BHI

Black Hole Index

STRUCTURAL LOCK-IN MEASUREMENT · B = CAPTURE / ESCAPE

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RESEARCH BRIEF · JRC DIGITAL SOVEREIGNTY SCIENCE FOR POLICY FORUM

30 AUGUST 2026

Measuring Provider Dependence as One Dimension of Digital Sovereignty

One axis of digital sovereignty, measured — and its limits, stated in advance.

Submitted by: Ivan Savich, Creator of the Black Hole Index (independent researcher)

Scope: one axis of digital sovereignty — structural dependence on a provider; nothing on jurisdiction, keys, applicable law or compelled access

Declaration: I have no commercial relationship with any system assessed. All evidence used is public. This brief is non-confidential and may be shared with the forum organisers.

1. The one-axis position

1.1. Digital sovereignty is not one quantity. Jurisdiction over data, control of keys, applicable law, exposure to compelled access and structural dependence on a provider are distinct axes: an organisation can hold its keys and still be unable to leave its platform.

1.2. The Black Hole Index (BHI) measures **one** of these axes — structural dependence — quantitatively, and claims nothing about the others. This is the framing of our 22 August 2026 submission to the European Commission.

2. What BHI is

2.1. One formula — **B = Capture / Escape** — over eleven structural parameters (data, memory, action, process and network capture; closeness; portability, substitutability, human fallback; organisational depth; momentum), each scored on published five-anchor rubrics from documented evidence.

2.2. Price is excluded from every structural parameter by rule and reported separately: price terms can be repriced by a decision; structure has to be rebuilt. 184 platforms across 18 sectors in the quarterly public release (data CC BY 4.0, recomputable from the published raw parameters).

3. The regulatory record (facts, not endorsements)

3.1. Response published by the UK Competition and Markets Authority among named respondents to its Apple steering consultation, 14 August 2026 (publication, not endorsement); data-sovereignty submission to the European Commission, 22 August 2026.

3.2. A remedy → parameter prediction register frozen before the CMA Board's six-month cloud review, so its predictions can be graded, not fitted.

3.3. Japan: a pre-registered measurement of Apple's and Google's designated software before and after full enforcement (18 December 2025) of the Mobile Software Competition Act, graded on dated policy text and frozen 29 August 2026. Japan is, to our knowledge, the first jurisdiction with a dedicated mobile-

platform competition statute in full effect and published compliance reports, so this is the first such ex-post reading available to this instrument.

3.4. Frozen research snapshots (S1 cloud, 22 August; S2 integrated stack and S3 Japan, 29 August 2026): hash-fixed publicly and RFC 3161-timestamped on the day of freezing — blackholeindex.com/research-snapshots.txt.

4. The worked example: the instrument that refused

4.1. In August 2026 BHI measured cloud infrastructure — AWS, Azure, GCP, Oracle Cloud — under one frozen, provider-neutral frame: a stipulated Reference Customer, twelve functional layers, one exit criterion. The result is an **identification boundary**: eight of eleven structural parameters were determinable from first-party provider documentation, for all four providers; three were not — momentum (no common unit of capability change exists across providers' release channels) and the two customer-state parameters (closeness, human fallback), whose anchors describe the customer's organisation, which no provider documents.

4.2. The instrument therefore **refused to output a composite score** and published the decomposition instead. An instrument that produces a number wherever a number is wanted measures its audience, not its object.

4.3. Two findings travel beyond clouds: **export capability is not exit capacity**, and **remedy classes differ structurally** — a remedy that removes egress charges and changes nothing else moves the structural index by exactly zero, pre-registered before the relevant regulator review.

5. Why this matters for the sovereignty conversation

5.1. Dependence claims saturate the policy debate; measurements of dependence are rare, and honest statements of what they cannot establish are rarer. BHI contributes both: a reproducible discipline (frozen boundaries, evidence tiers, public hash-fixed snapshots) and its own identification limits, stated in advance.

6. Limitations

6.1. All scores to date are by a single evaluator; inter-rater reliability is not yet established (study designed, cohort frozen, execution pending). The research process and provenance engineering are mature; the instrument's scientific validation is in progress — we state both levels and do not blur them. A B value does not by itself establish market power, abuse, infringement or harm. I remain available to brief the forum on the method.

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References

Black Hole Index (2026). Methodology, scoring rubric and aggregation function. blackholeindex.com/methodology