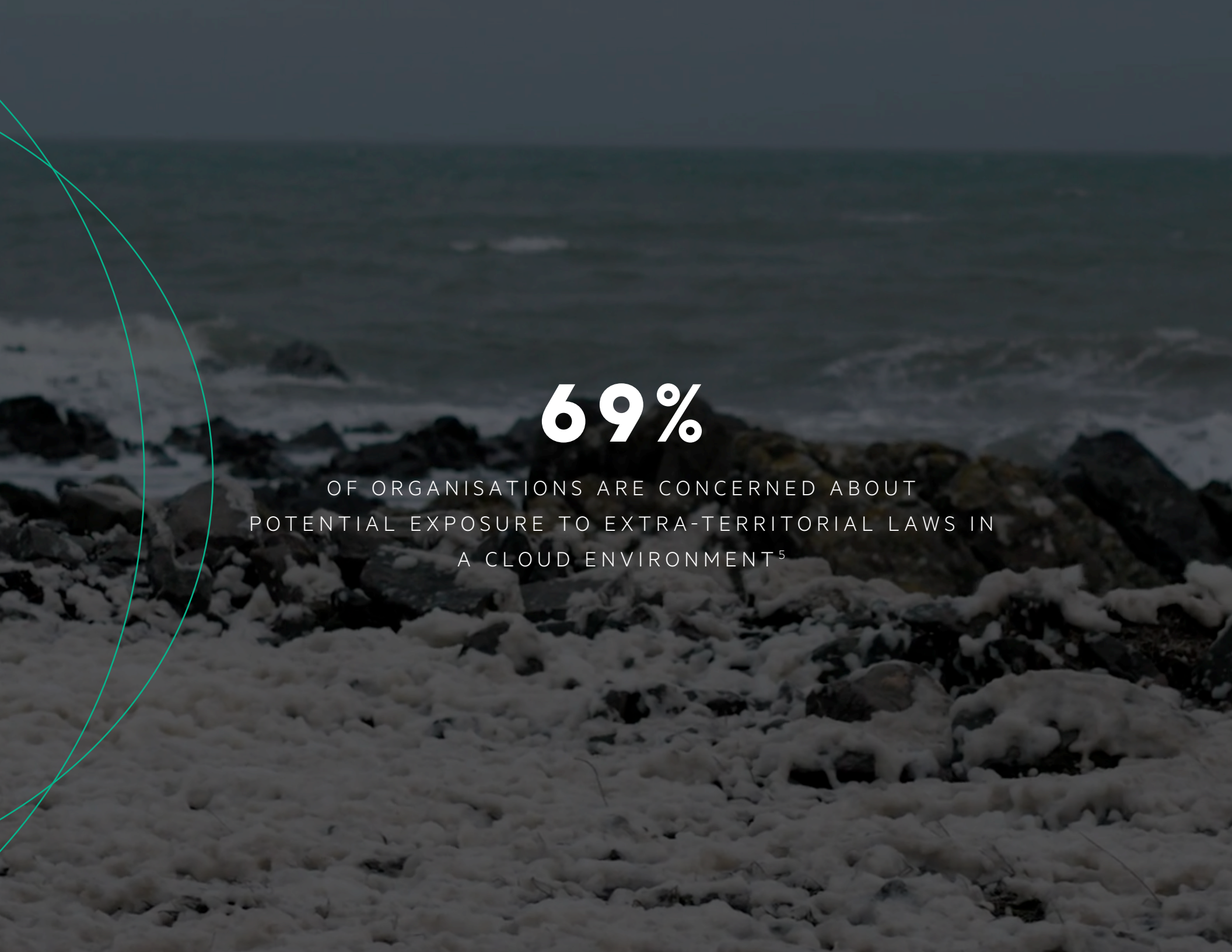
This spike in data centre footprint is in direct correlation with the amount of data that organisations are storing.

Corey Quinn, who specialises in helping enterprise organisations optimise their AWS spend, believes it is a topic that we should be openly talking about:

> When people ask, do you think that there is systemic risk in having so much of the world's computing infrastructure dependent upon one or a very small number of providers? My response is generally a barely politer version of 'Welcome to the Conversation'. It absolutely is a concern. It's something that has been a slow creeping worry in the back of folk's head for a long time. There's been a significant reluctance to articulate that in many more professional environments, just because it's easy to come off as an anti-cloud conspiracy theorist.
>
> The only thing stopping Amazon from slapping another zero on at the end of all of their prices is their own internal philosophy. There's remarkably little stopping them in an absolutist sense if the company decides that is what's best for them.

Organisations must be aware the risks of vendor concentration to their business. Over-reliance on a single provider can lead to being locked-in, and power ultimately shifting to the provider, not the customer.

It is important to recognise also that global infrastructure is not infinite. Perhaps nothing is but it's time to bring the discussion of physical limitations and dependencies to the table.



69%

OF ORGANISATIONS ARE CONCERNED ABOUT POTENTIAL EXPOSURE TO EXTRA-TERRITORIAL LAWS IN A CLOUD ENVIRONMENT[5]

Dr Luc Julia acknowledges this as a global issue,

> So, if there is an issue today, it could be a cable across the Atlantic being cut or whatever. This is bad because we basically put all our eggs in the same basket, right? Which is one of those big three. At the same time, this is very practical, of course. But if there is an issue, this is a global issue. So, it becomes very, very, bad.

The interdependencies of services and the cloud can cause a ripple effect, should there be an outage. We have become so reliant on cloud infrastructure; the effects could be detrimental.

> You cannot believe how business critical or like critical for the world even, I would say, these cloud vendors are today, right? How many businesses rely on them and would not work if it went out. Think about even critical things like healthcare. Right. They would still run probably for days. But a lot of important things are now done in the cloud.

Said Thomas Maurer, Hybrid Cloud Evangelist at Microsoft.

So, if our obsession with data and the cloud continues, it has become obvious that we are going to face a different set of challenges. Who owns it, who controls it, and ultimately who can monetise it? Public cloud has become an exception to geopolitical barriers. We are regularly hearing differing views on where data should live, who has it, or who has access to it.

The data sovereignty debate isn't just about governance and compliance - it's also about the opportunity to derive value from our national data. Governments across the world are talking more and more seriously about this, and there is a growing nervousness about missing out in the new data economy.

Data sovereignty, much like cloud, is a term that is often confused. It is the concept that information that has been converted and stored in binary digital form, is subject to the laws, jurisdictions, and regulations of the country in which it is located. Many feel it is political, arguably, it is.

Joe Baguley, CTO EMEA at VMware shared his definition of sovereignty and how that applies to data,

So, sovereignty is a word that again is becoming like cloud, and edge and heavily overused in our industry. And I think people are misconstruing what is actually meant by it. And there's misconceptions around data, location and data sovereignty and cloud sovereignty. When people talk about sovereignty, it's really about a maintenance of control.

If I have sovereignty over my data, I should have the ability to control it and understand who's got it, understand where it's being used, understand who has rights to see it. And know that there's controls in place of anyone being able to see it.

So, you know, handing your data off to any old cloud, you've got no sovereignty over it because you've got no idea what it's going to be. But what I want to know is if I can say, OK, I'm going to go into this engagement in the public cloud, but I know I'm going to have sovereignty over my data and I know exactly who's going to have access to it, where it's going to be stored you know, what it's going to be used for and how it's going to be destroyed.

And if anyone asks to look at it, whether a law enforcement agency or whatever, then I'm going to be told very in no uncertain terms that that's happening. That's what people are looking for when they look at sort of data sovereignty. Cloud sovereignty is even more sovereign cloud. Typically, this is around a particular jurisdiction.

So, within a nation within a regulatory area such as the European Union or whatever you see or whatever it is.

And with that, that's really more about meeting the needs and regulations of a particular environment. So, saying, OK, fine, we need to make sure that if we do use the cloud, it's a sovereign cloud. Why Will? Because we're under German law. So, we need a German data centre run by German employees you know, owned by a German company, managed entirely. So, there's no way that some foreign agency can come in and have access to my data by some weird overacting law that they they've deployed because it happens to be, you know, for example, an American company that's operating that data centre, for example, which is a typical thing that people are a bit worried about.

So, with sovereignty, you need to define what you're talking about. We're talking about data. Are we talking about physical access? Are we talking about logical access to virtual access? Are we talking about who has rights to see my data, who has rights to see my activity? It's a big mess, to be honest.

Francesco Bonfiglio, a man with a sovereign mission, is extremely passionate about the topic. CEO of GAIA-X, a European movement to promote federated cloud. He believes,

“Data sovereignty is an abused word. Sovereignty is a political concept. We need to understand that our social life, our political life, our natural and industrial ecosystems are all dependent on technology. It’s easy to understand that there is no political sovereignty without digital sovereignty. This translates into technology autonomy, there is no economy without technology autonomy. There needs to be an understanding that from a political, an industrial and increasingly a social point of view, we have to regain control of our data through controllable technologies, controllable data infrastructure. This is something we unfortunately do not have today.”

As we advance into a post-COVID, post-Brexit landscape, there is opportunity in data and insight, so unlocking the power of both Europe and the UK’s data is more important than ever. Simon Hansford, CEO, UK Cloud discussed this,

“It comes down to not only the physical proximity of data, but it’s the legal frameworks that we should be in control of, because we’re not in control of that. How can we map out our destiny and control that destiny where data becomes a critical national asset it becomes the foundation of the currency in the same way as oil is a currency, gold is a currency. Data is or certainly will become that all important national asset.”

“So, there’s a very well-respected think tank, and they have estimated that 92% of all data in the Western world is actually stored in the U.S. not by U.S. companies, but actually physically located in the US. So, 92% of data in the U.S.? Yeah, I think that’s concerning yes.”

Russell Macdonald, Chief Technologist at Hewlett Packard Enterprise echoed this,

> The benefits are clear, undeniable. But how do we consume that in a way that doesn't compromise our national sovereignty? And also, with the data economy, data has value. We've seen in the UK; we've gone from being a manufacturing power to being a services culture to financial services. And now, data has a lot of value, but clearly a lot of that data is controlled by companies that are outside of our shores.
>
> So, then what is the future of the economy of this country and how do we maximise those kind of sovereign data assets?
>
> Do we need some kind of legislation? How do individual countries balance their need for control or regulation versus the global capabilities that such things enable?

Thomas Maurer, Chief Evangelist Azure Hybrid at Microsoft believes that this responsibility sits with governments,

> I believe that governments should have some sort of oversight board or something that looks at things like who is doing what? So, they can determine the risk a little bit and manage that? And I'm sure they're doing that on some levels.

GAIA-X believes this is the era of distributed, federated cloud. The organisation is developing a data infrastructure based on the European values of openness, transparency, and trust. The idea is to develop a networked system that links many cloud services providers together, housed within the EU to encourage a sovereign, trusted infrastructure. The GAIA-X movement is born from the uncertainty around Europe's deep dependency on a small but powerful handful of public cloud providers.

Francesco Bonfiglio, CEO, shared,

"Yes, we have the GDPR. Yes, we have a lot of regulations. The European Commission is extremely active in developing new acts and new regulations. But let's be honest, from 2017 to 2020, the market of cloud tripled in Europe, and the market share of European cloud service providers is less than 10%. The market share of non-European cloud service providers, despite the declaration of European Commission, despite all the awareness, for example the census from the Court of Justice called Schrems II that basically declared that we cannot use American platforms, which is a very strong statement. Despite all of this, there are no European players increasing their market share.

So, what that means is that the market follows just one very blunt rule, which is the rule of competition. Until there is a real alternative to those technologies, we will still be hostage of technologies that are not trusted as we want. Technologies that are not controllable and interoperable as we want.

Legislation or regulation alone will not fix it. We need to have regulations implemented in technology and technology that applies to existing data platforms to increase trust. That's exactly our intent and the project we are running at GAIA-X."

We spent time with Nirvana Farhadi, an expert in RegTech, to understand how regulators have responded to data sovereignty concerns. Nirvana believes that all too often decision-making becomes politically and economically motivated.

“It’s sometimes a bit like the Eurovision Song Contest where one country outbids the other country and gives nil points to the other one, and I’m not going to name names, but it is very much motivation of, you know, what can we do to get more out of it?

I don’t think that there’s going to come a day where we’re all going to sit around a campfire and sing Kumbaya and everyone’s going to want world peace, and it’s all going to be OK.

It’s not going to happen, unfortunately, because everybody is very much vested in their own gains, whether it’s a country, whether it’s an organisation, it’s about what they can gain out of it.

So that’s a very challenging thing.”

Corey Quinn believes there is a “collective delusion going on about the idea of data sovereignty and that data must live in data centres within the borders of our country. Great. It’s still run by a company that is a US-based company.”

Scott Robertson, a cloud architect at Co-Op Group, shared his perception of the laws which govern data located in the USA, including the Patriot Act and the Stored Communications Act,

“The Ts and Cs of American companies is always a little bit vague. You know, all stuff that I’ve seen, which says that actually wherever it’s hosted, if it’s on our platform, it’s American data, we can still have a look right. I’m not aware of any occurrences of them doing that.”

Thomas Maurer, Hybrid Cloud Evangelist at Microsoft shared his experience with data sovereignty and how Microsoft addresses any concerns with publicly accessible 'Law Enforcement Request Reports' to offer transparency over data usage:

"[To access the data] they need to request to Microsoft to say, OK, well, this is the status, we have a customer there. I want to have access to that data. It's stored in a European location. Give us that.

We make these things public. We actually show the numbers of requests we have. And then we also have the numbers of those that are not a request, which we're not just going to do. We also release the numbers where we say, that's the amount of requests we got, that's how many we actually blocked and that's the amount we gave in because there are certain cases where it makes sense, right?

It's a very, very tough place to be for everyone. Because again, we are always now talking about, we are the good guys, right? We are like, hey, we have our company data, we have organisation data, we have health, all that good stuff.

But there are people out there who are doing bad things. And so, I understand that there needs to be some sort of thing and that's basically for legal to battle out."

For many it is believed, hybrid cloud, or distributed cloud, is the only way to achieve some sort of data sovereignty. The environment for critical data or customer data should be carefully considered.

Kirk Bresniker, Director and Fellow and Hewlett Packard Labs, says,

"I think you'll find a new sweet spot, hopefully one that is a much more egalitarian, open and democratised environment. One where you don't just have a couple of key players that have specific collections of resources. It'll actually be a much more broad economic development and enabling environment. I think that's where we're headed."

Blesson Varghese, Professor of Edge Computing at St Andrews University believes localised computing is a necessity.

"The future of the cloud itself and the future of humans who rely on that sort of a digital infrastructure, is something that people have been debating a lot about. Now, I don't believe that we will be able to roll back in time and find a completely new alternative to the cloud. The cloud will stay as the backbone to our economy, to our economies.

They do run certain applications in a fantastic way that we will not be able to replace. But what will the future of the cloud look like? I believe what we're going to see is more localised digital computing infrastructure emerge, there'll be more computing that'll be done locally. And this is primarily because of necessity.

So, for example, if you take a look at some of the laws around data protection, the laws of the land. The laws of the land in the country that I live in would be radically different from, let's say, another country so to protect the citizens of a country, it would be absolutely essential that we process data that adhere to the laws of the land where I produce my data. And for this it naturally means that localised processing, localised compute has to emerge."

THE EDGE AND HYBRID CLOUD ERA

It's clear that future technology strategies need to consider a broad spectrum of questions. With much of the world's technology infrastructure reliant on 'public cloud', is it wise to let the trends and behaviours of the last decade continue unchallenged with so much more than just individual businesses' consequences at stake?

Many believe this is the era of hybrid cloud – having learnt from the decade of the public cloud hype. If this is to be the case, why aren't more people adopting it?

Thomas Maurer, Hybrid Cloud Evangelist, shared his perspective on the way in which cloud vendors traditionally encouraged a cloud-first approach, may be impacting the perception of hybrid strategies.

"So, when customers have concerns about hybrid, that's mainly about, "Hey, is this just a way for you to make me move to the cloud or is it actually an honest thing to bring the value from the cloud to my on-premises environment?". When you look at how cloud vendors spoke to customers over the last decade or so, you might have a good point of asking that question.

But again, we are very serious about bringing all that down and we really like to acknowledge that this is not just to get you into the cloud or make you migrate everything to the cloud, but really drive your business value."

Joe Baguley, EMEA CTO at VMware, believes that hybrid is a default state for almost all organisations, whether they acknowledge it or not.

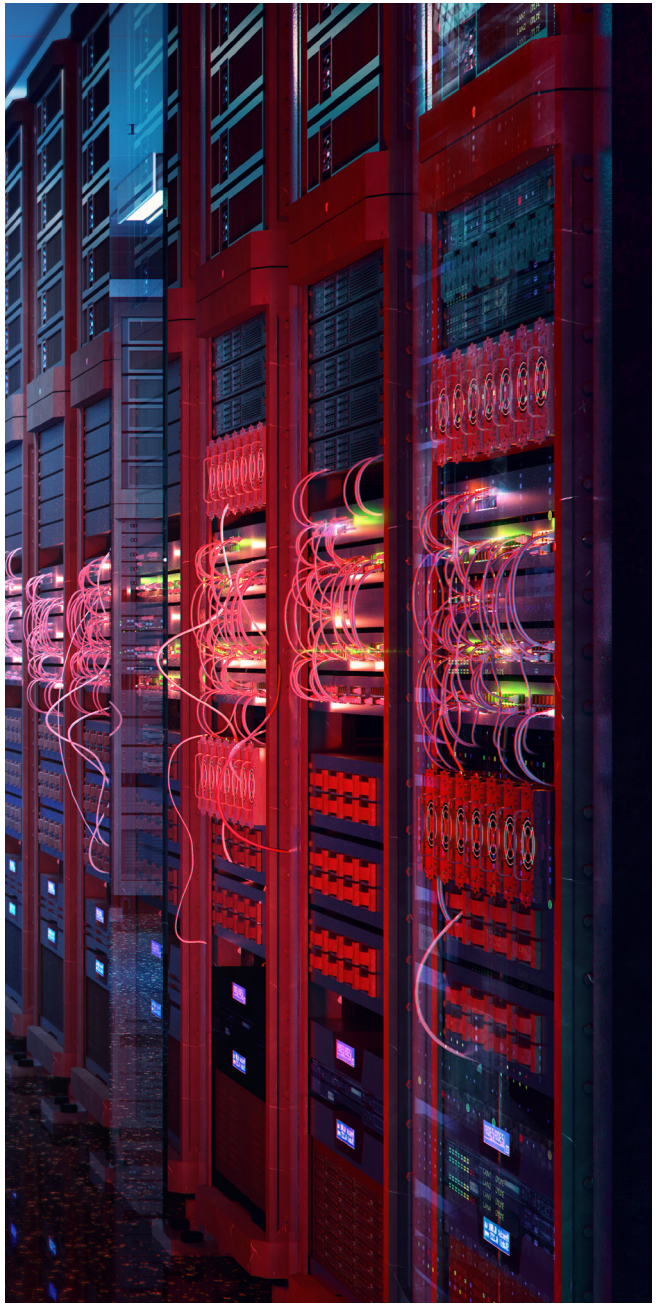
> Hybrid cloud is more than a legitimate strategy. It's a default. Most organisations you talk to are already in a hybrid state. They've got some stuff on-premises. They've got some stuff in a cloud, public cloud, co-lo, whatever it is. They have stuff that they are running and that they control, and they've got stuff running on stuff that they don't control.
>
> I think the next step to that is being consciously aware that you have to have a solid, multi-cloud strategy with what you're doing. Understand that hybrid isn't in two places – on-premises and off-premises – with two providers-you and someone else. It's the fact that your future status is multi-hybrid or multi-cloud, as we call it. It's where you understand that you are going to be doing not only stuff on-premises, but also, you're going to be doing things with multiple providers.

Bill Roth, Cloud Economist from VMware echoes this.

> People are still going to have critical assets on-premises in their own data centres. They will push the workloads that are useful into the cloud. So, hybrid is going to be with us for a very, very long time.

Thomas Maurer, Hybrid Cloud Evangelist at Microsoft believes hybrid is an inevitability,

> Cloud is not in the future just going to be these big cloud vendors data centre locations. Cloud really will extend from the cloud vendors data centres to the data centre of the customers and even their edge locations. So, we will see this hybrid scenario evolve even more.



Whilst some organisations are actively pursuing a hybrid cloud strategy, many have found themselves in an unplanned state of flux between public cloud, the edge and on-premises infrastructure. Cloud-first ambitions have been superseded by the reality of workloads and data not fit for the environment.

Scott Robertson, a Cloud Architect at the Co-Op group shared his approach to hybrid.

"We're not hybrid yet. We know we need to be, or we think we need to be. How do we justify that and how do we operate like that? So, we've done the public cloud thing – we've dipped our toes in. We've got a couple of ways that we are consuming and delivering services in the public cloud. And then we've got the traditional IT – which should live in traditional way.

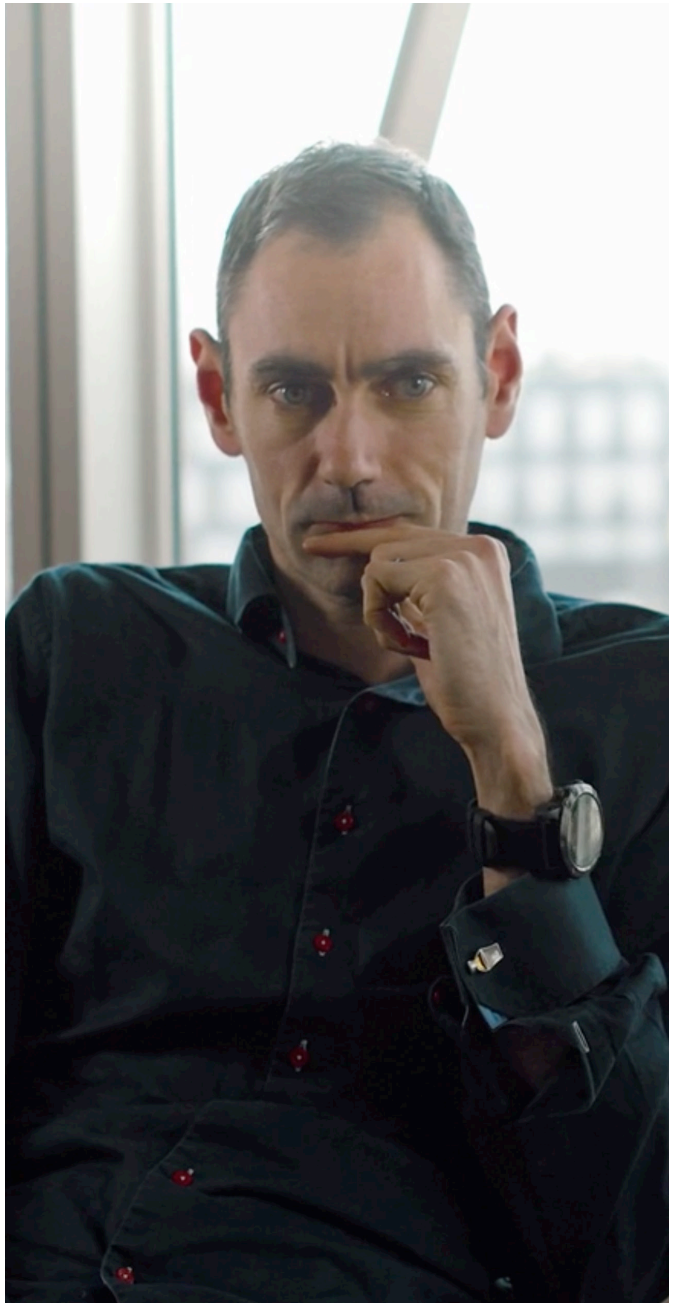
Now we've got two ways of working, with two different toolsets and different processes and almost two different sets of people. They're not two different sets of people, but there's almost this schizophrenic line down the middle.

You've got your traditional folk again who are doing things in the way they've always done it and then you've got all these new people over here who are challenging the traditional folk. There's tension between people in this skill set.

Then you've got a bunch of enterprise folk who are now wondering how their skills are relevant in this new world and how to make themselves relevant. I think this is where the hybrid cloud conversation comes in. It's not a hosting location. It's a set of skills, it's a mindset, it's a set of processes. It's how you do what you do, right?

You achieve the same outcome. You're just doing it in a slightly different way."

Many believe this is the decade of hybrid cloud. Dr Luc Julia, CSO at Renault Group – having learnt from the mistake of the public cloud-first decade – describes it as an opportunity to create distributed clouds that are fit for purpose.



Francesco Bonfiglio of GAIA-X is passionate about the need for a federated cloud citing a dialysis machine as an example of a use case not fit for public cloud. When there is a requirement for real-time data at the edge, public cloud becomes illogical.

“The new era of the cloud is the biggest disruption after the Internet and that is the real distributed, federated cloud era. In this new era, of course, the cloud must be hybrid. Of course, we’re going to have different types of cloud.

There must be a new paradigm of bringing the compute to the data. This is another very innovative element that technologists know very well. So, the compute data is the new paradigm. The distributed cloud is the new paradigm. The hybrid is natural.”

This is echoed by Microsoft in which Thomas Maurer said,

“We really speak now about this concept of the distributed cloud. We understand customers want to reduce dependencies, right? We want to make sure that we don’t rely on one single point of failure in the whole system. I’m not just talking about technology, but in general in the whole system, that even if something goes down, you can still do your work and that is what customers want, right?

Customers are risk aware. They want to have something which has less dependencies as possible when it’s critical.”

If the decade of hybrid and distributed cloud is inevitable, we wanted to explore the likely benefits and efficiencies that organisations would experience.

Kirk Bresniker, HPE Fellow and Director at HP believes,

> The benefits of hybrid to the enterprise are solving economics, physics, and law with precision. We're no longer in the era where we can afford. "Oh, well, it's pretty good. It's good enough." Now, we are at this point where, to remain competitive, or to lean into sustainability, to lean into equitably, into security and to privacy, we need precise solutions. We can no longer afford that sort of general purpose. For me, hybrid means the opportunity to fine tune, to gain precision in a solution.

The distributed nature of a hybrid strategy lends itself to edge cases – moving the compute towards the data. Edge as a concept is nothing new but its criticality can be articulated when leveraged as part of a hybrid approach.

Joe Baguley describes this,

> I think edge is a term that's being used out there to make architects, application developers, you name it, anyone involved in IT, understand that the future of applications is actually as it's always been, highly distributed.
>
> And once you get that and you realise it's not all about putting it in one cloud, it's about putting it in multiple clouds and then putting multiple elements across multiple physical locations. Then you realise that it's a huge distribution.

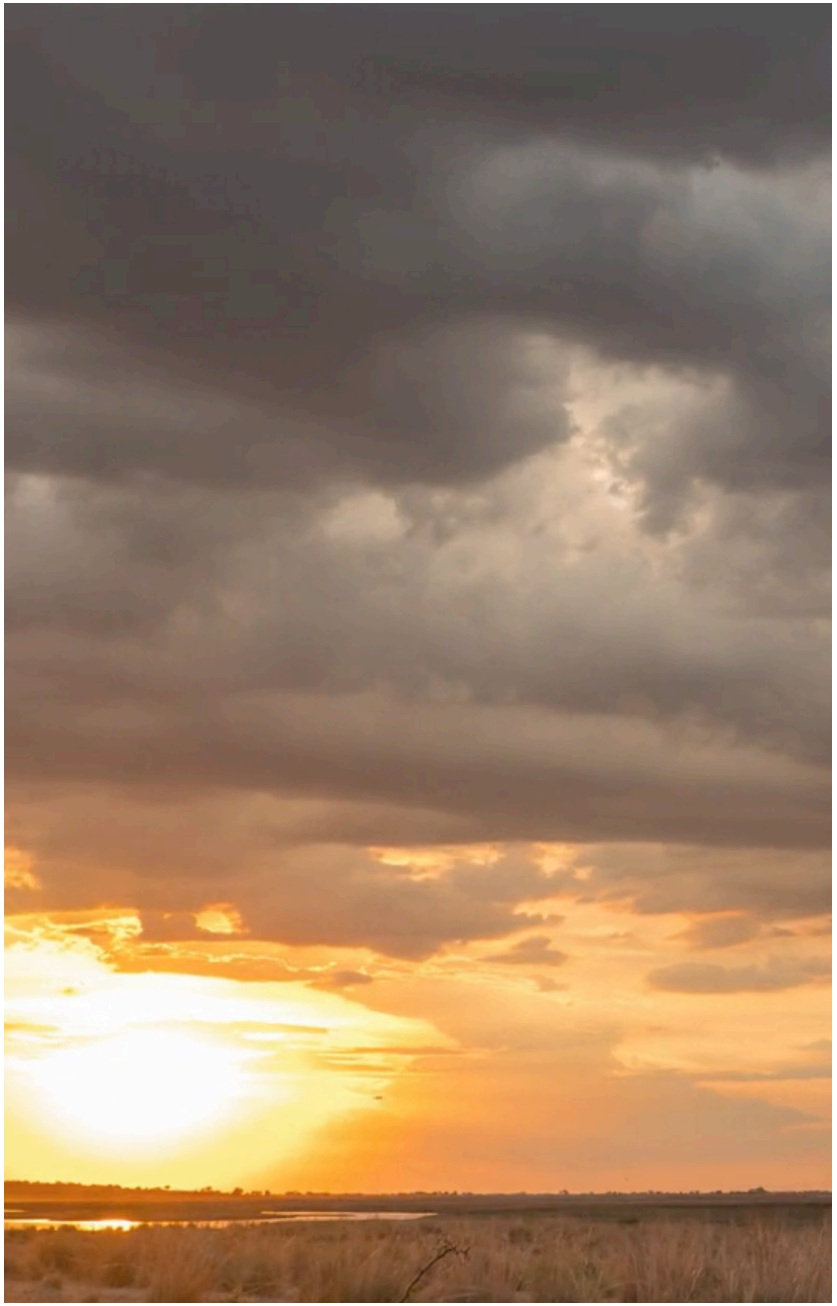
Grant Challenger, Director of Edge Computing at VMware describes how this can be achieved,

“You don’t necessarily need to be monolithically in the cloud. There are lots of physical things out there today, and they run on proprietary systems. They can run on commodity hardware and smart software, and as a result of that, actually be more performant and produce better outcomes. But how do you do that?

Well, you take the concepts of cloud, like cloud native development, the ease and scale of that, but you bring it down to edge computing. You bring it down to that eight-core box or that single processor server that can now run like a cloud but really it is a very small compute environment - collecting your data, analysing your data, producing an outcome, and in a real time environment. Our view of it is that those applications that are currently stuck in the cloud need to transform down to the edge.”

Kirk Bresniker, HPE Fellow and Director at Hewlett Packard Labs believes the edge is all about insight and value.

“The edge presents us with that opportunity, that opportunity to gain insight from more information to reason over more information, to gain those deep insights in a time that matters, and then turn those insights into action, because action no longer is just one line on a dashboard inside of the network operations centre, it’s applications pulled out to millions, perhaps even billions of individuals through their mobile devices and through intelligent, social infrastructure.”



CONSCIOUS CLOUD DECISION-MAKING

To succeed in the hybrid cloud era, a shift in mindset and culture is required. Organisations and technologists alike should critically review their cloud strategies and dispel cognitive biases and the subjectivity of the public cloud-first approach. Almost all our interviewees agreed that conscious, mindful decision-making is the only path.

Scott Robertson, Cloud Architect at the Co-Operative Group acknowledged the exponential rate of change and evolution in technology. The future can be hard to define, but no plan is worse than an outdated one.

> “You know, we’ve been through probably the most volatile two years in terms of, you know, upsetting things that we’ve seen. That’s not going to stop anytime soon. Right. All I can do is base my decision on the facts that I have right now today with the full consequence of I’m sure they’re going to change tomorrow.”

Corey Quinn shared how it is vital technologists understand their workloads, critically assessing whether the public cloud is the right environment for each application. If it’s not, it doesn’t make sense to migrate:

> “When you’re formulating a cloud strategy, there are a few things to bear in mind. Having done an awful lot of them. I can safely say that you can take cost off the table. You will not save money on a cloud migration all in on anything approaching a less than five-year horizon. So, send it out of your mind.”

“The reason to go to the cloud is the capability story that enables you to move faster in a whole bunch of different ways. Now, if you have a steady state workload, that hasn't meaningfully changed for the last 20 years, well, why do you want to move that to cloud? Because remember, we're taking cost off the table is there any benefit to increasing how nimble that workload is? Perhaps not.

Understand why you're doing the thing that you're doing, and then work backwards from there. What is the outcome you're chasing? OK, is cloud the right way to go there? Yes, that is a path. Is it the only path? No. Is it the best path? That depends on you.”

Corey Quinn, AWS Cloud Economist at Duckbill Group

Even the hyperscalers' message is evolving, having listened to the market and the viability of a hybrid approach. Thomas Maurer of Microsoft shared how cloud-first doesn't have to mean the utilisation of hyperscale cloud–the definition is evolving.

“Cloud first doesn't mean that it needs to be in one of the big hyperscalers, because what the big hyperscalers are saying is cloud now extends to everything. So, it's absolutely OK to make sure that everyone in the company gets that mindset, even though it's pretty tough. It can be very hard to convince people when they have a certain opinion, especially in cloud computing.”

CONCLUSION

One thing is clear there is no one size fits all, despite the hype promising that public cloud was the only answer. Our digital future, and perhaps even our civilisation, is in the hands of technologists. How they choose to architect platforms our businesses and our society is built on has never been so important.

After hundreds of conversations, the opportunity in hybrid cloud is evident and logical. It's also safe to say the cloud is no longer a destination and a public cloud-first strategy is a retired trend.

Cloud should be considered an experience, or a way to consume technology. A technology strategy should therefore still be based on the fundamentals of putting the right workloads, in the right place, for the right reason. This could be on-premises, private cloud, the edge, multi-cloud and/or the public cloud.

Even the hyperscale cloud providers are backing a more distributed hybrid world. Covering regulations, data sovereignty, the edge era and more, the Clouded film, aims to demystify the culture of 'cloud' and calls for mindful consideration. As a global community of technologists, now is the time to address this – Clouded is just the beginning.

Hewlett Packard Enterprise is a global technology leader focused on developing intelligent solutions that allow customers to capture, analyse, and act upon data seamlessly from edge to cloud. HPE enables customers to accelerate business outcomes by driving new ways of working, unlocking insights, and increasing operational efficiency.

LEARN MORE AT

consciouslyhybrid.com

1. https://www.idc.com/getdoc.jsp?containerId=US47961422
2. https://www.virtana.com/state-of-hybrid-cloud-and-finops-2021/
3. https://resources.couchbase.com/c/couchbase-cloud-database-report?x=KlgGqA
4. http://images.info.veritas.com/Web/Veritas/%7B364a7ca5-e05c-4fce-971b-88e18c62eafb%7D_45145_EMEA_Veritas_Strike_Report_Gulf.pdf
5. https://diginomica.com/cloud-sovereignty-growing-strategic-concern-says-capgemini

a00127370eew

Hewlett Packard Enterprise | vmware

A **DARK MATTER** FILM

CLOUDED

UNCOVERING THE CULTURE OF CLOUD

IN ASSOCIATION WITH

Hewlett Packard Enterprise | vmware®