Configurational Bundles in B2B Platform Evolution: How Architectural Primitives Anchor Coherent Strategic Choices

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Abstract

Existing platform research has largely treated value-creation logic, openness, and integration-cost sharing as independent strategic levers, each driven by its own logic of network effects, governance, or pricing. We argue that this view obscures a more fundamental pattern in business-to-business (B2B) platforms: strategic choices are not pulled independently but arrive in configurational bundles. The internal coherence of these bundles is anchored by a small set of architectural primitives, boundary resources, data-rights governance, and architectural debt, building on the platform-evolution and ecosystem-governance traditions. We confront the theory with descriptive empirical evidence from 196 B2B platforms profiled across their lifecycle. We find that strategic choices cluster into coherent bundles, with each platform type associated with a characteristic bundle. Once committed, platforms rarely transition: stage-to-stage transition probabilities are high, consistent with an architectural-debt account of bundle persistence. For most bundles, lifecycle movement is better characterized as deepening than reconfiguration. Hybrid platforms cluster in compatibility regions where bundles share architectural foundations. The evidence further sharpens the theory in two ways. First, marketplaces and IoT enablers converge on low user cost-sharing despite occupying opposite bundles, showing that similar observed outcomes can emerge from architecturally distinct logics: demand-protective subsidization in marketplaces and infrastructure-investment subsidization in IoT enablers. Second, data aggregators exhibit non-monotonic openness over the lifecycle due to a data related governance-burden which becomes more significant as they mature. The paper contributes a configurational theory of B2B platform evolution with important practical implications.

Keywords: B2B platforms, configurational theory, boundary resources, data-rights governance, architectural debt, platform evolution, abductive analysis.

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1. Introduction

Research on digital platforms has produced a robust set of insights: platforms thrive on cross-side network effects (Parker and Van Alstyne, 2005; Lee and Mendelson, 2007; Dou and Wu, 2021), openness drives innovation and growth (Boudreau, 2010; Parker et al., 2017; Parker and Van Alstyne, 2018), and once scale is achieved, winner-takes-all dynamics often follow (Arthur, 1996; Shapiro and Varian, 1999). Most of these insights, however, were developed in business-to-consumer (B2C) settings where user bases are large, integration is shallow, and feedback loops can be self-reinforcing within months. Business-to-business (B2B) platforms operate under qualitatively different conditions: heterogeneous industries, deep integration with legacy systems, strict data-governance constraints, and network effects that are fragmented rather than universal (Bonnet et al., 2025; Anderson et al., 2022; Hasler et al., 2022; Springer et al., 2025).

Existing scholarship on B2B platforms has begun to map this landscape, primarily by developing typologies (Feike and Rösch, 2024; Ritala and Jovanovic, 2024; Täuscher and Laudien, 2018; Millan et al., 2024) and by modeling platform-specific decisions such as integration investment (Anderson Jr. et al., 2023; Tan et al., 2020). Adjacent ecosystem-theory work has shown that modularity enables ecosystem emergence and that the structure of complementarities determines how ecosystems create and capture value (Jacobides et al., 2018), while recent theoretical contributions have framed digital innovation ecosystems as information ecologies whose parts coevolve with the whole (Wang, 2021). Yet a recurring assumption in this literature is that the central strategic levers, value-creation logic, openness, and integration-cost sharing, can be analyzed as independent decisions, each governed by its own logic. Cross-side value is treated as a function of network effects, openness as a function of governance trade-offs, cost-sharing as a function of pricing and demand sensitivity. This decomposition is analytically convenient, but it does not match what we observe in B2B platform evolution.

Our descriptive empirical record suggests something different. B2B platforms appear to evolve in *coherent bundles*: marketplaces tend to be open, cross-side, and platform-subsidized at integration. IoT enablers tend to be closed, standalone, and also platform-subsidized but for very different reasons. Data aggregators occupy an intermediate position whose stability depends on whether their data-governance regime can keep pace with their data-reusability potential. These bundles are persistent across the lifecycle, and the rare deviations cluster in specific compatibility regions rather than scattering randomly. The pattern is not what an independent-levers theory would predict.

We argue that the right unit of analysis for B2B platform evolution is the *configurational bundle*, a coherent combination of value-creation logic, openness, and integration-cost sharing that is anchored, made viable, and constrained over time by a small set of architectural building blocks. Specifically, we identify three blocks as structurally essential: *boundary resources* (Ghazawneh and Henfridsson, 2013; Eaton et al., 2015; Baldwin and Woodard, 2009; Karhu et al., 2018), which determine how external participation can be made scalable; *data-rights governance* (Wareham et al., 2014; Berente et al., 2021; Filosa et al., 2025; Abraham et al., 2019; Tallon et al., 2013), which determines whether data reusability translates into shared value or into withheld participation; and *architectural debt*, which we develop as a path-dependence construct (Sydow et al., 2009) that extends platform-evolution theory (Tiwana et al., 2010) and connects to the technical-debt tradition (Woodard et al., 2013; Rolland et al., 2018). These three primitives jointly explain why bundles cohere, why they persist, and why the hybrids that do occur cluster in the regions where two bundles share architectural foundations.

This paper makes three contributions. First, theoretically, it reframes B2B platform evolution as the dynamics of configurational bundles rather than independent strategic levers, and grounds it around these three building blocks. Second, it provides descriptive empirical evidence from a purpose-built survey of 196 B2B platforms, designed because existing archival sources do not systematically capture platform type, lifecycle stage, value-creation logic, access openness, and integration-cost sharing. Combining logistic regression with structured profiling, we document how these choices cluster into coherent bundles that persist across platform types and lifecycle stages. Third, empirically, it shows that the configurational view earns its keep in two distinct ways: it predicts a non-obvious convergence (marketplaces and IoT enablers reach the same observed cost-sharing outcome through architecturally distinct logics, a pattern an independent-levers view cannot recover) and it absorbs a genuine anomaly (data-aggregator non-monotonicity in openness and cross-side value over the lifecycle) through a targeted refinement that identifies governance-burden inversion as a maturity-stage mechanism connecting back to recent IS work on data governance.

The paper is organized as follows. Section 2 situates the configurational view within the platform literature. Section 3 develops the conceptual model: architectural primitives, the three building block mechanisms, and a set of propositions about bundle coherence, persistence, and compatibility. Section 4 introduces structured profiling as an abductive method. Section 5 presents the empirical patterns and includes the cost-sharing convergence as a confirmed configurational prediction. Section 6 treats the principal anomaly, data-aggregator non-monotonicity, as an engine of theoretical refinement. Section 7 discusses limitations and future research, and Section 8 concludes.

2. The Configurational View of B2B Platform Evolution

2.1 From Independent Levers to Configurational Bundles

The dominant framing in platform research treats strategic choices as independent levers. Network-effects research analyzes cross-side value as a function of the size of the opposite side and the strength of cross-group externalities (Parker and Van Alstyne, 2005; Rochet and Tirole, 2003). Openness research analyzes the extent of third-party participation as a governance choice trading off adoption against appropriability (Boudreau, 2010; Parker and Van Alstyne, 2018; Eisenmann et al., 2008; Parker et al., 2024). Pricing and integration research analyzes who bears integration costs as a function of cost sensitivity, multi-sided feedback, and platform incentives (Tan et al., 2020; Anderson Jr. et al., 2023). Each of these strands is analytically powerful in isolation, but each is silent on how the levers fit together.

Configurational theory (e.g., Miller and Friesen, 1984; Miller, 1986; Meyer et al., 1993; Tiwana et al., 2010; Wareham et al., 2014) suggests an alternative: strategic choices may be interdependent in ways that produce a small number of coherent bundles. Bundles cohere when their elements are mutually reinforcing through shared underlying primitives. They persist when the primitives generate switching costs. They decompose when an environmental change disrupts the primitives. The configurational view is not new, but it has not been systematically applied to

(B2B) platform evolution.

This configurational logic has a well-developed lineage that we build on and depart from in a specific way. Organizational research established that firms cluster into a limited number of internally coherent gestalts or archetypes rather than varying continuously along independent dimensions (Miller, 1986; Meyer et al., 1993), and that such configurations are marked by nonlinearity, synergistic interaction among elements, and *equifinality*, distinct configurations reaching comparable outcomes (Doty et al., 1993). A subsequent set-theoretic turn supplied methods matched to these premises: qualitative comparative analysis treats cases as combinations of attributes and uses Boolean logic to recover the few combinations associated with an outcome (Ragin, 1987, 2008), an approach Fiss (2007, 2011) brought into organizational configuration research to study equifinality, limited diversity, and the distinction between core and peripheral configurational elements, and which Misangyi et al. (2017) consolidated as a neo-configurational perspective. Within Information Systems (IS) research, this tradition has been used to theorize digital phenomena as configurations rather than as separable variables, emphasizing discontinuity and mutual causality among tightly coupled elements (El Sawy et al., 2010), with recent work codifying how configurational reasoning supports theory development on multifaceted digital phenomena (Park et al., 2020).

Our *discrete-attractor* commitment (the claim that platforms settle into one of a few coherent bundles and are pulled away from the in-between combinations) sits inside this tradition but sharpens two of its claims. The first is about how sharply the bundles are separated. Configurational research generally argues for *limited diversity*: of all the combinations of choices that are logically possible, only some turn out to be workable (Fiss, 2007). We make a stronger claim. In B2B platforms the workable bundles are not just few. They are separated by sharp architectural boundaries, so the mismatched combinations, an open platform that creates no cross-side value, or a closed one that tries to, are not merely uncommon but hard to sustain, because the underlying architecture works against them. This is the "discontinuity" that El Sawy et al. (2010) describe as a hallmark of configurational systems: platforms tend to settle into one of a few coherent bundles rather than spreading evenly across the range of options.

Second, earlier configurational work is good at showing *that* configurations hold together, but usually stops short of saying *what* holds them together in a particular setting (Meyer et al., 1993; Fiss, 2007). Our contribution is to name that "what" for B2B platforms: three mechanisms, boundary resources, data-rights governance, and architectural debt create these bundles and keep them stable as a platform matures. Two familiar ideas from the configurational literature then reappear in our data in concrete form. *Equifinality*, the idea that different setups can reach the same outcome, shows up as the cost-sharing convergence we document, where marketplaces and IoT enablers arrive at the same integration-cost result by architecturally different routes. And limited diversity shows up as the sparse "off-diagonal" cells, the mismatched combinations that almost no platform occupies.

Against the closest platform-theory neighbors, the discrete-attractor commitment specifies an *outcome* where they describe a *process*. Tiwana et al. (2010) model the coevolution of platform architecture, governance, and environmental dynamics as an ongoing process; the configurational view specifies the outcome of that process as a small set of discrete bundle structures with type–bundle correspondence and architecturally constrained compatibility regions. Jacobides et al. (2018) treat ecosystem complementarities as continuous relationships taking multiple forms (unique, generic, supermodular). We claim that in B2B platform contexts these complementarities resolve into discrete attractor states rather than continuous gradients. In both cases the addition our theory makes is the same: the mechanisms developed supply the specific architectural anchors that make B2B bundles cohere, persist, and admit only certain hybrid combinations.

We apply this configurational view to three observable platform strategic choices: value-creation logic (standalone vs. cross-side vs. hybrid), openness in terms of product offering (closed vs. open architecture), and integration-cost sharing (platform-borne, shared, or user-borne). These three choices, when examined jointly, exhibit a pattern of co-occurrence that is not consistent with their being chosen independently. Marketplaces cluster in the open / cross-side / low-user-cost region. IoT enablers cluster in the closed / standalone / low-user-cost region. IP&S and data aggregators occupy an intermediate. Standalone explanations of each lever cannot account for these joint patterns. A configurational explanation can.

2.2 Three Main Mechanisms

We carry forward three mechanisms as the main building blocks of our theory.

Boundary resources. Following Ghazawneh and Henfridsson (2013) and Eaton et al. (2015), and building on the core–interface–periphery view of platform architecture (Baldwin and Woodard, 2009), we define boundary resources as the technical and social devices, APIs, SDKs, integration templates, certification programs, sandboxes, developer documentation, governance protocols, through which a platform makes third-party participation simultaneously *scalable* and *controllable*. In B2B settings, boundary resources do more than reduce onboarding friction: they determine whether openness is a viable strategy at all (Karhu et al., 2018). Without scalable boundary resources, opening the platform creates more governance load than value, because each new participant must be integrated through bespoke effort. With them, openness becomes a repeatable mechanism rather than a per-customer cost. Boundary resources thus determine the maximum feasible level of openness a platform can sustain at a given stage of its development. Because we do not observe boundary-resource investment directly, we identify this mechanism by its *observable signature*: it implies a ceiling on realized openness, so that openness should track platform type rather than vary freely across it. This is a pattern the independent-levers view (which treats openness as a stand-alone governance choice) does not predict.

Data-rights governance. Following Wareham et al. (2014), Berente et al. (2021), and Filosa et al. (2025), and drawing on the data-governance framework of Abraham et al. (2019), we define data-rights governance as the credibility and enforcement of rules over data ownership, access, permissioning, anonymization, auditability, explainability, and reuse. In B2B, this is not a peripheral concern. Participants share proprietary operational data, customer relationships, and process knowledge. Without credible governance, data reusability is potential rather than realized: firms withhold or distort their contributions. With credible governance, latent reusability becomes shared platform value. The mechanism is not the volume of data collected but the credibility of the rules that govern it. This distinction is sharper in B2B than in B2C, where consumer data is typically subsidized by services rather than guarded by strategic firms. Its observable signature is twofold: cross-side value should be *realized* only where governance can be sustained, and because the cost of sustaining credible governance itself grows as data assets and regulatory burden accumulate, data-intensive bundles should display a non-monotonic openness trajectory over the lifecycle rather than the monotonic deepening an independent-levers account would expect.

Architectural debt. Extending the platform-evolution account of Tiwana et al. (2010); Tiwana (2013) and connecting to the notion of design capital in digital business strategy (Woodard et al., 2013), we develop architectural debt as the accumulated cost of past architectural choices that constrain future strategic adaptation. Architectural debt grows when a platform commits to proprietary interfaces, customer-specific integrations, non-standard data formats, or bespoke governance arrangements. It shrinks when the platform invests in standardization, reusable boundary resources, and modular interfaces. Like financial debt, it must be "serviced" before new strategic moves are feasible (Kruchten et al., 2012; Ramasubbu and Kemerer, 2016). Unlike financial debt, it is largely invisible until the moment of attempted reconfiguration. Architectural debt is therefore the mechanism through which past choices lock in present configurations and explain why bundles persist even when external conditions change (Sydow et al., 2009; Rolland et al., 2018). Its observable signature is dynamical rather than cross-sectional: it predicts high stage-to-stage persistence, switches concentrated early and rarely reversed, and hybrids confined to the type-pairs that share architectural foundations, patterns that neither random choice nor stage-invariant preference heterogeneity would generate.

These three mechanisms are the building blocks of the configurational view. They are architectural and governance properties that, in principle, have concrete technical and organizational instantiations. Our data, however, do not measure these instantiations directly. We therefore identify each mechanism *indirectly, through the distinctive signature it leaves in the observable choice and transition data*. Each signature is chosen so that its presence discriminates the configurational account from the independent-levers alternative, which treats the same three choices as separately optimized and therefore predicts neither their co-occurrence, nor their persistence, nor the type-specific non-monotonicity we document. This indirection is a deliberate feature of the abductive strategy we adopt in our descriptive analysis below: the mechanisms are inferred from their consequences rather than observed, and the theoretical propositions that follow are stated accordingly, with an explicit observable-pattern claim separated from its mechanistic reading. They jointly determine which configurational bundles are viable, which are coherent, and which become path-dependent.

3. Conceptual Model: Architectural Building Blocks, Mechanisms, and Bundles

3.1 Definitions

We define a B2B platform as a digital technology infrastructure that facilitates exchange among firms, organizations, and their resources (Parker et al., 2024). Following an established functional classification (Stange, 2022; Parker et al., 2023), we distinguish four B2B platform types based on the primary function they perform:

- **Marketplace (MP):** platforms that match supply and demand for traditional products and digital services (Malone et al., 1987; Bakos, 1997);
- **Data aggregator (DA):** platforms that combine data from multiple sources to enable new exchange and collaboration (Berente et al., 2021; Mancuso et al., 2024);
- **Intelligent product & service provider (IP&S):** platforms that augment traditional products and services with connectivity and data, often as part of digital servitization (Huikkola et al., 2022; Paschou et al., 2020);
- **IoT enabler (IoT):** platforms that provide technology building blocks and infrastructure enabling clients to build their own IoT or industrial solutions (Yoo et al., 2010; Hodapp et al., 2019).

We distinguish four maturity stages: pre-launch (use-case identification, minimum viable product, proof of concept), launch (go-to-market, product-market fit), scale (rapid growth, system scalability), and maturity (decelerating growth, exploration of adjacent markets).

The three observable strategic choices we focus on are value-creation logic, access openness, and integration-cost sharing. *Value-creation logic* ($r \in \{\mathrm{ST}, \mathrm{CS}, \mathrm{H}\}$) captures how a platform primarily generates value: *standalone* (ST), where the platform delivers its own products or services to participants without depending on interaction between distinct participant groups; *cross-side* (CS), where value arises from mediating exchange between two or more distinct sides, so that each side's benefit grows with participation on the other (cross-side network effects); and *hybrid* (H), which combines a proprietary standalone offering with cross-side mediation. *Access openness* ($o \in \{\text{closed}, \text{open}\}$) is defined as offering third-party products in addition to or instead of the platform's own. *Integration-cost sharing* captures who bears the up-front integration cost: platform, shared, or user.

3.2 Architectural Bulding Blocks and Mechanisms

A platform of a specific type inherits a set of architectural building blocks that reflect the technical and organizational structure of the activities it mediates. They are properties of the platform's domain. They include transaction modularity (the extent to which exchanges can be decomposed into standardized transactions, interfaces, or exchange modules), which is high when the platform can connect supply and demand through relatively standardized matching, pricing, contracting, and fulfillment routines. This has been identified as a primary enabler of coordination across distinct yet interdependent organizations (Jacobides et al., 2018). Other building blocks are data reusability (the extent to which data generated by one participant can create value for others), asset specificity (the extent to which participation requires customer-specific physical or process integration), openness hazard (the appropriability and security risk of admitting third parties), and legacy complementarity (the value derived from bundling with installed assets, services, and customer relationships).

These primitives matter, but, they do not directly determine strategic outcomes. Their effect is mediated our three main mechanisms. We organize the conceptual model around how these mechanisms convert primitives into bundles. Since none of the three is measured directly in our data, each mediation below should be read together with the mechanism's observable signature: the mediation states how a primitive is *meant* to become an observed choice, and the signature states the pattern by which we can tell, from the choice data alone, whether that mediation is operating.

Boundary resources mediate transaction modularity into openness. Modular transaction structure is necessary for openness to be viable, but it is not sufficient. The platform must also have invested in scalable boundary resources, APIs, integration templates, certification, documentation, that allow third parties to participate without per-participant bespoke work. A marketplace operating in a domain with high transaction modularity but underdeveloped boundary resources will not be able to sustain an open architecture. Openness will collapse into governance overload. Conversely, a platform in a less modular domain that has invested heavily in boundary resources can sometimes sustain partial openness. Boundary resources therefore translate the latent modularity of the domain into the realized openness of the bundle.

Data-rights governance mediates data reusability into cross-side value. High data reusability creates the potential for cross-side value when one participant's data improves outcomes for another. Whether that potential is realized depends on whether participants trust the platform's data-rights regime enough to share their data freely. Without credible governance, reusability is potential without realization. With it, latent value becomes shared platform value. Data aggregators are the type whose bundle most directly depends on this mechanism, but it also matters for IoT (sensor and machine data) and even for marketplaces (transaction data analytics). The strength of data-rights governance is therefore a key determinant of whether a bundle achieves cross-side value or remains anchored in standalone delivery.

Architectural debt locks in bundles over time. Once a platform commits to a configuration, the architectural choices it makes, proprietary versus open interfaces, custom versus standardized integrations, bespoke versus reusable governance, accumulate as architectural debt that must be serviced before alternative configurations become accessible. A platform that has invested in customer-specific IoT integrations cannot easily pivot to a marketplace bundle. The architectural debt would have to be repaid first. This mechanism is the source of bundle persistence over the lifecycle. It is also the source of compatibility patterns among hybrids: bundles that share architectural foundations can be combined with relatively low architectural-debt friction, while bundles built on different foundations cannot.

3.3 Configurational Bundles

The interaction of the three main mechanisms with the type-level primitives produces a small number of coherent bundles. We characterize them as follows. For each bundle we identify the primitives whose values most directly explain why the bundle is internally coherent and ground them in the relevant literature.

The *marketplace bundle* combines high transaction modularity with substantial investment in boundary resources, moderate data-rights governance, and relatively low architectural debt. High transaction modularity is the structural feature that distinguishes marketplaces in the literature: matching, search, contracting, and fulfillment can be standardized into routinized exchange across heterogeneous participants (Bakos, 1997; Malone et al., 1987). This standardization makes scalable third-party participation feasible, which in turn motivates the boundary-resource investments that the platform-architecture literature has shown to be essential for governing such participation (Ghazawneh and Henfridsson, 2013; Eaton et al., 2015). The bundle is internally coherent: openness is feasible because boundary resources scale, cross-side value is high because matching liquidity grows with each side (Anderson et al., 2022), and integration costs are low and easily borne by the platform because individual participant onboarding is routinized. The MP bundle thus combines open architecture, cross-side value, and platform-borne (or absent) integration costs.

The *IoT-enabler bundle* combines high asset specificity with high legacy complementarity and high openness hazard, served by deep but customer-specific integrations and substantial proprietary technical investments. High asset specificity follows directly from the layered modular architecture characteristic of IoT platforms, which connects to physical devices, sensors, and customer-specific operational systems across organizational boundaries (Yoo et al., 2010; Hodapp et al., 2019). High legacy complementarity reflects the embedded role of IoT platforms within incumbent industrial firms whose value depends on existing installed bases and supply-chain relationships (Sjödin et al., 2022; Subramaniam, 2022). High openness hazard follows from the proprietary operational data and process knowledge that IoT platforms mediate, which the ecosystem-governance literature has identified as raising the appropriability and quality-control risks of opening (Wareham et al., 2014; Baldwin, 2015). The bundle is also internally coherent, but for opposite reasons to the MP bundle: closed architecture is preferable because openness would expose proprietary integration with customer operational systems, standalone value is high because legacy complementarity makes proprietary delivery more valuable than ecosystem mediation, and integration costs are high in absolute terms but borne by the platform as an infrastructure investment that creates installed-base lock-in. The IoT bundle combines closed architecture, standalone value, and platform-borne integration costs, similar to the MP bundle on the cost dimension but for fundamentally different reasons.

The *intelligent-product-and-service bundle* combines high legacy complementarity with moderate asset specificity and visible customer-facing integrations. The high-legacy-complementarity primitive is grounded in the digital-servitization literature, which has documented how IP&S platforms derive value primarily from augmenting existing physical products and services rather than from ecosystem mediation (Huikkola et al., 2022; Paschou et al., 2020; Raff et al., 2020), with enterprise-software platforms providing an example of how complementor-driven cocreation builds value around a focal product line (Ceccagnoli et al., 2012). Moderate (rather than high) asset specificity reflects that IP&S platforms typically operate at the product layer rather than at the operational-system layer, which makes their integrations visible to customers as packaged solutions rather than as infrastructure investments. The bundle is partially open but more often centered on the proprietary product line, with cross-side value emerging selectively rather than dominantly. Integration costs are visible and chargeable as part of solution delivery, so users bear a larger share of integration cost than in the IoT case.

The *data-aggregator bundle* is characterized by high data reusability, which the data-centric platform literature has identified as a precondition for value creation when one participant's data improves outcomes for others (Berente et al., 2021; Mancuso et al., 2024). Whether that potential is realized, however, depends critically on data-rights governance. The literature on data sharing and trust has documented how participants withhold or distort their contributions when governance is weak, transforming what should be a cross-side benefit into mere potential (Filosa et al., 2025; Petropoulos et al., 2023; Wareham et al., 2014). The bundle is therefore conditionally coherent: if governance is credible, reusability translates into cross-side value and openness is feasible. If governance is weak, reusability remains potential and the bundle drifts toward standalone delivery. The DA bundle is thus less stable than the others, and we will see in Section 6 that this fragility has specific consequences.

Figure 1 synthesizes the conceptual model: type-level primitives feed into the three mechanisms, which in turn shape the observable strategic choices and the persistence of the resulting bundles.

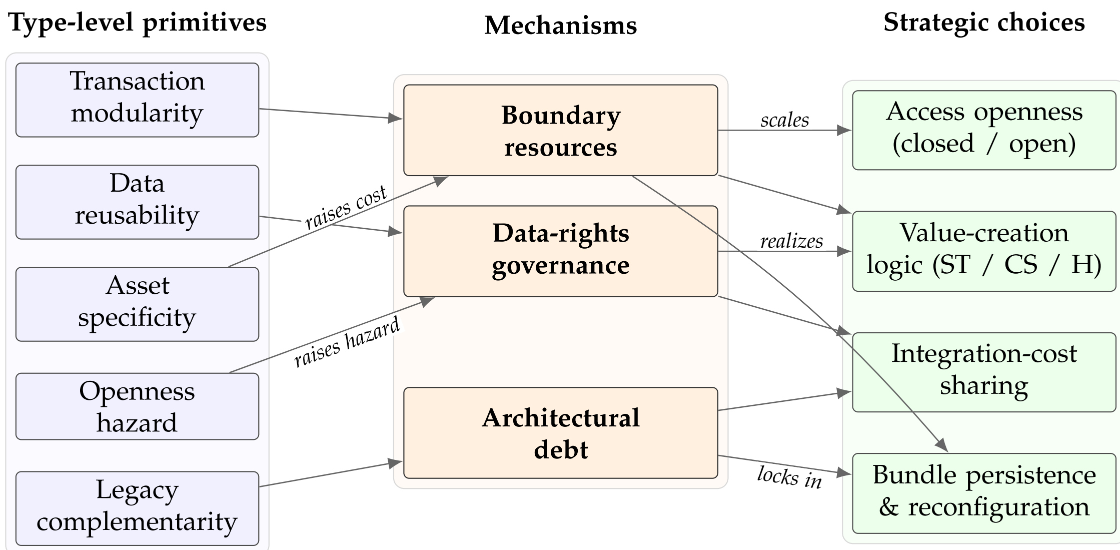

Figure 1: The three mechanisms mediate type-level primitives into observable strategic choices. Boundary resources scale modular transactions into open architecture. Data-rights governance converts latent data reusability into realized cross-side value. Architectural debt locks bundles in over the lifecycle. Asset specificity and openness hazard are shown as separate primitives because they enter the configurational logic through different mechanisms (asset specificity raises integration cost, openness hazard raises the cost of opening to third parties), even though they tend to co-vary across platform types.

3.4 Propositions

The conceptual model yields a small set of propositions about bundle coherence, persistence, and compatibility. We state each proposition in two registers. The first is an *observable-pattern* claim about the joint distribution or transition dynamics of the three strategic choices. The second interprets the pattern in terms of the main mechanisms we presented above.

Proposition 1 (Bundle coherence as discrete attractor structure) *The strategic choices observed in B2B platforms (value-creation logic, openness, and integration-cost sharing) are not statistically independent, and their joint distribution concentrates on a few coherent combinations rather than spreading evenly across the configuration space.*

Observable pattern. The joint distribution of value-creation logic and openness concentrates on a small number of cells, with sparse off-diagonals, and openness and cross-side value are strongly and positively associated. Hence, the claim is disconfirmed if the off-diagonal cells (open/standalone, closed/cross-side) are populated at densities near the products of their marginals or if they fill the joint space gradationally rather than clustering.

Proposition 2 (Type-bundle correspondence) *Each B2B platform type is associated with a characteristic bundle, anchored by its specific configuration of boundary resources, data-rights governance, and architectural debt: MP with the open/cross-side bundle, IoT with the closed/standalone bundle, IP&S with the moderately closed/standalone bundle with chargeable integration, DA with an intermediate bundle whose stability depends on data-rights governance.*

Observable pattern. Stratifying by type, each type concentrates in a characteristic cell of the openness/value-creation grid, with off-diagonals sparse within every type. This is disconfirmed if types distribute similarly across bundles, or if a type's modal cell is an off-diagonal one.

Proposition 3 (Bundle persistence through architectural debt) *Once a platform has committed to a bundle, the architectural debt accumulated through bundle-specific investments makes transitions to alternative bundles costly. Bundles therefore exhibit strong persistence over the lifecycle, with persistence stronger when more architectural debt has accumulated.*

Observable pattern. Within bundle cohorts, stage-to-stage transition probabilities are high on the diagonal, and the switches that do occur are concentrated early and rarely reversed. This is disconfirmed if transition matrices are close to uniform, or if reversals are as common as forward moves.

Proposition 4 (Lifecycle deepening within bundles) *Within a given bundle, the lifecycle is characterized by deepening rather than reconfiguration* when the bundle's anchoring primitives remain stable over the lifecycle. *Under that condition, as boundary resources, installed bases, and governance routines accumulate, platforms move further toward the bundle's archetypal configuration, not toward alternative bundles. Where anchoring primitives are themselves stage-dependent, the deepening pattern may be non-monotonic, and the bundle may exhibit stage-specific reconfiguration.*

Observable pattern. Within a bundle, cross-sectional distributions shift monotonically toward the archetypal configuration across stages, *except* where an anchoring primitive is itself stage-dependent, in which case the trajectory may reverse. The primary (monotonic) clause is disconfirmed if bundles drift toward *other* bundles' archetypes as they mature. The monotonic clause is a genuine prediction of the boundary-resource signature: as a platform invests in the infrastructure that supports its current bundle, the bundle's archetypal configuration becomes progressively easier to reach than alternatives.

Proposition 5 (Compatibility through shared architectural foundations) *Hybrid platforms (those combining two type-functionalities) cluster in compatibility regions defined by shared architectural foundations. Specifically, MP–DA hybrids are common because both rely on relatively low asset specificity and benefit from shared boundary-resource investments. IoT–DA and IoT–IP&S hybrids are common because they share high asset specificity and infrastructure investment. MP–IoT hybrids are rare because their architectural foundations are incompatible.*

Observable pattern. Observed hybrids concentrate in a subset of type-pairs and are sparse in others. This is disconfirmed if hybrids distribute evenly across type-pairs, or concentrate in pairs our assignments call incompatible.

4. Data Collection and Structural Profiling as an Abductive Pattern Discovery

4.1 Sample and Survey

The empirical setting required primary data collection. Existing archival sources can identify firms, sectors, funding histories, or product descriptions, but they do not systematically record the lifecycle-stage choices central to our theory: whether the platform created standalone or cross-side value at prior stages, whether it relied on own, mixed, or third-party offerings, and how up-front integration costs were allocated. We therefore designed and fielded a purpose-built survey through guided online interviews. The dataset was constructed in three iterative stages. First, a seed list of approximately 80 platforms were extracted from a German BDI white paper (BDI, 2020). This list was subsequently expanded to roughly 370 platforms through a systematic manual-research process that combined (1) desk-research by analyst at Capgemini Invent, (2) previous research studies (BDI, 2020; etventure, 2020), and (3) a collaborative effort with INJ Partners, a dedicated market-research firm. Each candidate of the list was reviewed individually and classified into one of four archetypes (MP, DA, IP&S, and IoT) on the basis of its underlying business model. The classification scheme was designed to mitigate the semantic ambiguity of the term "platform" by requiring explicit evidence of multi-sided value creation before inclusion.

The empirical component of the project comprised a structured survey administered over a four-month window (January – April 2023), which was subsequently codified. A questionnaire was co-developed by the internal team over a six-month design phase (second half of 2022) using a nine-category framework that limited the instrument to 30 survey items (2-3 questions per category). Among those frameworks, we focus specifically on *value-creation logic*, *openness*, and *integrations* to examine the validity of our theoretical contributions. After a pilot run with 10% of the intended sample, the instrument was refined and then rolled out to a final sample of 200 respondents drawn from the original pool of 370 companies. The sampling strategy aimed for geographical (United States, Europe, and Asia) and archetypical balance (MP, DA, IP&S, and IoT). INJ Partners conducted all interviews independently. Survey progress was monitored at 10%, 50%, and 100% completion milestones, enabling iterative quality checks. All data-collection activities complied with Capgemini Invent's publication policies.

The original sample comprises 200 B2B platform respondents collected through guided online interviews. After dropping the four pre-launch responses for which transition data are minimal, the analytic sample is $N = 196$ platforms. Of these, 48 (24%) were at launch, 119 (61%) at scale, and 29 (15%) at maturity at the time of the survey. Operating years range from 1 to 26 (median 6). Some platforms exhibit multiple type-functionalities. This gives 248 platform-type observations after excluding 5 that fall outside our four categories of interest. We use this expanded count when analyzing type-level patterns.

The survey items measure platform type, maturity stage, value-creation logic at each prior stage, openness at each prior stage, and integration-cost sharing at present. Exploiting the retrospective items, we expand the 196 platforms into platform-at-stage tuples; a platform currently at a given stage contributes one observation per stage up to and including its current stage. Note that although no platform's current stage is pre-launch, retained platforms still contribute pre-launch tuple reflecting their earlier-stage choices. This yields 569 platform-at-stage tuples. A further 56 tuples arise from platforms that reported both value-creation logics (cross-side and standalone) at the same stage, bringing the total to 625 observations.

A sample is broad in both geographic and industry scope. Geographically, we record a total of 484 region observations across the 196 platforms, an average of 2.47 regions per platform–though the distribution is markedly bimodal rather than concentrated at the mean. The single largest group, 103(53%) platforms operates in only one region, while 36(18%) operate in all six; the remainder span two regions (24 platforms), three (22), four (4), and five (7). The sample spans Europe, North America, South America, APAC, the Middle East, and Africa. Europe accounts for the largest share at 30%, followed by North America at 22% and APAC at 20%; South America, the Middle East, and Africa account for 10%, 10%, and 8%, respectively. By industry scope, 165 platforms operate in a single industry, 25 in two, and 6 in three, giving 233 industry observations; of these, roughly 30% carry no specific sector focus, indicating a significant share of sector-agnostic positioning; among the sectors specified, technology, manufacturing, and retail/wholesale are the most common, at 14%, 12%, and 10% respectively.

4.2 Abductive Logic and Structured Profiling

The empirical strategy is abductive (Sætre and Van de Ven, 2021) rather than hypothetico-deductive (Sarker et al., 2018). We treat the propositions in Section 3 as a starting set of theoretical claims and use the data to identify patterns, both confirmatory and disconfirmatory, that refine the configurational view.

We develop a technique we call *structured profiling*. The technique reconstructs the historical trajectory of each platform's strategic choices across maturity stages, using survey responses that ask retrospectively about choices made in each prior stage. For a platform currently in stage s, profiling produces a sequence of strategic choices $(c_0, c_1, \ldots, c_s)$ across each dimension (value-creation logic, openness, integration cost-sharing). Aggregating across platforms allows us to compute (i) cross-sectional distributions of bundles by type and stage, (ii) stage-to-stage transition probabilities, and (iii) the joint distribution of strategic choices that defines bundle structure.

This approach has two features that make it well-suited to abductive analysis. First, it preserves the trajectory rather than summarizing it, which allows persistence and reconfiguration patterns to be observed directly rather than inferred. Second, it produces categorical joint distributions that can be inspected for clustering, allowing the data to suggest configurational patterns rather than presupposing them.

Given the data limitations and modest sample sizes for individual platform types, limited temporal variation (only four maturity stages), categorical variables throughout, and uneven distribution of cases across maturity stages, we refrain from causal claims. Instead, we employ logistic regression to identify *association*, leveraging its compatibility with our data structure, and triangulate findings with structural profiling to examine the consistency of empirical evidence across analytical approaches. This strategy allows us to evaluate our theoretical model's empirical support while acknowledging our data's constraints. Consistent with the two-register statement of the propositions (Section 3), the analysis adjudicates only the *observable-pattern* register of each claim; because the main three mechanisms are not measured directly.

5. Descriptive Empirical Patterns

We organize the empirical patterns around the five propositions of Section 3, with explicit attention to where the data broadly support the configurational view and where they suggest refinement.

5.1 Configurational Bundle Coherence (Proposition 1)

To evaluate the statistical independence between strategic choices, especially between value-creation logic and openness, we conduct logistic regression with specification shown in Eq 1, while controlling for maturity stage and platform type, with results presented in Table **??**. Categorical variables are defined as follows: Cross-side $\in \{0,1\}$, Platform Openness $\in \{1,2,3\} = \{\text{Closed}, \text{Mixed}, \text{Open}\}$, Maturity Stage $\in \{1,2,3,4\} = \{\text{Pre-launch}, \text{Launch}, \text{Scale}, \text{Mature}\}$. For platform type, we use indicators $t_{mi} \in \{0,1\}$ for four binary $m \in M = \{\text{IoT}, \text{DA}, \text{IP\&S}, \text{MP}\}$, where each indicator represents whether a platform carries the corresponding type tag. Since a platform can carry more than one tag, we enter the platform type indicators as additive dummies rather than as a single mutually-exclusive categorical variable. Let $p_i = Pr(\text{Cross-side}_i = 1)$. Using logistic regression, we estimate the following equation: $\text{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \eta_i$, with,

$$\begin{aligned}\eta_i \quad &= \textstyle\sum_{k=1}^{3} \beta_k \,\mathbf{1}\{\text{Openness}_i = k\} + \sum_{j=2}^{4} \gamma_j \,\mathbf{1}\{\text{Maturity Stage}_i = j\} + \delta_1 \,\text{IoT}_i + \delta_2 \,\text{MP}_i \\ &\qquad + \delta_3 \,\text{IP\&S}_i + \delta_4 \,\text{DA}_i \end{aligned} \tag{1}$$

Table 1: Association between Cross-side Value Creation Logic and Openness

	Dependent variable:		
		logit(p_i)	
	(1)	(2)	(3)
Product Offering			
Closed	-4.477^{***}	-5.309^{***}	-4.784^{***}
	(0.581)	(0.621)	(0.681)
Mixed	0.562^{***}	-0.239	0.188
	(0.172)	(0.253)	(0.441)
Third-party	1.554^{***}	0.974^{***}	1.359^{***}
	(0.181)	(0.215)	(0.426)
Constant	No	No	No
Stage Controls	No	Yes	Yes
Type Controls	No	No	Yes
Observations	625	625	625
Log Likelihood	-210.253	-199.987	-193.784
Akaike Inf. Crit.	426.506	411.973	405.569

Note: *p<0.1; **p<0.05; ***p<0.01. The model is estimated without an intercept. Because openness is mutually exclusive, its three indicators (closed, mixed, third-party) enter as a full set and partition the intercept among themselves; their coefficients are level-specific baseline log-odds rather than contrasts against an omitted openness category. Maturity stage retains pre-launch as a dropped reference, so stage coefficients are log-odds ratios relative to pre-launch. Type indicators enter additively because platforms may carry multiple type-tags, and are interpreted as marginal log-odds increments for carrying a given functionality rather than as contrasts against a reference type. The openness coefficients are the quantities of interest; stage and type only enter as controls, so we do not report their coefficients.

The result provides descriptive evidence in support of Proposition 1. Closed platforms, those exclusively offering proprietary products, exhibit an extremely low probability of participating in cross-side value creation, reflecting sparse off-diagonal cells characteristic of a discrete strategic bundle in which architectural choices are not mutually reinforcing.

Mixed platforms, which simultaneously offer both proprietary products and third-party products, occupy an intermediate position with approximately even odds of cross-side value creation. Notably, this effect does not achieve statistical significance after controlling for relevant fixed effects, suggesting strategic instability at this intermediate point, a position lacking the internal coherence that characterizes specialized architectures.

In contrast, purely open platforms, those exclusively offering third-party products and services, demonstrate substantially elevated odds of cross-side value creation, indicating tight coupling between openness and value-creation mechanisms. This finding underscores the proposition's central claim that platform strategies cluster into internally coherent bundles rather than distributing independently across the strategic space. Pure strategies (closed or open) activate complementary IS mechanisms and architectural primitives that facilitate or inhibit cross-side value creation, whereas hybrid strategies lack this internal reinforcement.

Table 2: Joint distribution of value-creation logic and openness, by platform type.

	Closed/Own	Mixed	Third-party only/Open
Marketplace			
Standalone	22.4% (26)	10.3% (12)	0.9% (1)
Cross-side	0.0% (0)	25.9% (30)	40.5% (47)
Chi-squared Test of Independence		$p < 0.001$	
Data aggregator			
Standalone	51.9% (27)	11.5% (6)	1.9% (1)
Cross-side	0.0% (0)	11.5% (6)	23.1% (12)
Chi-squared Test of Independence		$p < 0.001$	
Intelligent product & service			
Standalone	51.6% (16)	19.4% (6)	3.2% (1)
Cross-side	0.0% (0)	9.7% (3)	16.1% (5)
Chi-squared Test of Independence		$p < 0.001$	
IoT enabler			
Standalone	68.9% (42)	8.2% (5)	1.6% (1)
Cross-side	0.0% (0)	11.5% (7)	9.8% (6)
Chi-squared Test of Independence		$p < 0.001$	

Note: We employed chi-squared tests with Monte Carlo simulation (10,000 replicates) to account for sparse cells across bundle categories. Observation counts in parentheses; includes platforms with both value creation logics present at their current stage.

We treat openness and cross-side value as distinct variables because they refer to different constructs. Openness is a property of the product offering–whether the platform carries third-party products alongside or instead of its own. Cross-side value is a property of network–whether value is created by connecting two distinct sides of the market. Our data help clarify where the two constructs move together and where they diverge.

A purely closed form offers only its own products, so the supply side collapses to the platform itself, leaving only a single side to connect. Cross-side externalities are therefore structurally hard to generate under closed architecture. This is what we observe–no closed platform in our sample creates cross-side value (the closed/cross-side cell in Table 2 is empty across all four types, and the Closed coefficient in Table 1 is large and negative). To that extent, openness and cross-side value do move together, and this reaffirms prior literature.

The part where it breaks down is the reverse pairing. We observe open/standalone platforms: platforms that carry third-party products yet do not create cross-side value, present at varying levels across the type bundles. This combination would be impossible if the two constructs were the same thing, which is precisely why treating them as one variable would obscure it. The existence of open/standalone configurations shows that openness is necessary but not sufficient for cross-side value: a platform can broaden its offering without the two market sides reinforcing each other. Distinguishing the two variables lets us identify this gap and attribute it to the underlying architectural bundle rather than assuming that the openness and cross-side value are interchangeable.

5.2 Type-Bundle Correspondence (Proposition 2)

To examine whether these coherent bundles manifest consistently across different platform bundles, we analyze the joint distribution of value-creation logic and openness by platform type. Table 2 summarizes this distribution across platform bundles. The pattern is unambiguously bundle-shaped. Marketplaces concentrate in the open/cross-side region (40.5% of MPs are open and cross-side), reinforcing the tight coupling between openness and cross-side value creation observed in the regression analysis. IoT enablers, by contrast, concentrate in the closed/standalone region (68.9% are own-product and standalone), reflecting a strategic logic centered on proprietary control. IP&S platforms concentrate similarly (51.6% of their own-product and standalone) but with a secondary cluster in the mixed/standalone cell, suggesting experimentation with mixed product offerings while maintaining a certain level of distance from the cross-side value mechanisms. Data aggregators concentrate in the closed/standalone cell (51.9%) but with a substantial share also in open/cross-side (23.1%), suggesting that this platform type can sustain multiple coherent bundles–a flexibility that likely reflects the foundational role of data-rights governance in determining how they operate.

Crucially, the off-diagonal cells, open/standalone and closed/cross-side, are sparsely populated for all types, which is what bundle coherence predicts: choices co-occur according to bundle structure rather than independently. The distribution is also consistent with the bundle structure predicted by Proposition 1: choices cluster in characteristic combinations rather than scattering across the joint space. Independence would predict that the marginal distributions of openness and value-creation logic should multiply to the joint cells, which is decisively rejected by inspection (e.g., MP shows 40.5% in the open/cross-side cell against an independence prediction of roughly 27%; IoT shows 68.9% in the closed/standalone cell against an independence prediction of roughly 54%). The clustering is sharpest at the bundle archetypes and weakest at the off-diagonal cells, exactly as the configurational view predicts.

The shape of the joint distribution also bears on the discrete-attractor commitment. Specifically, what Table 2 decisively rejects is *independence*: the off-diagonal cells are far sparser than the products of their marginals would imply. We therefore read the pattern as *consistent with* the discrete-attractor framing and as a clear departure from independence.

One point worth highlighting is the relatively high proportions of IP&S that create standalone value while operating in an open mode, specifically, while simultaneously carrying both their own and third-party products. This is further assessed in Section 5.4.

Cost-sharing convergence: a confirmed configurational prediction

Cost-sharing correspondence is documented in Table 3. Both MP and IoT exhibit low user cost-sharing, but the underlying mechanisms appear different: MP has the lowest absolute integration costs (40% report no costs), while IoT has the highest (only 9 of 58, or 16%, report no costs). A chi-squared test of independence between platform types and integration cost-sharing is, however, only marginally significant, and given the sparse cells the test is underpowered. This result yields that the type-level association with cost structure is weak and not statistically detectable in this sample.

We are careful not to over-read the result in either direction: the marginal p-value is not evidence that cost-sharing differs systematically across all four types, but neither, given the low power, is it evidence that the types are equivalent. A more informative read is thus the specific pattern of similar outcomes reached through different mechanisms, which itself the configurational signal: the two bundles occupying opposite regions of the space converge on platform-borne integration but for different architectural reasons.

Table 3: Up-front integration cost-sharing, by platform type.

	MP	DA	IP&S	IoT
No integration cost	40	12	10	9
Platform pays	43	23	11	38
Platform and user share	16	8	7	6
User pays	10	7	3	5
Chi-squared Test of Independence	*p-value=0.067*			
Total platforms	109	50	31	58
Share with integration costs	0.63	0.76	0.68	0.84
Share where users pay (any rate)	0.24	0.30	0.32	0.19

This convergence is worth dwelling on because it is a place where the configurational view delivers a non-obvious prediction that an independent-levers theory cannot recover. The independent-levers view of cost-sharing predicts that platforms with strong cross-side feedback should subsidize integration to protect demand-sensitive participation, while platforms with weak cross-side feedback should pass more cost to users. By that logic, IoT enablers, which exhibit the weakest cross-side orientation in the sample, should have the *highest* user cost-sharing share. Instead, they have the lowest (19%, against 24% for MP, 30% for DA, and 32% for IP&S). MP and IoT converge on low user cost-sharing despite occupying opposite bundles.

The configurational view explains this convergence directly. The MP bundle exhibits *demand-protective subsidization*: cross-side feedback makes integration cost a binding constraint on participation, so the platform absorbs cost to preserve the multi-sided liquidity that defines its value.

The IoT bundle exhibits *infrastructure-investment subsidization*: integration is itself a strategic asset that creates installed-base lock-in, deepens technical dependence, and generates option value through future monetization (data access, service expansion, predictive maintenance). The platform absorbs cost not to protect demand but to build proprietary infrastructure within the customer environment.

IP&S platforms occupy a different position along the same logic: their integration is bundled into a visible solution that customers perceive as creating immediate private value, so user cost-sharing is higher than in IoT despite a similar architectural foundation in legacy complementarity. The configurational view recovers this meaningful heterogeneity by anchoring the cost-sharing choice in the architectural logic of the bundle, not in the cross-side coefficient alone.

5.3 Persistence of bundle (Proposition 3)

Do platforms leave their bundle? Table 4a reports stage-to-stage transition probabilities for value-creation logic. The off-diagonal probabilities are low across the board: most platforms retain their value-creation logic from one stage to the next, regardless of starting position. Cross-side persistence in the launch-to-scale transition is essentially complete for DA, IP&S, and IoT (1.00) and very high for MP (0.98). Standalone persistence is similarly high (0.88–1.00 in launch-to-scale; 1.00 across all types in scale-to-mature). The handful of switches that do occur are concentrated in launch-to-scale and skew toward MP standalone-to-cross-side (12%), consistent with marketplaces transitioning into their archetypal bundle as boundary resources accumulate.

The architectural-debt mechanism predicts that persistence should strengthen with maturity, as bundle-specific investments accumulate. The data are partly consistent: standalone persistence reaches 1.00 across all types in scale-to-mature, and IoT cross-side persistence is also 1.00. But cross-side persistence weakens in scale-to-mature for DA (0.67) and IP&S (0.50). These weakenings are concentrated precisely in the platform types whose bundles depend on data-rights governance and chargeable integration, an anomaly whose theoretical implications we develop in Section 6. A similar pattern holds for openness (Table 4b). Once a platform has chosen own-products, mixed, or third-party-only, it almost never moves backward toward more-closed configurations. Movement toward more-open configurations occurs but is concentrated in the

Table 4: Transition Probabilities.

	MP		DA		IP&S		IoT	
	ST	CS	ST	CS	ST	CS	ST	CS
Launch → Scale								
From ST	0.88	0.12	0.92	0.08	1.00	0.00	0.96	0.04
From CS	0.02	0.98	0.00	1.00	0.00	1.00	0.00	1.00
Scale → Mature								
From ST	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
From CS	0.07	0.93	0.33	0.67	0.50	0.50	0.00	1.00

(a) Value-creation transition probabilities (single-value platforms).

	MP			DA			IP&S			IoT		
	O	M	T	O	M	T	O	M	T	O	M	T
From Own (O)	0.90	0.12	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
From Mixed (M)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
From Third only (T)	0.00	0.02	0.98	0.00	0.10	0.90	0.00	0.17	0.83	0.00	0.00	1.00

(b) Architecture transition probabilities, launch → scale.

early stages. One exception we observe is DA, which reverted from open to closed, shifting from a mixed configuration to its own products only. Although noteworthy, we draw limited theoretical implications from it. Pre-launch design phases are highly experimental, and our focus remains on the more strategically significant post-launch architectural choices.

Together, the between-bundle differences and the continuation of each bundle across lifecycle stages demonstrate bundle persistence. This persistence underscores the importance of early commitment: once a platform settles into a bundle at the start of its lifecycle, that choice tends to carry forward stage-to-stage, because the accumulated architectural debt and bundle-specific boundary resources make switching *costly*.

Persistence, however, is not absolute. The off-diagonal probabilities are non-zero in some instances, but they are small, and the few switches that occur cluster where architectural debt is low: where a bundle rests on reusable, one-time boundary resource investment rather than recurring bespoke integration, the accumulated debt is weaker, leaving some room to revert toward the adjacent bundle.

Table 5: Proportions of Different Architectures by Stage

Value Creation	Stage	MP	DA	IP&S	IoT
Stand-alone	Launch	0.40	0.78	0.88	0.98
	Scale	0.36	0.67	0.85	0.93
	Mature	0.18	0.75	0.75	0.67
Cross-side	Launch	0.60	0.22	0.12	0.02
	Scale	0.64	0.33	0.15	0.07
	Mature	0.82	0.25	0.25	0.33

(a) Value Creation Logic

Architecture	Stage	MP	DA	IP&S	IoT
Closed	Launch	0.26	0.54	0.52	0.72
	Scale	0.21	0.50	0.50	0.66
	Mature	0.05	0.56	0.33	0.50
Open	Launch	0.74	0.46	0.48	0.28
	Scale	0.79	0.50	0.50	0.34
	Mature	0.95	0.44	0.67	0.50

(b) Closed and Open Architecture

5.4 Lifecycle Deepening (Proposition 4)

Table 5 reports the stock of choices at each stage, irrespective of the route by which they arrived. The lifecycle pattern in strategic choice of openness and cross-side value creation is one of deepening rather than reconfiguration, especially from launch to scale. MP openness rises from 74% at launch, to 95% at maturity. IoT openness rises from 28% at launch to 34% at scale but never approaches MP levels. The share of platforms adopting cross-side value-creation logic increases for MP (60% to 82% from launch to maturity) and modestly for IP&S (12% to 15%, from launch to scale) and IoT (2% to 7%, from launch to scale). DA, however, exhibits non-monotonicity: cross-side share rises from launch (22%) to scale (33%) but then *declines* to 25% at maturity.

These diverging trajectories reflect underlying differences in how readily each bundle can generate cross-side value early in its lifecycle. Marketplace platforms are advantaged in the modularization of exchange: identifying counterparties, reducing search costs, standardizing transaction rules, and enabling repeated interaction across buyers and suppliers. Their cross-side bundle can deepen naturally as the platform matures with increased cross-side value generation with greater number of integration and rich data accumulation.

DA, IP&S, and IoT, in contrast, face greater frictions. Although DA possesses high potential for data reuse, this potential is difficult to realize before sufficient data volume, data-rights governance, and participant trust have accumulated. These features increase the relative attractiveness of standalone value creation at launch and delay the point at which cross-side value can dominate. For IoT and IP&S, standalone value is not merely a transitional starting point but often the primary economic logic of the platform. These platforms frequently build on proprietary assets, installed equipment, embedded software, customer-specific processes, and long-standing service relationships. Although both type-bundles display a modest distributional shift toward cross-side logic as they mature, the small mature-phase sample precludes meaningful inference about the shift; what we can report with greater confidence is their persistent tendency to retain a standalone value creation logic alongside a discernible movement toward greater openness.

5.5 Compatibility Among Hybrids (Proposition 5)

Of the 196 platforms, 57 (29%) report multiple type-functionalities. The compatibility pattern is striking: MP–DA combinations are the most common (11 cases), followed by IoT–DA (6) and IoT–IP&S (5). MP–IoT combinations are rare (4), and MP–IP&S combinations are also rare (5, of which most overlap with other types). The pattern is consistent with Proposition 5: hybrids cluster where bundles share architectural foundations.

The MP–DA pairing is theoretically clean: both bundles rely on relatively low asset specificity and benefit jointly from boundary-resource investment. Mercateo Unite, for example, runs the MP layer for buyer-seller matching while the DA layer aggregates transaction data for procurement insight; the boundary resources serving the matching market also serve the data-aggregation function. The IoT–DA and IoT–IP&S pairings are similarly compatible: all three bundles share high asset specificity and infrastructure investment, so the architectural debt does not have to be reset to add the second function. The MP–IoT pairing is rare because the architectural foundations are incompatible: the MP bundle's reliance on standardized exchange and the IoT bundle's reliance on customer-specific integration cannot be served by the same architecture without substantial reconfiguration.

6. Theoretical Refinement

The empirical patterns broadly support the configurational view, and Section 5 has shown that one notable cost-sharing convergence, between marketplaces and IoT enablers, is in fact a non-obvious prediction that follows directly from the configurational logic developed in Section 3. One empirical pattern remains, however, that the conceptual model anticipates only conditionally and whose specific mechanism warrants explicit theoretical engagement: data aggregators exhibit a non-monotonic lifecycle trajectory. The non-monotonicity appears in both the stage-share distribution and the cross-side persistence probabilities, and it runs counter to the deepening rather than with it. Proposition 4 allowed for non-monotonic deepening where a bundle's anchoring primitive is itself stage-dependent, but it left the mechanism producing such stage-dependency unspecified.

Proposition 4's primary clause predicts monotonic movement toward bundle archetype when anchoring primitives are stable. Its conditional clause anticipates non-monotonic deepening when they are not. Data aggregators sit on the conditional side: as reported in Section 5.4, their cross-side and openness shares rise from launch to scale and then decline at maturity, the only type to do so. The proposition's structure thus places the explanatory burden on identifying which DA primitive is stage-dependent and why—work the conceptual model leaves unspecified.

A configurational theory built only on transaction modularity and asset specificity cannot explain this. Both primitives are stable across DA's lifecycle, so they cannot account for stage-dependent reversals. The mechanisms developed in Section 3 can. Specifically, data-rights governance is the load-bearing primitive for the DA bundle, and it interacts with maturity in a way the original framing did not fully capture. As DA platforms mature, three things happen simultaneously: (i) accumulated data assets become more strategically valuable, raising the appropriability hazard for participants; (ii) data-protection regulation (GDPR, sector-specific privacy law, audit requirements) becomes more demanding, raising the governance burden; (iii) competing platforms or vertical-integration alternatives become more credible, lowering switching costs for participants who feel their data sovereignty is at risk.

The result is what we call *governance-burden inversion*: at maturity, the marginal cost of sustaining credible data-rights governance grows faster than the marginal benefit of additional cross-side value, producing a retreat from the open/cross-side bundle toward the closed/standalone bundle. The mechanism is not a failure of the configurational view. It is a consequence of taking data-rights governance seriously as a load-bearing building block that itself evolves over the lifecycle. This refinement leads to:

Theoretical Refinement 1 (Governance-burden inversion in data-intensive bundles) *For platform types whose bundle is anchored by data-rights governance, the relationship between maturity and bundle archetype is non-monotonic. Specifically, when the marginal cost of sustaining credible data-rights governance grows faster than the marginal benefit of cross-side value, mature platforms retreat from open/cross-side configurations toward closed/standalone configurations. This effect is most pronounced for data aggregators because data-rights governance is most directly load-bearing for their bundle.*

The refinement has two consequences for the theory. First, it specifies the mechanism by which data-rights governance becomes a stage-dependent primitive, the case Proposition 4's conditional clause anticipated but did not characterize. Data-rights governance is not just a credibility property at a moment but a stage-dependent capability whose cost trajectory matters. Second, it suggests that bundle stability is type-specific: MP and IoT bundles are anchored by primitives (transaction modularity and asset specificity) that do not invert with maturity, so their bundles satisfy the primary clause and deepen monotonically. The DA bundle is anchored by a primitive that can invert, which is why DA exhibits the only non-monotonic trajectory observed in the sample.

IP&S open under different incentives. Rather than opening to build a cross-side market, they incorporate third-party products into an existing portfolio–adding features on top of their own proprietary services and integrating the client firm's installed product base to elevate it with new functions delivered by the platform core. This directly qualifies the coherence claim of Proposition 1: the open/standalone cell that the claim treats as incoherent, and expects to remain sparse, is for IP&S a coherent configuration rather than an off-diagonal anomaly. IBM's watsonx, for instance, layers AI services onto a client's existing system, enhancing that installed base

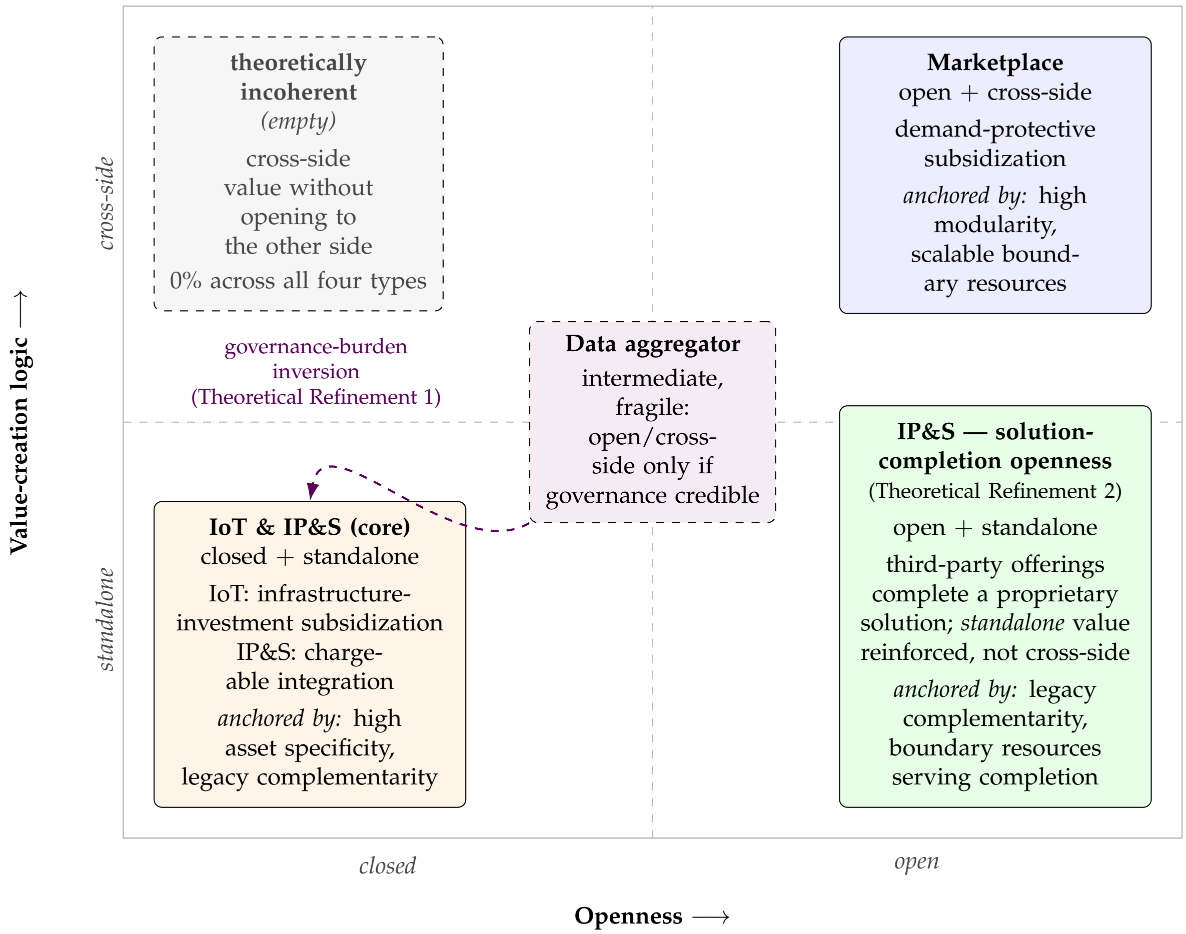

Figure 2: The configurational map of B2B platform bundles. Each bundle is anchored by the architectural primitives noted within its box. The marketplace bundle (open/cross-side) combines modular openness with demand-protective subsidization. IoT and IP&S are *distinct* types that share the closed/standalone core region but differ in cost-sharing logic: infrastructure-investment subsidization for IoT and chargeable integration for IP&S. The two-pathways logic, developed in Section 3 and confirmed empirically in Section 5, accounts for the otherwise-puzzling convergence of marketplaces and IoT enablers on low user cost-sharing despite occupying opposite bundles. The data-aggregator bundle, drawn with a dashed border, occupies an intermediate region whose stability depends on data-rights governance. Weak governance produces drift toward closed/standalone via governance-burden inversion (Theoretical Refinement 1). Under the baseline configurational view the open/standalone cell is incoherent (openness without a cross-side rationale to amortize its governance cost) but it becomes coherent for platforms with a focal product line (IP&S), where boundary resources scale third-party integration to complete a proprietary solution rather than to mediate exchange (Theoretical Refinement 2).

through a proprietary layer rather than mediating exchange between two sides. In this logic, the seemingly incoherent open/standalone bundle becomes feasible precisely when the boundary resources are strong enough to make third-party integration scalable without surrendering the proprietary core. The refinement thus leads to:

Theoretical Refinement 2 (Solution-completion openness) *Openness is coherent without cross-side value when its governance cost is used to complete the proprietary solution rather than through cross-side network effects. For platform types with high legacy complementarity and a focal product line, most likely IP&S, the open/standalone configuration is coherent rather than incoherent, and is realized predominantly in the mixed (own-plus-third-party).*

Solution-completion openness is a consequence of taking boundary resources seriously as a load-bearing primitive: under the high legacy complementarity that anchors IP&S, boundary resources scale third-party participation toward completing a proprietary solution and creating standalone value rather than toward creating cross-side.

The methodological message of these refinements reinforces the abductive logic of the empirical strategy. The value of the configurational view is not that it predicts every empirical pattern but that, when patterns deviate, the deviations are interpretable in terms of the same load-bearing primitives that define the bundles.

Figure 2 synthesizes the resulting theoretical map. The four bundles occupy distinct regions of the openness–value-creation space, each anchored by the architectural primitives identified in Section 3.

7. Limitations and Future Research

The limitations of this study can inspire avenues for future research. To begin with, the empirical evidence is descriptive and retrospective. Still, to our knowledge, this is the only available dataset which provides insights on the evolution of B2B platforms over their life-cycle. Future work should use longitudinal data on platforms whose architectural choices can be observed contemporaneously. A related concern is *survivorship*: the sample observes surviving platforms only, so platforms that were forced to reconfigure or exited before reaching later stages are absent. Because this selection mechanically inflates observed persistence, the persistence evidence for Proposition 3 should be read as an upper bound, and disentangling architectural-debt lock-in from survivorship is a first-order task for longitudinal designs that observe entry and exit.

Moreover, our measurement of openness, value-creation logic, and cost-sharing relies on self-classification. Consistent with our identification strategy, the three load-bearing mechanisms are inferred from their observable signatures (Table 6) rather than measured. Richer technical measures (API maturity, data-governance audit results, integration-cost decomposition) would allow them to be measured directly and the signature inferences to be validated against the underlying constructs.

Note also that the configurational view as developed here is qualitative. The natural set-theoretic operationalization is qualitative comparative analysis (Ragin, 1987, 2008; Fiss, 2011), which is built specifically for the categorical, configurational, modest-N data we analyze and would allow bundle coherence to be expressed as consistency and coverage of causal recipes (Park et al., 2020). We report an illustrative crisp-set QCA in the appendix, but do not adopt it as our primary method for two reasons. First, our present aim is to establish observable-pattern regularities rather than to identify sufficient configurations. Second, several bundle-defining primitives are not directly measured in our data and so cannot serve as calibrated conditions; the QCA can therefore be run only on the observable type indicators, which limits what a set-theoretic analysis can establish. A fuller QCA that operationalizes these primitives would be a natural direction for future work once appropriate measures are available.

Several theoretical scope conditions also bound the configurational view as developed here. First, we abstained from inter-platform competitive dynamics, which prior work has shown to be an important driver of ecosystem outcomes (Tiwana, 2015). A competition-aware extension would ask how the architectural debt of incumbents shapes entrants' bundle choices and whether bundles can be defended against imitation. Second, the configurational view explains bundle coherence and persistence but not bundle performance: two platforms within the same bundle can differ substantially in scale, longevity, or value capture. A productive line of future research would investigate how generative AI and agentic interfaces alter the main mechanisms themselves.

8. Conclusion

This paper has developed a configurational theory of B2B platform evolution. Its point of departure is that the field's central strategic choices, value-creation logic, access openness, and integration-cost sharing, are typically analyzed as independent levers, each optimized on its own logic of network effects, governance, or pricing. We have argued that this framing misdescribes how B2B platforms actually evolve. The three choices are not pulled independently. They co-occur in a small number of coherent bundles, and the coherence, persistence, and admissible hybrid combinations of those bundles are anchored by three information-systems mechanisms: boundary resources, data-rights governance, and architectural debt. The paper's central contribution is to shift the unit of analysis from the individual platform decision to the architecturally anchored bundle, and to identify the mechanisms that make bundles cohere, endure, and occasionally reverse.

This reframing does explanatory work that an independent-levers view does not naturally provide. The same observable choice acquires a different meaning across bundles: low user cost-sharing reflects demand-protective subsidization in marketplaces but infrastructure-investment subsidization in IoT enablers—architecturally distinct logics that converge on the same observed outcome. Persistence, likewise, is not mere inertia but the servicing cost of accumulated architectural debt, which also explains why hybrids cluster only where bundles share architectural foundations. And where a bundle's anchoring primitive is itself stage-dependent, as data-rights governance is for data aggregators, the theory anticipates the non-monotonic lifecycle trajectory we observe and names its mechanism, governance-burden inversion. Compared with taxonomic and formal-modeling work, the configurational view thus explains the relationships among strategic choices, and the architectural reasons they hold together, rather than cataloguing platform types or optimizing a single decision under stylized assumptions.

The view also has direct implications for practice. Because the same primitives anchor all three choices, platform strategy is best set jointly rather than as a sequence of separable decisions. The compatibility map is immediately actionable: marketplace–data-aggregator and IoT–data-aggregator extensions are architecturally accessible, whereas marketplace–IoT combinations demand a costly architectural reset and are better staged or avoided. Two type-specific lessons follow. Data aggregators should treat data-rights governance as a capability to build early, since its cost becomes a binding constraint precisely at maturity, when the temptation to retreat toward closed, standalone delivery is strongest. IoT enablers, in turn, should evaluate integration subsidies as infrastructure investment whose return arrives through installed-base lock-in and future monetization rather than short-run participation elasticity.

More broadly, B2B platforms do not converge on a single open, cross-side, winner-takes-all architecture. They settle into a few internally coherent bundles whose stability reflects shared architectural foundations rather than fixed industry categories. Seen this way, B2B platform strategy is not a series of separable choices but the management of an architecturally anchored bundle whose elements coevolve over the lifecycle.

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Online Appendix

Identifying the Mechanisms by Observable Signature

The configurational view rests on three architectural mechanisms: boundary resources, data-rights governance, and architectural debt (Section 3). These mechanisms are properties of a platform's information architecture and governance, and in principle they have concrete technical instantiations. Our data, however, do not measure those instantiations directly. Each mechanism is identified *indirectly*, through the distinctive pattern it leaves in the observable choice and transition data. Table 6 states, for each mechanism, the observable signature we attribute to it, why that signature discriminates the configurational account from the independent-levers alternative, and where in the empirical analysis the signature is confronted with the evidence.

An independent-levers account treats value-creation logic, openness, and integration-cost sharing as three separately optimized decisions; a configurational account treats them as jointly anchored by shared mechanisms. These two views agree on much, so the table is built around the places where they *disagree*. Each row names a prediction the configurational mechanism makes and the independent-levers view does not, so that observing the predicted pattern is evidence for the former over the latter.

Read row by row, the table also previews the structure of the empirical sections. *Boundary resources* bound the level of openness a platform can sustain, so their signature is a ceiling on realized openness and an association between openness and platform type, rather than openness varying freely as a stand-alone governance choice. This signature is confronted with the coherence and openness evidence in Section 5. *Data-rights governance* converts latent data reusability into realized cross-side value only where the governance regime can be sustained; because the cost of sustaining that regime itself rises as data assets and regulatory burden accumulate, its signature includes a *non-monotonic* openness trajectory over the lifecycle in data-intensive bundles, rather than the monotonic deepening the independent-levers view would expect. This signature is confronted in Section 5.4 and, for the data-aggregator case specifically, in the refinement of Section 6. *Architectural debt* accumulates as platforms commit to bundle-specific investments, so its signature is dynamical: high stage-to-stage persistence, switches concentrated early and rarely reversed, and hybrids confined to type-pairs that share architectural foundations, patterns that neither random choice nor stage-invariant preference heterogeneity would generate. This signature is confronted in the persistence evidence of Section 5 and the compatibility analysis of Section 5.5.

Because the mechanisms are inferred from their consequences rather than observed, the table licenses *interpretation* of the observed patterns, not a direct test of the mechanisms themselves. Each proposition in Section 3 is stated accordingly, with an observable-pattern claim (which the empirical sections adjudicate) kept separate from its mechanistic reading, which this table supplies. Direct measurement of the mechanisms (for example, API maturity for boundary resources, audit and permissioning regimes for data-rights governance, or the ratio of bespoke to standardized integration for architectural debt) would allow the signatures to be validated against the underlying constructs and is a natural direction for future work.

Table 6: Identification of the three mechanisms by observable signature.

Mechanism	**Observable signature (register-1 pattern)**	**Discriminates against independent levers because…**	**Where confronted**
Boundary resources	Ceiling on realized openness; openness tracks type rather than varying freely across it	…independent levers treat openness as a free, separately optimized governance choice	§5 (coherence; openness)
Data-rights governance	Cross-side value realized only where governance is sustainable; non-monotonic openness in data-intensive bundles over the lifecycle	…independent levers predict openness rising monotonically with scale, with no governance-cost reversal	§5.4; §6 (DA)
Architectural debt	High stage-to-stage persistence; switches early and rarely reversed; hybrids in shared-foundation type-pairs	…independent levers imply free re-optimization each stage, hence no lock-in and no compatibility structure	§5 (persistence); §5.5

Note. The mechanisms are not measured directly in our data. Each is identified by the pattern it implies in the observable choice and transition data. The final column indicates where each signature is confronted with the evidence in Section 5.

Outline of our Identification Strategy

Table 7 outlines our identification strategy for validating each proposition. First, we use logistic regression to assess bundle coherence (Proposition 1) while controlling for lifecycle stage and platform type. Second, we test type-bundle correspondence (Proposition 2) by stratifying analyses by platform type and applying chi-squared independence tests or distributional analysis to examine coherence between architectural bundles. Third, to test bundle persistence (Proposition 3), we employ structural profiling to examine stage-by-stage evolution, calculating transition probabilities to compare persistence and switching patterns across adjacent stages. Finally, we examine lifecycle deepening (Proposition 4) by assessing whether persistence strengthens as platforms mature through cross-sectional distributions at each lifecycle stage.

Table 7: Summary of Identification Strategy for Validating Propositions

Prop.	**VCL**	**Open.**	**Integ.**	**Stage**	**Bundle**	**Analytical Approach**
(1)	✓	✓		Pooled with FE	Pooled with FE	Logit
(2)	✓	✓			Stratified	Chi-squared
(2)			✓		Stratified	Distribution
(3)	✓			✓	Stratified	Structural Profiling: Transition
(3)		✓		✓	Stratified	Structural Profiling: Transition
(4)	✓			✓	Stratified	Structural Profiling: Distribution
(4)		✓		✓	Stratified	Structural Profiling: Distribution

Visualization of the Results of Structural Profiling

Figures 3 and 4 visualize, for value-creation logic and openness respectively, the stage-to-stage transition probabilities reported in Tables 4a and 4b and the stage-wise state distributions discussed in Section 5.4.

In each panel, node size is the share of platforms occupying a state at a given stage, line width is the conditional probability of the next-stage transition, and color separates platforms that retained (blue) from those that switched (coral) their logic.

How to read a panel. Take the marketplace panel of Figure 3. At launch, 60% of marketplaces are already cross-side and 40% standalone. Following the launch-to-scale transitions, standalone marketplaces mostly stay standalone (0.88) while a minority (0.12) convert to cross-side, and

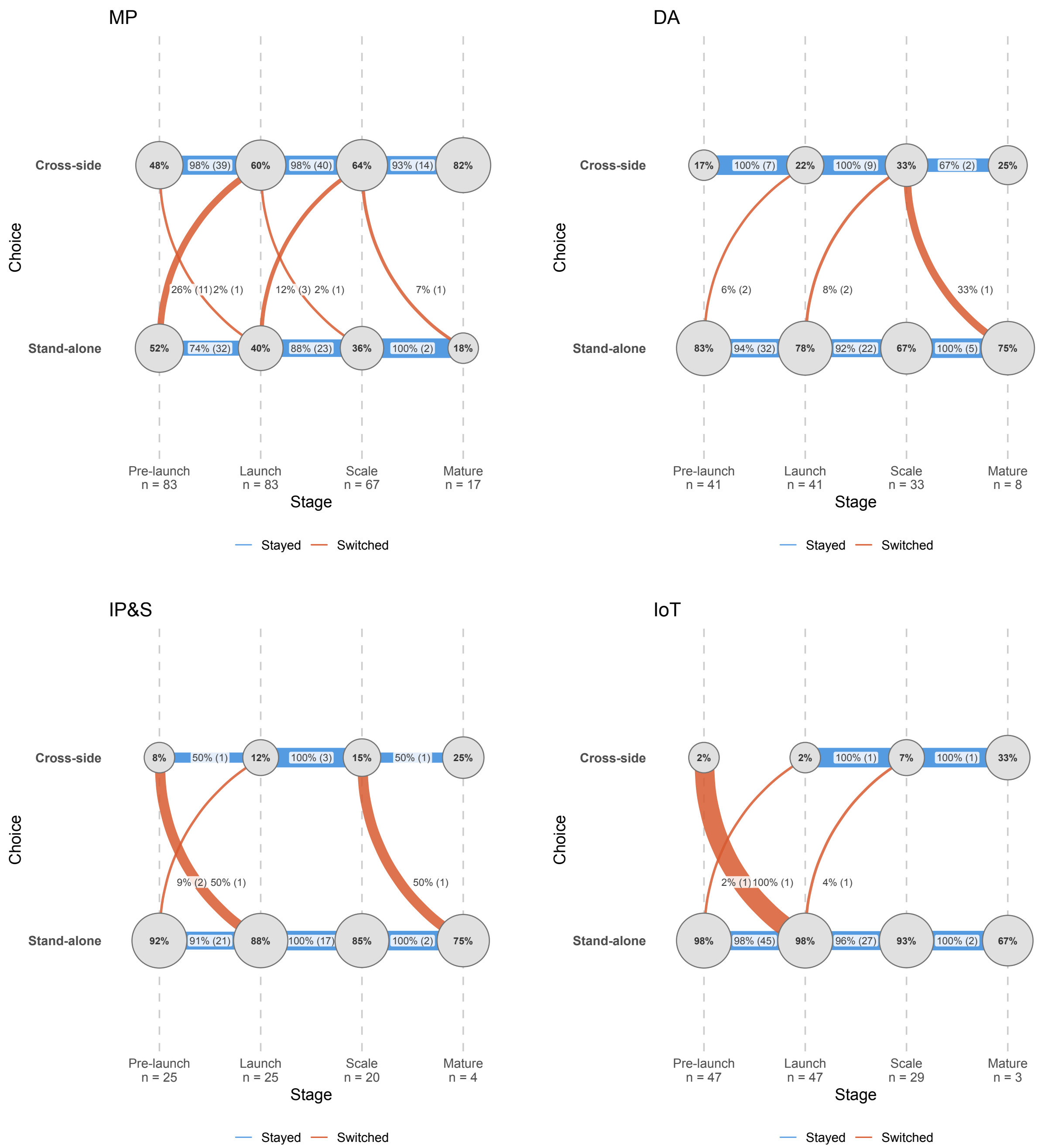

Figure 3: Visualization of Structural Profiling–Transition Probabilities and State Distributions in Value-Creation Logic: This figure maps how platforms move between value-creation states across lifecycle stages. Node size is the share of platforms in each state at a given stage. Line width is the conditional probability of transitioning to each next state and color distinguishes platforms that retained (blue) versus switched (coral) their logic. The panel is right-censored by lifecycle stage, as platforms mature, progressively fewer remain under observation, reducing the number of observations at later stages. Consequently, the transition patterns reported for the later stages are inferred from, and extrapolated on the bases of, the revealed strategic choices of the subset of platforms that reached those stages.

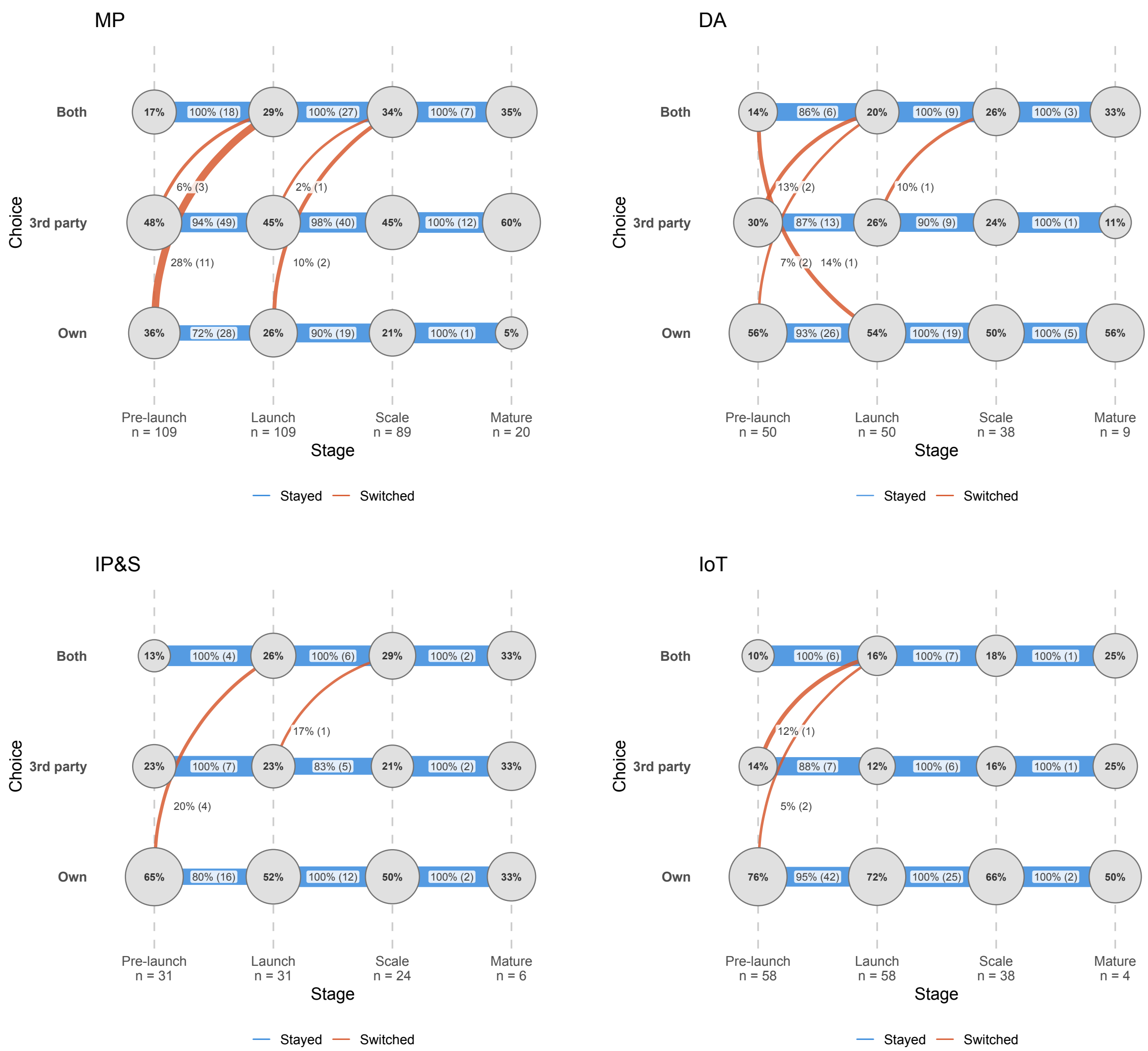

Figure 4: Visualization of Structural Profiling–Transition Probabilities and State Distributions in Openness Logic: This figure maps how platforms move between openness states across lifecycle stages. Node size is the share of platforms in each state at a given stage. Line width is the conditional probability of transitioning to each next state and color distinguishes platforms that retained (blue) versus switched (coral) their logic.

cross-side marketplaces almost never revert (0.98); by scale the cross-side node has grown to 64%, and by maturity to 82%. The visual impression is of a node that swells stage by stage while the states themselves do not reshuffle, the graphical form of lifecycle deepening (Proposition 4).

What the four panels show. Two features carry the propositions across all panels. First, the blue (retention) transitions dominate the coral (switching) ones at every stage and in both dimensions, and the coral transitions that do appear are concentrated in the launch-to-scale step and thin toward maturity, the visual signature of bundle persistence (Proposition 3) and of early commitment hardening into architectural debt. Second, the panels differ in exactly the way the theory predicts. Marketplaces deepen monotonically toward the cross-side/open archetype. Data aggregators are the visible exception: their cross-side share rises from launch (0.22) to scale (0.33) and then falls at maturity (0.25), and their open share follows the same rise-then-fall path (0.46, 0.50, 0.44), the non-monotonic trajectory that motivates the governance-burden-inversion refinement in Section 6. Intelligent-product-and-service platforms remain standalone-dominant throughout (standalone share 0.88 at launch), with only a modest drift toward greater openness (open share 0.48 to 0.67) and cross-side value staying low. IoT enablers show the strongest standalone retention of all, beginning almost entirely standalone (0.98) and closed-leaning, with openness rising only slowly across the lifecycle.

A caution on the later stages. Both figures are right-censored: as platforms mature, progressively fewer remain under observation, so the maturity-stage nodes rest on small subsamples and the transition probabilities into them should be read as indicative rather than precise. This is most acute for the smaller types at maturity, where the value-creation panels contain only $n = 8$ data aggregators, $n = 4$ intelligent-product-and-service platforms, and $n = 3$ IoT enablers. Several maturity-stage figures therefore reflect one or two platforms—the apparent jump in IoT cross-side share at maturity (0.33), for instance, corresponds to a single platform of three and we draw no inference from movements of this magnitude. The patterns we rely on are the launch-to-scale transitions, where the samples are largest, and the data-aggregator non-monotonicity, which is visible across both the scale and maturity steps rather than resting on a single node.

Supplementary Qualitative Comparative Analysis

To test the configurational claim, we applied a crisp-set qualitative comparative analysis (csQCA) on a cross-sectional set of platforms, each observed once at its current lifecycle stage. Although the full dataset contains 196 platforms, we restricted the analysis to the 185 cases that follow either standalone or cross-side value creation logic–but not both–at the observed stage. These 11 platforms were retained in the frequency-based analyzes as each case should be treated independently because they are producing both, but csQCA requires every case to have an unambiguous membership in the outcome set: a platform must be either in the open/cross-side bundle or not. A case that is simultaneously standalone and cross-side cannot be assigned a single crisp outcome value without either discarding information or imposing an arbitrary tie-break rule, both of which could generate contradictory rows and depress configuration-consistency scores. Such an exclusion also yields sharper truth tables than would be obtained with the full sample. We report separate truth tables by lifecycle stage and keep the sufficiency threshold at the conventional level of 0.8.

The results are summarized as follows. At launch, no configuration reaches sufficiency: the MP-only configuration achieves a consistency of 0.53 (n=15) and the IoT-only configuration 0.00 (n=13), and the only configuration that crosses the threshold rests on only one case and is therefore not interpretable. At scale, no configuration reaches sufficiency; the MP-only configuration, by far the best populated with 47 cases, achieves a consistency of only 0.45; all others are lower. At maturity, the MP-only configuration reaches sufficiency (consistency 0.83, n=12).

Two patterns are robust despite the limited data. First MP-only configuration consistently holds sufficient consistency for the open/cross-side archetype, with its highest consistency observed at maturity–consistent with our main finding of a life-deepening pattern. Second, the IoT-only configuration is repeatedly insufficient for this condition. The absence of any configuration that meets the sufficiency threshold at the scale stage is also worth noting, suggesting that this phase is dominated by development rather than archetype consolidation.

Two limitations merit a discussion. First, only the MP-only and IoT-only configurations are adequately populated; the remaining configurations contain only a few cases. Second, although

The observed DA's rise-then-fall in consistency across the lifecycle aligns directionally with the governance-burden inversion hypothesis, we treat this pattern cautiously and as a theoretical refinement rather than a robust inference, given that it rests on a limited number of observations. The QCA therefore serves primarily as a descriptive corroboration of the patterns identified in the main analyzes.

Table 8: Crisp-set QCA Truth Tables by Lifecycle Stage.

MP	DA	IP&S	IoT	n	Consistency	Sufficient?
Panel A: Launch						
1	0	0	0	15	0.53	No
0	0	0	1	13	0.00	No
0	1	0	0	4	0.00	No
0	0	1	0	4	0.00	No
0	1	0	1	3	0.33	No
1	1	0	0	2	0.00	No
0	1	1	0	1	1.00	(n=1)
Panel B: Scale						
1	0	0	0	47	0.45	No
0	0	0	1	21	0.10	No
0	1	0	0	14	0.21	No
1	1	0	0	6	0.50	No
0	0	1	0	6	0.00	No
1	0	1	0	3	0.67	No
1	1	1	0	3	0.00	No
0	1	0	1	2	0.50	No
1	1	0	1	2	0.50	No
Panel C: Maturity						
1	0	0	0	12	0.83	Yes
0	1	0	0	4	0.00	No
1	1	0	0	3	0.33	No
0	0	0	1	2	0.50	No
0	0	1	0	2	0.50	No
1	0	1	0	2	0.50	No

Note: Outcome: membership in the open/cross-side bundle. Conditions: platform-type indicators (MP = marketplace, DA = data aggregator, IP&S = intelligent product & service, IoT = IoT enabler). Sufficiency threshold `incl.cut` = 0.80. Consistency scores on configurations with $n < 5$ cells are unstable. $N = 185$ platforms (11 dual-logic cases excluded).