CMA CLOUD SERVICES MARKET INVESTIGATION TECHNICAL BARRIERS WORKING PAPER MICROSOFT SUBMISSION ON CONCEPTUAL REMEDIES FRAMEWORK

1. INTRODUCTION AND SUMMARY

- (1) As described in Microsoft's response to the Technical Barriers Working Paper (the "Working Paper"), and expanded further below, Microsoft strongly believes that an intervention is more likely to succeed, and less likely to lead to unintended consequences, if it harnesses the existing efforts of the open-source community. The open-source community (which includes customers, not just cloud service providers ("CSPs"))¹ is best placed to understand what would (and what would not) work on these complex and technical issues. Marshalling collective industry efforts in the right places within such a delicate ecosystem would be more likely to produce desirable outcomes and avoid the unintended consequences likely to attach to the imposition of inorganic standards.
- (2) In addition, CSPs have the incentive to make all the necessary APIs available for customers and ISVs to develop fully functioning solutions in the CSP's cloud. In an increasingly multicloud environment, ensuring that these APIs remain available also to abstraction layer providers means that they can continue to play their role in enabling multicloud and that this role can continue to grow in the future. Publicly accessible APIs expose underlying service functionality, which abstraction layers build on top to abstract away the unique aspects of each cloud and provide a common interface across different cloud services. Microsoft suggests that ensuring such APIs remain accessible, in order to promote abstraction layers, is a worthwhile in-market solution the CMA should consider.

2. PROMOTING OPEN-SOURCE SOLUTIONS THAT CAN BE USED ACROSS CLOUDS

- (3) The open-source community is a large collective of developers (from CSPs and customers alike) using and improving the software made available under open-source licences.² This creates a unique market dynamic not found outside software, capable of producing powerful tidal forces independent of any single supplier, like Microsoft, AWS or Google.
- (4) Open-source foundations provide a hub and structure to the community, acting as custodians of the projects they support, providing governance and stewardship to ensure projects maintain their integrity and align with their mission. These foundations also incentivise funding and investment in an otherwise naturally unstructured space.
- (5) There are a large number of such foundations,³ but the most prominent in cloud computing is the Linux Foundation,⁴ of which the Cloud Native Computing Foundation ("CNCF")⁵ is part. The Linux Foundation hosts 900 open-source projects, which in aggregate receive 51 million

¹ See e.g. <u>https://www.cncf.io/about/members/</u>

² See https://opensource.org/licenses

³ See, for example, the lists available at <u>https://opensource.com/resources/organizations</u> or alternatively at <u>https://en.wikipedia.org/wiki/List_of_free_and_open-source_software_organizations</u>

⁴ <u>https://www.linuxfoundation.org/</u>

⁵ <u>https://www.cncf.io/</u>

lines of new code each week from approximately 777,000 developers. Similarly, the CNCF hosts 191 projects receiving contributions from over 248,000 developers. The importance of the Linux Foundation and CNCF is generally accepted among CSPs.⁶

- (6) Empowering these foundations would promote and institutionalise their democratising impact on cloud services. The developers who comprise and contribute to the open-source community are employed by CSPs, ISVs, and customers. As explained in Microsoft's response to the Working Paper, developers ultimately influence the decisions of customers on which technologies are deployed for workloads, and therefore which CSP a customer might ultimately choose for a particular workload. The foundations serve as "public squares" where developers can make contributions and improvements to software used by many others for common problems. A virtuous cycle of uptake by developers of the open-source software in customer applications and contributing back any further improvement sees rapid adoption of technologies that solve or mitigate common problems. By virtue of this broad church of contributors, opensource software resists any kind of single-party asymmetry.⁷ Above all, as developers are generally reluctant to reinvent the wheel, they flock to successful open-source projects.
- (7) Promoting these foundations could take several forms and contribute towards developing an effective remedy, should the CMA find an AEC. As Microsoft submitted in response to the Working Paper, alongside other market participants, there is a tension in maintaining the procompetitive product differentiation in the market while mitigating the difficulties arising from switching between solutions that do similar things in dissimilar ways. The CMA might consider including a number of these elements:
 - (a) **Mandatory membership of the CNCF** at a membership level commensurate with the CSP's customer base, ensuring it is present on the "public square" as well as contributing regular funding to the CNCF securing its long-term future;
 - (b) **Funding contributions beyond membership fees** to ensure that both the Linux Foundation and the CNCF have the resources to maintain growth at the same pace as the cloud services market;
 - (c) **Contributions to operations, corporate governance and technical governance**, such as on the CNCF's Technical Oversight Committee;⁸
 - (d) **A commitment that support for open-source solutions for portability will be conformant**⁹ where a conformance certification programme exists, such as Kubernetes,¹⁰ so customers have a consistent experience across certified environments. To the extent any non-conforming versions were also offered, the cloud provider would

⁶ See: Google's response to the Working Paper, paragraph 7(c), and also page 12; IBM's response to the Working Paper, response to paragraph 9.50. See also list of CSPs present as Platinum members of the CNCF (<u>https://www.cncf.io/about/members/</u>) and the Linux Foundation (<u>https://www.linuxfoundation.org/about/members</u>).

⁷ This is codified, for example, in the CNCF's policies: "CNCF projects must not be driven primarily by the needs of one party which uses their position to control which features are in the project to the obvious detriment of the ecosystem." See <u>https://contribute.cncf.io/maintainers/community/vendor-neutrality/</u>.

⁸ See <u>https://www.cncf.io/people/technical-oversight-committee/</u>

⁹ Without restricting a CSP's rights to separately develop new software using the open source release as a base.

¹⁰ See <u>https://www.encf.io/training/certification/software-conformance/</u>. Certification requires a deployment of Kubernetes to satisfy a programme of specific technical tests, the results of which are validated and published by CNCF. The tests themselves for, *e.g.*, Kubernetes v1.30 are available at <u>https://github.com/encf/k8s-conformance/blob/master/docs/KubeConformance-1.30.md</u>

need to make clear that the version does not conform. Conformance and validation have a long history in programming, such as W3C's validation of code against its web standards for HTML code and website accessibility,¹¹ and promote technical consistency. This limb in particular would offer customers a guaranteed minimum level of portability and consistent experience between managed instances of open-source software between CSP environments, while leaving CSPs free to innovate and differentiate their services within that managed instance offering as well as outside it.

- (8) Microsoft believes the open-source community will continue to deliver solutions that enable portability and interoperability in the cloud. If the CMA wants to promote continued support of the Linux Foundation and the CNCF as hubs of the cloud computing open-source communities, the approaches outlined above would reinforce the incentive for CSPs to offer and support open-source solutions that allow portability and consistency between CSPs' environments.
- (9) The CMA could apply this remedy to those CSPs active in the UK, regardless of size. Logically, a remedy designed to promote interoperability through safeguarding effective in-market mechanisms of mitigating interoperability challenges would be far less effective if it promoted switching and multicloud only between today's largest CSPs. The CNCF and the Linux Foundation already enjoy the global support of most CSPs including Microsoft, who all to a large degree already fulfil a number of these limbs: this remedy would simply provide a degree of regulatory certainty that this support will continue and in specific ways that promote mitigation of the concerns identified in the Working Paper, giving confidence that existing progress in an early and dynamic market will continue to drive forward in the future. To that end, the remedy has the additional feature of supporting UK cloud customers without making them outliers in an otherwise global market in terms of the resourcing required for CSPs to serve them.

3. ABSTRACTION LAYERS

- (10) Abstraction layers are already available in the cloud services market, both on a first-party (*e.g.*, Azure Arc) and third-party (*e.g.*, Terraform) basis. They owe their existence, and continue to depend, on the availability and accessibility of APIs. Their mere existence proves the extent to which CSPs' APIs are public. In an increasingly multicloud environment, abstraction layers have a clear role to play and to that end CSPs and ISVs are incentivised to create and maintain them, where the demand exists.
- (11) Abstraction layers enable developers seeking a single pane to access similar functionality across services in different environments by abstracting way the differentiation and different implementations done across clouds.¹² As such, cloud service abstraction layers do not depend on *all* of a CSP's internal interfaces and implementation layers being made into public APIs: only those on the outer edge of a service that provide the desired functionality are necessary.¹³ Cloud providers have every incentive to expose the APIs necessary to building an abstraction layer, as those APIs offer the same functionality that customers and ISVs depend on to build their own solutions in the cloud. Indeed, the cloud would not be attractive to customers if they

¹¹ See <u>https://www.w3.org/standards/about/</u>.

¹² In a sense, an API is itself a type of abstraction layer, exposing and structuring specific gates in and out of an underlying service that accept and parse requests and return the service's output in a standardised format.

¹³ The universality of this can be seen, for example, in Google's use of the qualifier "user-facing" in its claim that "Google Cloud's user-facing APIs are openly accessible to all" in paragraph 7(a) of its response to the Working paper.

did not expose the necessary APIs. As long as those APIs are equally available for the purpose of building abstraction layers, then those layers can continue to succeed.