

## CMA CLOUD SERVICES MARKET INVESTIGATION

## Google Cloud's response to the CMA's technical barriers working paper

## Introduction and Executive Summary

1. Google Cloud welcomes the opportunity to comment on the CMA's technical barriers working paper dated 6 June 2024 (the **Technical Barriers Working Paper**).
2. The Technical Barriers Working Paper sets out the CMA's initial analysis of the potential impact of technical barriers on public cloud customers' ability and incentive to switch and multi-cloud and whether they have an adverse effect on competition (**AEC**) between cloud service providers (**CSPs**). The CMA's findings include:
  - a. Customer feedback on the relative significance of any technical barriers is generally mixed. Whilst some customers consider that there can be meaningful challenges to switching and integrating multiple public clouds, other customers find that these can be worked around "*using third party tools or building custom solutions to connect services*" and experience "*minimal barriers to integration across multiple public clouds*";<sup>1</sup>
  - b. Cloud providers with significant market power and a larger existing share of supply do not have the same incentives as smaller players such as Google Cloud to support switching and multi-cloud;<sup>2</sup> and
  - c. Customers and other stakeholders consider that the use of Microsoft software (in particular its on-premises identity and access management (**IAM**) service, Active Directory, but also other Microsoft software and services) incentivises customers to also use, or even makes it "*unviable to deviate from*" using, Microsoft's "*Entra ID over competing [identity and access management] IAM services to manage their public cloud.*"<sup>3</sup>
3. As explained further below:

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<sup>1</sup> Technical Barriers Working Paper, paras. 4.13 to 4.14.

<sup>2</sup> Technical Barriers Working Paper, paras. 8.99 to 8.100.

<sup>3</sup> Technical Barriers Working Paper, paras. 6.50 to 6.53.

- a. **A degree of technical differentiation is inherent in cloud technology and Google Cloud is incentivised to do all it can to mitigate the effects of that differentiation on customers' ability to switch and multi-cloud (Section II).** Technical differentiation is the result of innovation which drives competition in this market and is an important differentiator (see [Section II.A](#) below). As a challenger cloud provider with a [5-10%] market share, Google Cloud is both incentivised and committed to promoting and fostering interoperability and an open cloud.<sup>4</sup> As a result, and as recognised by Ofcom,<sup>5</sup> Google Cloud has consistently promoted open standards and committed significant resources to building innovative tools that help customers overcome technical complexities and work flexibly across clouds (see [Section II.B](#) below). Many customers the CMA has spoken to also recognise this, noting in particular that Kubernetes, a container orchestration software that Google developed and released as open source, promotes workload mobility.<sup>6</sup>
- b. **Microsoft's artificial technical restrictions exacerbate the lock-in effects of its licensing practices and are the main technical barrier customers face (Section III).** We agree with the CMA's assessment that not all players have the same incentives to promote an open cloud and interoperability. We consider that a small subset of technical barriers are not the result of innovation but rather have been deliberately introduced or maintained with a view to impeding open cloud and interoperability. We consider that the restrictions Microsoft imposes to prevent competing IAM solutions from seamlessly integrating with Active Directory, its legacy on-premises IAM service which underpins a significant proportion of UK customers' existing workloads, to be the most harmful example of artificial technical barriers for which there is no justification (see [Section III.A](#)). These restrictions on Active Directory's interoperability with competing IAM solutions not only create a barrier to switching and multi-cloud between CSPs but, more significantly, impact on customers' initial choice of CSP at the point of migration from on premises to the cloud (see [Section III.B](#)). While we are generally able to find workarounds to most technical restrictions, Microsoft's artificial technical and licensing restrictions are the most significant barrier that customers face to switching or pursuing a multi-cloud strategy. We are therefore of the view that, at a minimum, Microsoft should be required to make technical changes to Active Directory and/or grant access to relevant documentation, APIs or source code, in order to ensure customers can migrate Microsoft-related workloads to their choice of cloud.
- c. **Google Cloud does not consider that other factors pose a meaningful barrier to switching and multi-cloud.** However, we recognise that the incentives of the two market leaders may not be fully aligned with those of customers and smaller CSPs ([Section IV](#)).

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<sup>4</sup> Google Cloud, Empowering customers and the ecosystem with an open cloud, 18 November 2020.

<sup>5</sup> Ofcom, Cloud services market study (final report) (**Ofcom Final Report**), para. 4.122.

<sup>6</sup> Technical Barriers Working Paper, paras. 8.68 to 8.71.

- I. **A degree of technical differentiation is inherent in cloud technology and Google Cloud is incentivised to do all it can to mitigate the effects of that differentiation on customers' ability to switch and multi-cloud**

*A. Technical differences are inherent in a market driven by innovation*

4. We consider most technical differentiation to be the natural result of innovation, which we believe is one of the hallmarks of effective competition in the cloud market and an important way for smaller CSPs to differentiate themselves from the two market leaders.<sup>7</sup>
5. The importance of innovation-driven differentiation is supported by feedback in the Jigsaw Report, which highlights widespread customer recognition that *“when you make things generic you lose some of the advantages of one cloud over another.”*<sup>8</sup> The CMA also acknowledges that any efforts to eliminate all technical differentiation, for example by setting industry standards, *“could impair innovation.”*<sup>9</sup> This is an important point when considering the proportionality of, and unintended distortions to market outcomes resulting from, any market-wide remedies in respect of technical differentiation.<sup>10</sup> This is especially the case in circumstances where (with some notable exceptions, such as IAM services) customers' views on the relative significance of technical barriers when considering switching or multi-clouding are, at best, mixed. As described further below at para. 10, importantly, cloud providers and customers can and do use and/or build workarounds to overcome most technical challenges that result from innovation-driven differentiation and complexity.

*B. An open cloud is at the heart of Google Cloud's strategy*

6. Google Cloud's business model and commercial strategy are underpinned by our incentives to promote and develop an open cloud in which customers can easily switch and/or use multiple providers. The widespread and growing use of Kubernetes, container orchestration software that Google Cloud developed and released as open source, is a prime example of how Google Cloud technology is helping customers to *“improve the portability of their workloads”, “manage workloads across [...] multi-cloud environment[s]”* and gain *“workload mobility across technology platforms.”*<sup>11</sup> Google Cloud also offers solutions such as Dataproc, which allows customers to run open source data analytics at scale, and TensorFlow, a free and open source software library for machine learning and AI tools.
7. Consistent with our open cloud ethos and our position as a challenger CSP, our overarching objective when supporting a customer that wants to either switch providers or adopt a multi-cloud strategy is for us to bear as much of the technical burden associated with doing so. We are deeply invested in making sure that our cloud infrastructure services are easy to use not only on a standalone basis but also in combination with services offered by other CSPs. As Ofcom

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<sup>7</sup> Competitive Landscape Working Paper, para. 2.49(c).

<sup>8</sup> CMA, Cloud Services Market Investigation, Qualitative Customer Research Report (**Jigsaw Report**) p. 60.

<sup>9</sup> Technical Barriers Working Paper, para. 9.44.

<sup>10</sup> CC3 (Revised), Guidelines for market investigations: Their role, procedures, assessment and remedies, (**CMA's Market Investigation Guidelines**), para. 352(a).

<sup>11</sup> Technical Barriers Working Paper, para. 8.71.

acknowledged in its Final Report, Google Cloud has continuously “*focused on designing services that encourage multi-cloud and hybrid-cloud environments.*”<sup>12</sup> In particular:

- a. **Google Cloud’s user-facing APIs are openly accessible to all.** Open APIs preserve the ability of customers and third parties to build on each other’s work and provide opportunities to improve software iteratively and collaboratively. As customers have told the CMA, the availability of open APIs “*make integration easier.*”<sup>13</sup> To this end, Google Cloud’s user-facing APIs (e.g., Cloud Build API) by default are open, well-documented and easily accessible so that developers can easily write against them.
- b. **Google Cloud supports a variety of open standards and protocols.** We believe that customers should be able to deploy their applications on different cloud environments while still having the ability to use a common development and operations approach. In this regard, open source and open standards are key enablers of an open cloud as they allow customers to use the same technologies irrespective of where they deploy. For example, BigLake, our multi-cloud data lake solution supports open table and file formats including Parquet, Avro, ORC, CSV, JSON. Our AlloyDB Enterprise Database product is fully PostgreSQL compatible allowing flexibility and true portability. In addition Cloud Run, our serverless container runtime platform, provides full workload portability since it is based on [Knative](#).
- c. **We promote and develop new open source technology to support interoperability on a continuous basis.** As recognised by Ofcom in its Final Report, Google Cloud is “*one of the biggest adopters and promoters of open-source technologies, having been responsible for first introducing Kubernetes*”,<sup>14</sup> which is now the industry standard in container portability and interoperability. Google Cloud is also the leading contributor to the Cloud Native Computing Foundation’s open source ecosystem.<sup>15</sup>
- d. **We work with customers to understand and address any potential barriers to multi-cloud.** We work extensively with our customers to develop customer-led solutions that minimise the impact of any technical differentiation when it comes to their switching and/or multi-cloud decision-making, including by:
  - i. **Providing access to technical engineering support.** Our customer engineers are involved from the very start of the migration, switching or multi-cloud process and assist customers in creating and executing on their plans. They also demonstrate technical features and find solutions to any potential roadblocks.
  - ii. **Offering documentary guidance for every step of the process.** Google Cloud’s [Migration to Google Cloud: Getting Started](#) guide helps businesses to

<sup>12</sup> Ofcom Final Report, para. 4.122.

<sup>13</sup> Technical Barriers Working Paper, para. 4.14.

<sup>14</sup> Ofcom Final Report, para. 4.122.

<sup>15</sup> See <https://www.fierce-network.com/telecom/google-dominates-code-contributions-across-cloud-native-computing-foundation-projects>

plan, design and implement the process of migrating workloads to Google Cloud and optimising their environment. We also publish a guide on [how to build hybrid and multi-cloud architectures](#).

- iii. **Providing specific tools to ensure that any transition is as seamless as possible.** As an example, our [Storage Transfer Service](#) allows new customers to transfer their data quickly and securely between storage locations spread across other public cloud platforms, private clouds and on-premises.
- iv. **Partnering with professional service providers.** Today, Google Cloud works with more than [50 different partners](#) that offer cloud migration support services and facilitate customer switching.

*C. Feedback suggests that while some customers experience friction when switching or multi-clouding, the wide range of mitigation tools available means that many others face minimal barriers*

- 8. As explained above, Google Cloud recognises that there is a degree of technical differentiation between services offered by different providers.
- 9. Whilst some customers have described potential challenges to switching,<sup>16</sup> other than in respect of IAM services (where they have raised consistent concerns, as set out in more detail below), their feedback is generally mixed. The feedback appears to reflect a more general recognition of the resources and challenges involved in any major IT change/transformation project, rather than specific technical barriers to switching that are unique to the cloud market. As outlined in the Technical Barriers Working Paper, there are various provider-led and customer-led mitigations available, such as Kubernetes,<sup>17</sup> which customers generally consider to be effective solutions for overcoming most technical difficulties.<sup>18</sup>
- 10. Customer feedback on multi-cloud also suggests that many are able to take full advantage of, and successfully benefit from these solutions. In particular, we note that customers that have adopted multi-cloud strategies experience “*minimal barriers to integration across multiple public clouds*” due to the availability of open APIs and other workarounds offered by providers.<sup>19</sup> Other customers told the CMA that “*although there are challenges, there are some workarounds such as using third party tools or building custom solutions to connect services.*”<sup>20</sup> This feedback is consistent with our experience of supporting customers to develop multi-cloud architectures, including in the ways we set out above.
- 11. For many customers these workarounds are relatively straightforward and worth pursuing to obtain the substantial benefits of multi-cloud, which include avoiding vendor lock-in, increased security and operational resilience, and improved access to innovation. We recognise that for

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<sup>16</sup> Technical Barriers Working Paper, paras. 4.24 to 4.39.

<sup>17</sup> Technical Barriers Working Paper, paras. 8.66 to 8.71.

<sup>18</sup> Technical Barriers Working Paper, paras. 8.68 to 8.71.

<sup>19</sup> Technical Barriers Working Paper, para. 4.14.

<sup>20</sup> Technical Barriers Working Paper, para. 4.13.

some customers the potential benefits of multi-cloud do not (yet) outweigh the additional technical effort required and that not all customers have identified a business case for an integrated multi-cloud set-up. However, we strongly believe that the key to a well-functioning cloud market is to ensure that those customers who do want to switch or multi-cloud, can do so free of any unnecessary, artificial barriers. Google Cloud is committed to continuously developing new tools that further reduce actual and perceived barriers to switching and multi-cloud, with the ultimate goal being to make open cloud a reality that is accessible to all.

## II. Microsoft’s artificial technical restrictions exacerbate the lock-in effects of its licensing practices and are the main technical barrier customers face

12. We agree with the CMA’s observation that IAM is an important consideration when adopting a multi-cloud architecture or switching between clouds. However, for the vast majority of UK traditional enterprises who are yet to complete their cloud migration journey (which makes up a significant share of the total addressable market for cloud services),<sup>21</sup> IAM is also an important consideration for their choice of cloud provider. As the CMA notes, customers who use public cloud typically use the chosen cloud provider’s own IAM service/tool for the main functions of an IAM service, namely identity authentication and access authorisation.<sup>22</sup>
13. As the CMA observes, players with market power, like Microsoft, may in some cases have different incentives to other smaller providers, which can impact how they approach technical design decisions for their products and services (e.g., whether to use open source code, make their APIs accessible or adopt commonly-used standards). In particular, the CMA notes that “cloud providers with [...] large shares of supply, may have more to lose from customers using multi-cloud architectures and switching, as this could over time erode their ability to sustain higher levels of profitability”.<sup>23</sup> We agree. Moreover, Microsoft not only has market power in cloud, it also has significant market power in on-premises software which, as recognised in the Licensing Working paper, includes Active Directory, as part of Windows Server.<sup>24</sup> Microsoft is therefore not only incentivised to design its products in a way to maintain its market power in cloud, but also to maintain and extend the market power it holds on-premises and across its software ecosystem, including Office 365.
14. While customer feedback on the relative significance of technical barriers when considering switching or multi-clouding is generally mixed, a number of customers have raised concerns that Microsoft’s IAM services and tools present significant, and in some cases insurmountable, technical challenges for Microsoft customers when switching or integrating services across multiple public clouds.<sup>25</sup> In particular:

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<sup>21</sup> See for example our response to [redacted].

<sup>22</sup> Technical Barriers Working Paper, para. 6.19.

<sup>23</sup> Technical Barriers Working Paper, para. 8.100.

<sup>24</sup> Indeed, as the European Commission noted in its Windows Media Player infringement decision (Case COMP/C-3/37.792), “the Windows domain architecture [through which client and server interactions take place] can be termed an Active Directory domain architecture”, para. 182.

<sup>25</sup> Technical Barriers Working Paper, para. 6.45.

- a. Customers have described technical challenges that prevent Microsoft’s Active Directory from integrating with third party IAM services and tools;<sup>26</sup> and
  - b. Customers have explained how Microsoft incentivises them to use Entra ID over competing third party IAM solutions.<sup>27</sup>
15. However, as discussed in further detail in the section below, not only do these restrictions create technical challenges for customers switching or multi-clouding but, they create technical challenges for customers that are migrating workloads to the cloud for the first time.
- A. Active Directory is a key lever that Microsoft uses to unfairly extend its market power into the cloud, this is consistent with its historic behaviour and recent exclusionary licensing practices*
16. As recognised in the Technical Barriers Working Paper, customers depend on Active Directory.<sup>28</sup> This is especially the case for traditional enterprises with an on-premises footprint. This dependency is a reflection and indeed an important element of customers’ dependency on Windows Server. And, as the CMA recognises, Windows Server not only includes Active Directory functionalities<sup>29</sup> but also enjoys a “significant degree of market power”<sup>30</sup> in its own right.
17. Active Directory is a “horizontal” service - i.e. a foundational service that spans across a customer’s IT footprint and across its workloads performing common identity authentication and access authorisation across applications. It acts as a primary “source of truth” and threads each component of the Microsoft software ecosystem together. As a result it helps to amplify the effect of Microsoft’s market power in each of these software markets. This is recognised by customer feedback which explains that Microsoft’s integration with its traditional components makes Office 365 and Entra ID “unviable to deviate from”.<sup>31</sup>
- B. Customer feedback reflects the impact of Microsoft’s practices, not only on switching and multi-cloud but, more significantly, on first migration to cloud*
18. Customers’ dependency on Active Directory not only impacts switching and multi-cloud between cloud providers for customers that have already migrated to the cloud, but, more significantly, customers that are yet to, or are still in the process of, migrating workloads to the cloud.
19. Typically customers, in particular traditional enterprises, migrate to the cloud in stages, rather than all at once. In order for customers to be able to integrate their on-premises and off-premises workloads, they need to be able to connect their cloud services to their existing primary on-premises IAM service. As the CMA recognises, Active Directory is the IAM software that is

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<sup>26</sup> Technical Barriers Working Paper, paras. 6.47 to 6.52.

<sup>27</sup> Technical Barriers Working Paper, para. 6.53 to 6.59.

<sup>28</sup> Technical Barriers Working Paper, para. 6.47.

<sup>29</sup> Licensing Working Paper, para. 3.31.

<sup>30</sup> Licensing Working Paper, para. 3.77.

<sup>31</sup> Technical Barriers Working Paper, para. 6.50.



“commonly used in customers’ on-premises IT set ups”.<sup>32</sup> It is therefore crucial that customers’ chosen cloud IAM solution can interoperate smoothly with Active Directory.

20. However, Microsoft has designed Active Directory to make it very difficult for third-party services to interoperate with it. In particular Microsoft does not provide the necessary interoperability information for third-party cloud IAM solutions to integrate effectively with Active Directory. This (unnecessarily and deliberately) makes it very costly and time consuming for customers to integrate their cloud services with any existing Active Directory-related workloads. By contrast, customers that use Entra ID, Microsoft’s own cloud IAM solution, are able to do so as Microsoft has access to the necessary APIs and technical information to be able to offer seamless integration and interoperability with Active Directory. Microsoft is therefore leveraging its control over its legacy, on-premises tool to prevent competition on the merits in the cloud market, not only at the point of switching and multi-cloud, but also at the point of initial migration.
21. The consequence of dependency on Windows Server and Active Directory, is that most of these customers will therefore most likely end up migrating to Azure, as this is the only way that they can easily “lift and shift” their existing on-premises applications and workloads, which rely heavily on Microsoft software and Active Directory, straight onto the cloud, without having to refactor or reconfigure them.
22. Google Cloud has developed partial technical solutions to try to overcome these restrictions, most notably Managed Active Directory. However the closed nature of Active Directory makes it very difficult and costly (commensurate to use) for us to maintain this solution as a viable alternative to using Entra ID on Azure. Further, regardless of these particular technical workarounds, Google Cloud is also unable to address the commercial barriers imposed by Microsoft through its software licensing practices (as described in the Licensing working paper) which make it more difficult and expensive from a total cost of ownership perspective to move to non-Azure cloud infrastructure.
23. The effects of Microsoft’s restrictions are reflected in customer feedback the CMA has received - for example customers note that that “*they selected Entra ID based on their use of Active Directory*” and that they had “*tended towards using Entra ID (Azure Active Directory), which is a technical decision based on its established Active Directory footprint*”. The effects of these restrictions, combined with Microsoft’s anti-competitive software licensing restrictions, can also be seen in the CMA’s market data - Microsoft has won more than [60-70]% of new customers in each of 2021 and 2022.<sup>33</sup>

*C. Integration between Entra ID and other Microsoft software is just another example of Microsoft leveraging its market power from one market into another*

24. We also agree with the CMA’s findings that customers who use other Microsoft software and services may be incentivised to use Entra ID over competing IAM services to manage their public cloud. As explained in the Technical Barriers Working Paper, Entra ID is offered “*for free to customers who purchase software licences for Microsoft 365, despite these being separate*

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<sup>32</sup> Technical Barriers Working Paper, para. 6.47.

<sup>33</sup> Competitive Landscape Working Paper, para. 5.51.



products”.<sup>34</sup> However once customers adopt Entra ID they are unlikely to switch away due to its “integration”<sup>35</sup> with other Microsoft products, and its lack of interoperability with third party identity solutions. This is consistent with our experience and is another clear example of Microsoft leveraging its market power in software markets into new cloud markets - this time from Microsoft 365 into cloud IAM services.

*D. Swift action is needed to stop customers from being locked into Microsoft’s software ecosystem for the foreseeable future*

25. Customer feedback also demonstrates the long-lasting impact of Microsoft’s restrictions - even after first migration. For example, as one customer notes “*in the longer term it expects to retire Active Directory and move entirely to a cloud only IAM solution, which is likely to be Entra ID*” - a clear demonstration of how Microsoft has used these restrictions to maintain this customer within the Microsoft ecosystem throughout its migration from on-premises to off-premises. As a result, addressing these restrictions on Active Directory’s interoperability must be part of a wider solution that addresses Microsoft’s restrictive licensing requirements and prevents customers from being locked-in to the Microsoft ecosystem for the foreseeable future.

**III. Google Cloud does not consider other factors to pose a meaningful barrier to switching and multi-cloud, but recognises that the incentives of the two market leaders may not be fully aligned with those of customers and smaller CSPs**

26. Google Cloud does not consider other technical factors, *i.e.*, latency, skills and transparency, to comprise meaningful barriers to customers wanting to switch or adopt multi-cloud architectures:
- a. **Skills.** Whilst there is a degree of technical differentiation between services as a result of innovation (as noted above), cloud providers broadly offer the same core services (*i.e.*, compute, networking and storage) and the principles and concepts underpinning these core services are common across the industry. For example, IT engineers who are AWS- or Oracle- certified can relatively easily become certified with Google Cloud (typically within a few weeks or months). While there will be some effort and resources involved on the customer’s part, we offer extensive training and resources to help customers upskill on Google Cloud. This includes dedicated resources on our website tailored to individuals who have specialised and/or trained with another cloud provider (such as AWS).
  - b. **Latency.** We do not believe that latency between services constitutes a meaningful barrier to switching or multi-cloud. Latency relates to the geographic distance between infrastructure hosting services and any dependent services and/or end users. This means customers experience latency irrespective of whether they are using a single cloud, multi-cloud, hybrid, or exclusively on-premises set-up. This is consistent with some customers’ comments that latency is not a significant concern.<sup>36</sup> There are already many products and solutions that actively mitigate any concerns around latency in a

<sup>34</sup> Technical Barriers Working Paper, para. 6.54.

<sup>35</sup> Technical Barriers Working Paper, para. 6.55.

<sup>36</sup> Technical Barriers Working Paper, para. 7.11.

multi-cloud set-up, such as Google Cloud's Cross-Cloud Interconnect which helps customers establish high-bandwidth dedicated connectivity between Google Cloud and other cloud providers.

- c. **Transparency.** We also do not consider (any perceived lack of) transparency to be a meaningful barrier to switching or multi-cloud. In Google Cloud's case, we publish extensive, detailed technical documentation (including APIs and release notes) for all of our services. This provides third parties, including developers, with the knowledge to easily and seamlessly integrate their services with ours.

27. Nevertheless, Google Cloud agrees with the CMA that the incentives of cloud providers with significant market power are not necessarily aligned with those of customers (even if they value interoperability) and, as a result, those cloud providers may favour a lack of transparency and prefer that customers are required to develop skills specific to their cloud.<sup>37</sup> As explained above, Microsoft in particular raises unnecessary artificial technical (and licensing) restrictions which create unnecessary barriers to customers' ability to switch and/or multi-cloud.

#### IV. Remedies

28. Google Cloud considers that market-wide interoperability remedies are neither necessary nor proportionate to address certain narrow (and provider-specific) technical challenges customers face when switching or adopting a multi-cloud strategy. As described above, technical differentiation is primarily driven by innovation and customers and cloud providers are generally able to find workarounds to these complexities and work flexibly across clouds. Customer feedback on barriers to switching and multi-cloud is at most mixed and does not support a finding that there is a systemic market-wide issue in respect of technical differentiation that could reasonably be seen to give rise to an AEC (with the exception of artificial restrictions relating to IAM services). We also consider that market-wide remedies would be complex in a fast-moving market with new emerging technologies, and could lead to unintended distortions to market outcomes, including by potentially hampering innovation.
29. We therefore consider that any remedy should be limited to addressing the provider-specific technical barrier(s) that customers have consistently identified - i.e. the artificial restrictions that Microsoft imposes that limit interoperability between Active Directory and third party IAM solutions. At a minimum, Microsoft should be required to make technical changes to Active Directory and/or grant access to relevant documentation, APIs or source code, in order to ensure customers can migrate Microsoft-related workloads to their choice of cloud, and this remedy should be implemented in conjunction with commercial changes relating to Microsoft's licensing practices, as the CMA outlines in its Licensing Working Paper.<sup>38</sup>
30. Nevertheless, in the event the CMA is minded to impose a broader remedy to address any other perceived technical barriers, Google Cloud agrees with the CMA's emerging view that remedies should not apply to players without market power. Applying the same remedy to all players would disproportionately affect smaller providers who are already incentivised to (and do) make their

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<sup>37</sup> Technical Barriers Working Paper, para. 8.98.

<sup>38</sup> Licensing Working Paper, para. 7.67.

services fully interoperable with third party products and services in order to win workloads, and may have the unintended consequence of discouraging innovation.

31. Please see the **Annex** for Google Cloud's responses to the CMA's consultation questions on potential remedies.

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## Annex - Google Cloud's responses to remedy consultation questions

### Potential remedies that require common standards for cloud provider

9.46 Do you agree with our characterisation of common standards in cloud services and interfaces, as set out in Table 9.1 and, if not, why do you disagree?

9.47 Do you agree that common standards and standardisation in general are more appropriate for IaaS, ancillary services and tools and interfaces (APIs) than for more abstracted types of PaaS services?

9.48 What are the benefits and harms of introducing common standards for IaaS, ancillary services and tools and APIs?

9.49 What are the benefits in having common standards for cloud services where there is more abstraction?

In response to questions 9.46-9.49, we consider that a market-wide interoperability remedy involving binding common standards is neither necessary nor proportionate in the absence of compelling evidence of an issue and considering the mixed feedback received regarding the extent of technical barriers to switching and multi-cloud.

In the context of a dynamic, rapidly-evolving, innovative industry, there should continue to be a high bar for regulatory-driven standardisation as there is a significant risk of any such intervention leading to unintended consequences or becoming quickly outdated. This is particularly important in circumstances where industry has already successfully developed abstraction technologies to help customers mitigate technical differentiation between clouds when switching or multi-clouding by increasing the mobility of workloads and applications with the cloud. For example, Google Cloud developed Kubernetes, an open source technology, which has now become the industry standard in container portability and interoperability. The industry has already come together to place these technologies under the governance of independent bodies such as [Cloud Native Computing Foundation](#), thereby ensuring that these technologies will continue to develop as independent, interoperable solutions.

In line with the CMA's own guidance,<sup>39</sup> any remedies should not be any more onerous than necessary (and its benefits should be weighed against the potential downsides). Any interoperability remedy should therefore be targeted at addressing the specific technical barriers that customers have consistently identified as a concern - namely Microsoft's restrictions on IAM interoperability.

9.50 Which standards setting bodies have sufficient independence and could set common standards for one or more of the types of cloud service or interfaces?

We consider that this is one of the many risks associated with setting common standards for cloud services or interfaces. Considering the dynamic and innovative nature of the industry, we do not think it is appropriate, or practical, for any local regulator to have oversight over common standards. We also do

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<sup>39</sup> The CMA's Market Investigation Guidelines, para. 344.

not consider that there is currently any relevant body either in the UK or globally, with sufficient independence or the necessary degree of specialist knowledge to set common standards for the cloud industry across a broad range of diversified cloud products and services.

#### **9.51 Should the standards apply to all cloud providers that offer a relevant cloud service or should standards only apply to the largest cloud providers?**

We do not consider that it is necessary or proportionate to impose market-wide standards on all CSPs in the absence of compelling evidence of an issue and considering the mixed feedback received regarding the extent of technical barriers to switching and multi-cloud. In line with the CMA's own guidance,<sup>40</sup> a remedy should not be any more onerous than necessary. Any remedy should therefore be limited to addressing any provider-specific technical barrier(s) that customers have consistently identified (such as Microsoft's IAM services).

To the extent the CMA nevertheless considers it necessary to impose a broader set of standards, we consider that their application should be limited to players with significant market power. Smaller players are incentivised to respond to customer demand for interoperability between public clouds by taking actions or technical design decisions designed to reduce the technical costs for multi-cloud and switching. By contrast, and as recognised in the Technical Barriers working paper, it may be the case that players with significant market power and shares of supply are disincentivised from taking similar steps to support multi-cloud and switching as they would stand to lose more customers/revenues than the incremental customers/revenues they would gain.<sup>41</sup> If standards are to be imposed as a remedy (which as noted above, we consider is neither necessary nor proportionate), their application should be limited to addressing these larger players' mixed incentives. Applying the same remedy to all players would disproportionately affect smaller providers who already have the incentive to (and do) make their services fully interoperable with third party cloud products/services.

#### **Potential remedies that use principles-based requirement**

#### **9.62 Is it preferable to impose broader principles-based requirements on cloud providers, or more prescriptive rules/common standards?**

#### **9.63 What broad principles should cloud providers be required to comply with, if we pursued a principles-based approach?**

As described above in response to 9.51, we do not consider that it is necessary or proportionate to impose industry-wide remedies on CSPs in the absence of compelling evidence of an issue and considering the mixed feedback received regarding the extent to which technical differentiation amounts to a barrier to switching and/or multi-cloud.

#### **9.64 Should all cloud providers be required to comply with a principles-based approach or only the largest cloud providers?**

As set out above, Google Cloud agrees that any remedy should only apply to those with significant market power for as long as they retain such a position, as many of the smaller players are already, and

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<sup>40</sup> The CMA's Market Investigation Guidelines, para. 344.

<sup>41</sup> Technical Barriers Working Paper, para. 8.99 to 8.100.

will continue to be, incentivised to promote an open cloud and interoperability between public cloud providers. Indeed, many of the industry's smaller providers are already fully committed to and supportive of industry-led initiatives that seek to support increased openness and interoperability, such as [CISPE's Fair Licensing Principles](#).

### **Potential remedy to improve the interoperability of cloud services through the use of abstraction layers**

**9.81 To what extent do the products already offered by the cloud providers, such as Azure Arc and Google Anthos, act as an abstraction layer and allow customers to operate across multiple public clouds?**

**9.82 To what extent do IaC products already offered by ISVs, such as Terraform (by HashiCorp) or Pulumi, act as an abstraction layer and allow customer to operate across multiple public clouds?**

**9.83 To what extent could cloud providers extend the reach of their ecosystems by offering abstraction layers and would this increase the potential for customer lock-in? If so, how could this risk be mitigated?**

**9.84 To what extent does abstraction also require underlying standardisation?**

**9.85 Would a potential requirement for cloud providers to offer abstraction layers benefit or harm ISVs who offer the same or similar solutions?**

**9.86 What action(s) could we take to increase the uptake of existing abstraction products offered by ISVs?**

**9.87 What action(s) could we take to increase or improve competition to develop abstraction layers?**

**9.88 Should we require cloud providers to offer abstraction layers for a subset of IaaS services for free, and, if so, which IaaS services should be in scope?**

As recognised in the Technical Barriers Working Paper,<sup>42</sup> and described in response to 9.49 above, the industry has already successfully developed a number of abstraction technologies and tools, such as Kubernetes and Terraform, which are being successfully adopted by customers to mitigate technical barriers to switching and multi-cloud.

The issue is therefore not the development, promotion or governance of these abstraction tools, but rather certain narrower artificial restrictions (notably on IAM services) that undermine the effectiveness of the mitigation tools that already exist in the market. Unless the action is taken to address these specific, artificial barriers, alongside Microsoft's licensing restrictions, customers will not be able to reap the full benefits that these mitigation tools offer.

**9.89 Under what circumstances would the potential remedy no longer be required and should be allowed to lapse?**

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<sup>42</sup> Technical Barriers Working Paper, para. 8.80.

In line with the CMA's guidance, the CMA should consider including a sunset clause in relation to any remedy and should keep the remedy under review and remove or revise it once it is no longer appropriate.<sup>43</sup>

### **Remedy requiring cloud providers to publish documentation on the interoperability of cloud services and the ability to migrate away from cloud services**

#### **9.125 Should the potential remedy only apply to the largest cloud providers or to all cloud providers?**

Yes, Google Cloud agrees that any remedy should only apply to those with significant market power for as long as they retain such a position.

#### **9.126 Which cloud services should this potential remedy apply to?**

While there is already a high degree of transparency in this market, Google Cloud is generally supportive of any measures that seek to further improve transparency for the benefit of customers. However, we do not consider that increasing the amount of information available to customers would address the underlying barriers to switching or multi-cloud, which are artificial licensing restrictions and artificial technical restrictions on IAM services.

#### **9.127 Under what circumstances would the potential remedy no longer be required and allowed to lapse?**

In line with the CMA's guidance, the CMA should consider including a sunset clause in relation to any remedy and should keep the remedy under review and remove or revise it once it is no longer appropriate.<sup>44</sup>

### **Remedy requiring cloud providers to give notice and publish details of upcoming material updates to cloud services**

#### **9.135 What constitutes a material update to a cloud service?**

#### **9.136 Do cloud providers already give sufficient notice of material updates to their services? If not, how much notice should cloud providers give stakeholders of a material update to a cloud service?**

#### **9.137 What are the circumstances that would constitute an emergency, where cloud providers would be allowed to process a material update to a cloud service without giving notice?**

#### **9.139 Which cloud services should this potential remedy apply to?**

In response to 9.135-9.137 and 9.139, as noted in the Technical Barriers Working paper and above,<sup>45</sup> providers with significant market power may not always have the same incentives to promote and

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<sup>43</sup> Market studies and market investigations: Supplemental guidance on the CMA's approach (the **CMA's Supplemental Guidance on Market Investigations**), para. 4.22.

<sup>44</sup> The CMA's Supplemental Guidance on Market Investigations, para. 4.22.

<sup>45</sup> Technical Barriers Working Paper, paras. 8.99 to 8.100.



ensure interoperability with third-party services. As a result, whenever those players decide to update their services, any third-party service workarounds have to be updated to ensure ongoing interoperability.<sup>46</sup> By way of example, Google Cloud's technical workaround to Microsoft's IAM restrictions, Managed Active Directory, is vulnerable to any updates or changes Microsoft makes to Active Directory. Consequently, we agree it could be beneficial if the two largest cloud providers gave sufficient notice (of at least 12 months, unless a shorter notice period is required to comply with applicable law or to address a material security risk) of any upcoming material updates, in particular any upcoming discontinuation of services or related material functionality for which they do not offer a replacement similar service or functionality, to allow other industry players time to respond and to ensure continued interoperability with their services.

However, importantly, such a remedy – in isolation – would not address the fundamental issue and far more significant barriers to switching and multi-cloud – i.e., the combination of artificial technical barriers and Microsoft's licensing practices.

#### **9.138 Should the potential remedy only apply to the largest cloud providers or to all cloud providers?**

Yes, Google Cloud agrees that any remedy should only apply to those with significant market power for as long as they retain such a position.

#### **9.140 Under what circumstances would the potential remedy no longer be required and allowed to lapse?**

In line with the CMA's guidance, the CMA should consider including a sunset clause in relation to any remedy and should keep the remedy under review and remove or revise it once it is no longer appropriate.<sup>47</sup>

### **Remedies to improve skills**

#### **9.149 What constitutes cloud-agnostic training?**

#### **9.150 What percentage of training courses should be cloud-agnostic?**

#### **9.151 Are there any other potential remedies that involve improving skills or making training more cloud-agnostic?**

In response to 9.149 - 9.151, Google Cloud is generally supportive of any measures that seek to further improve and facilitate training for the benefit of customers. However, we do not consider that improving training will address the underlying barriers to switching or multi-cloud, which are artificial licensing restrictions and artificial technical restrictions on IAM services.

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<sup>46</sup> Technical Barriers Working Paper, para. 5.93.

<sup>47</sup> The CMA's Supplemental Guidance on Market Investigations, para 4.22.