Platform Data Strategy

Hemant K. Bhargava
University of California Davis
Graduate School of Management

Olivier Rubel[1]
University of California Davis
Graduate School of Management

Elizabeth J. Altman
University of Massachusetts Lowell
Manning School of Business

Ramnik Arora
Facebook

Jörn Boehnke
University of California Davis
Graduate School of Management

Kaitlin Daniels
Washington University
Olin Business School

Timothy Derdenger
Carnegie Mellon University
Tepper School of Business

Bryan Kirschner
DataStax

Darin LaFramboise
Auth0

Pantelis Loupos
University of California Davis
Graduate School of Management

Geoffrey Parker
Dartmouth College
Tayer School of Engineering

Adithya Pattabhiramaiah
Georgia Tech
Scheller College of Business

[1] Corresponding Author. Email: orubel@ucdavis.edu

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Abstract

Platforms create value by enabling interactions between consumers and external producers through infrastructures and rules. We define platform data strategy to encompass all data-related rules undertaken by platforms, aimed at fostering sustainable competitive advantage over the long-term. Despite the fact that platform firms face growing pressure to increase accountability for how they use data, an explicit treatment of platforms' data strategy and a systematic discussion of various forces influencing such data-related choices has been absent in the academic literature. This paper identifies promising research opportunities into platform data strategy to better inform future academic research, strategic decision-making, and regulatory analysis.

1. Introduction

Platform businesses (e.g., Alibaba, Amazon, Apple, Credit Karma, Facebook, Google, Lyft, Microsoft, PatientsLikeMe, Tencent) have shaken up traditional industries worldwide, created new markets, and inspired non-platform firms to embrace platform thinking (Parker et al. 2016; Hagiu and Wright 2015; Cusumano et al. 2019). Platform-native firms and traditional firms adopting platform strategies share two key characteristics: they both rely on network effects (Katz and Shapiro 1985; Parker and Van Alstyne 2005) and data analytics (Van Dijck et al. 2018). Platforms predominantly create value by data-driven coordination of activities across platform participants. Moreover, for many platforms, trading in individual and aggregate data about participants plays a central role in their monetization and revenue strategies centered on facilitating transactions (e.g., Uber, Facebook), while other platforms

use collected and observed data to foster innovation, not only internally, but also crucially, with external communities of complementors (e.g., Atlassian, SAP).

Given the central role that data plays in platform business models and the growing regulatory scrutiny into how firms, and especially platform firms, use consumer data (e.g., Europe's General Data Protection Regulation and California Consumer Privacy Act), there is a need for a better understanding of platforms' data strategies. Platform firms are facing a growing pressure to increase accountability into their data collection, storage, management, and sharing policies. Nonetheless, an *explicit* treatment of platforms' data strategy and a systematic discussion of various forces influencing such data policy choices has been conspicuously absent in the academic literature. The main objectives of this paper are first to propose a unified definition of data strategy for platforms and second to identify related research opportunities. These issues include threats to user privacy and anti-competitive behaviors by platforms, which have been the most commonly considered perspectives in the marketing and economics literatures on platforms (Rochet and Tirole 2003; Seamans and Zhu 2014; Casadesus-Masanell and Hervas-Drane 2015; Tucker 2014; Martin et al. 2017), and the opportunities created by data-sharing between platform participants, such as those related to innovation, which have received less attention.

The rest of the paper is structured as follows. In Section 2 we elaborate on the basic elements of platforms. Section 3 focuses on the strategic importance of taking into account not only individual consumers' attitudes towards data (e.g., privacy consideration), but also attitudes towards data by other (usually B2B) participants on the platform. Section 4 elaborates on data-strategy issues for platforms related to the pursuit of operational efficiency and the possible competition between the platform and its complementors. Finally, we conclude in Section 5.

2. Elements of Platforms and Data Strategy

Platforms create value by enabling interactions between consumers and external producers through infrastructures and rules (Parker et al. 2016; Van Alstyne et al. 2016). Platform businesses range from marketplaces that connect buyers and sellers (e.g., Uber, Pinterest), to organizational and technological foundations upon which innovators create new functionality (e.g., GE Predix), to hybrids that combine elements of the two structures (e.g., Amazon, Atlassian, Tencent). Early work on platforms focused on the role of network effects (Katz and Shapiro 1985, Farrell and Saloner 1986) and the economics of information intermediaries (e.g., Bhargava and Choudhary 2004). Over time, the literature expanded by investigating the economics of two-sided markets and platforms (Evans 2003; Gawer and Cusumano 2002; Rochet and Tirole 2003; Parker and Van Alstyne 2005, Bodoh-Creed at al. 2020) and exploring topics such as competition between platforms, roles of complementors, governance considerations, co-opetition, etc.

2.1 Defining Data Strategy in Platforms

Given the importance of data to platform businesses, the formulation of platform data strategy is a vital aspect of platform governance, which ultimately impacts marketing decisions. However, there is scant research linking data-related decision-making to firm strategy, particularly in the realm of platform firms (exceptions include Casadesus-Masanell and Hervas-Drane 2020; Goldfarb and Tucker 2012; Parks and Wigand 2014). We define *platform data strategy* to encompass all *data-related* rules undertaken by platforms, aimed at fostering sustainable competitive advantage over the long-term (e.g., Andrews 1987; Porter 1989). These decisions include, for instance, which data the platform should collect (e.g., individual vs. aggregate data), how these data should be stored (e.g., on premise or in the

cloud), shared (e.g., data "hoarding" for in-house innovation vs. data-sharing for external innovation by third-party developers), accessed (e.g., through APIs or not) and ultimately monetized (e.g., ad-supported vs. consumer payment models).

Similar to those in non-platform businesses, a platform's data strategy must align with the firm's overall competitive business strategy. An important distinctive dimension in the case of platform businesses is that they coordinate value creation with and by business partners via data sharing (exchange and analysis). This creates *interdependence* of the platform's data strategy with the choices made by the platform's customers and complementors, as well as by regulators. For example, while a platform's data strategy impacts choices made by complementors, the reverse is also true (choices made by complementors may affect a platform's data strategy). Similarly, the new legal environment created by regulators (e.g., GDPR) creates a legal threat to the mishandling of data and how data are shared through APIs, such that data are never truly exchanged in a personal identifiable way anymore. Figure 1 illustrates the *centrality* of platform data strategy in that it connects regulators' policies with complementors' and consumers' choices.

-------Insert Figure 1 About Here-----

Platforms also differ from "traditional" firms in how contractual relationships are created with business partners. Traditional firms also interact extensively with external partners (e.g., supply chain partners) but these interactions generally involve individual bilateral relationships with relatively few partners, encompassing long term relationships, developed under bespoke contracts. In contrast, platforms create and manage ecosystems that may contain thousands, if not millions or more, participants (e.g., app developers, social media users, Uber riders and drivers, Airbnb hosts and guests, etc.). Moreover, the participant base may not only be very large, but also rapidly evolving. As a result, contracts are often

automated and lightweight. More importantly, for this discussion of platform data strategy, these relationships are very frequently about data exchange. These differential contractual environments entail different sets of issues for platforms.

2.2 Transaction vs. Innovation Platforms

As platforms have become increasingly prevalent and prominent across the global economy, researchers have developed a body of research addressing their structures and behaviors. In addition to the dominant considerations of platform pricing, competition, and growth, many ways have been put forth to characterize platforms (e.g., Baldwin and Woodard 2009; McIntyre and Srinivasan 2017; Thomas, Autio, and Gann 2014). A useful typology for framing our understanding of platform data policy is the distinction between *transaction* versus *innovation* platforms (Cusumano, Gawer, and Yoffie 2019), while noting that hybrids of the two exist. We choose this dichotomy to anchor our platform data strategy analysis to highlight key contrasts in data usage that exist among platforms based on whether their primary role is transaction- vs. innovation-focused. This distinction is best explained by considering contrasting examples. Uber enables transactions (a trip from point A to B) between a driver and a rider, by matching and by enabling payment between the two sides - an action that relies on the secured exchange of limited information. In contrast, the Android operating system provides software developers with a foundation upon which they can innovate, i.e., develop apps that provide or extend value to users of the operating system, rather than enabling transactions.

In practice, platform businesses are often hybrids of the two, as they conduct both transaction and innovation activities. For instance, Google's transaction platform, the Play Store, complements their innovation platform by enabling innovators to offer their apps to

users (via transactions). Similarly, Atlassian hosts an innovation platform through which thousands of third-party software developers create new products and services for users of Atlassian software, such as Jira, Trello, Bitbucket, and Confluence. At the same time, Atlassian also offers an Atlassian Marketplace serving as a central repository of these third-party apps and a storefront through which Atlassian enables purchase and use of these apps (transactions).

3. How Participants' Attitudes Towards Data Influence Platforms' Data Strategy

This section examines how a platform's data strategy is influenced by platform participants' attitudes towards data. To activate this discussion, Figure 2 employs the framework of Figure 1 to illustrate how platforms (here, Uber and Atlassian) differ in what types of participants they attract. Specifically, Uber's data strategies have to be designed around data attitudes of individuals (riders and drivers) and subject to compliance with various regulations, in particular consumer privacy, whereas Atlassian's data strategies are governed by data attitudes of enterprise customers and third-party software developers, and corresponding governmental regulations.

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3.1. Individual Consumers' Attitudes Towards Data

Respect for consumer perceptions around their data is a vital consideration for all firms, not least because of the need for a long-term financial relationship between firms and their consumers. Exercising requisite discretion around data is even more vital for platforms due to their reliance on network effects. Like Goldilocks, consumers in the modern platform marketplace generally face three types of choices: (i) accept firms' collection and sharing of their personal information in exchange for subsidized product access, (ii) accept advertising

in exchange for subsidized product access, or (iii) pay heavier fees and avoid one or both. Examples include Hulu's ad-light premium subscription, and AT&T's optional $30 monthly discount for internet activity tracking, however there are also firms that present consumers with a starker "accept or stay out" dichotomy (e.g., Equifax personal financial reporting services). The seemingly rhetorical choice that platform participants face (give up their data to platforms or abstain and remain isolated) underlines the need for research-driven insights into the following questions:

- *Should platforms be allowed to hold final rights to data collection, storage, protection, and disposal?*
- *Is society better off by allowing consumers to selectively license their data to platforms?*
- *Can anti-competitive aspects of platforms' data strategies meaningfully be evaluated based on existing bedrock criteria such as consumer welfare preservation; or do platform business models require new criteria that incorporate the effects of complementors' innovations fueled by data sharing?*

Exactly how consumers evaluate their data choices is a key question that is still poorly understood (Acquisti et al 2016) and can benefit from empirical and theoretical research into consumer attitudes regarding data. Prior research has demonstrated that consumers exhibit paradoxical behaviors regarding the use of their data (e.g., Athey et al. 2017 find that, although consumers appear highly concerned about privacy, few are actually willing to pay a fee to safeguard it), and that there is substantial heterogeneity in their perception of and sensitivity to privacy (e.g., Turjeman and Feinberg 2019 find that consumers responded to data breach at a matchmaking site with varying levels of data scrubbing and activity reduction). Additional opportunities for research include *building and testing decision models for*

platforms to balance the business value of data against the costs and risks of managing data within platform environments, subject to consumers' concerns regarding data usage by firms and regulators' expectations.

Firms and researchers can empirically address these questions with a precise understanding of a consumer's willingness to pay for privacy, along the lines of early work in this area (e.g., Lin 2020). For instance, an empirical choice model can be used with the above AT&T data to model a consumer's preference for ad tracking and his/her willingness to pay for privacy.

Granular customer data enable platforms to optimize marketing tactics such as cross-selling, personalized messaging, and content customization. For instance, in North America, newspapers obtain a wider cross-channel view of their customer base by providing free unlimited web access (including to premium paid content) to print subscribers. While such a digital bundling strategy permits curation of a multi-channel view of the news publisher's customer base, aiding its ability to tailor promotions to existing/prospective subscribers, it can also stand to benefit subscriber retention, by enhancing print subscription value (Pattabhiramaiah et al. 2019). Machine learning-based methods enable these data-rich platform ecosystems to make real-time decisions at scale. However, these algorithms are constrained by the quality and nature of training data available to them, as well as the user profiles and experiences underlying the data. These tradeoffs raise important questions regarding the relative efficacy of algorithms when compared to human decision agents in data-rich and data-light settings (Claussen et al. 2019), their effect on consumer welfare (Acemoglu et al 2019), and the biases underlying their computations (Hosanagar 2019). In light of this,

- *How should platforms ensure that their algorithms, and those of their partners, are trained over representative data?*

- *How do a platform's data sharing choices - especially with ecosystem participants of unknown provenance - affect consumers' data attitudes towards the platform?*

3.2. Attitude of Other Participants

Platforms must consider data-sensitivity attitudes not only of individual customers, but also of other platform participants - e.g., advertisers, B2B customers (as in the case of Atlassian), suppliers, developers and so on. Network externalities can complicate this task (Miller and Tucker 2009; Miller and Tucker 2011). Thus far, data attitudes held by B2B participants have received less attention in the literature, while there is clearly a need to better understand such tensions around platforms' treatment of participants' data. For instance, suppliers (e.g., sellers on Amazon Marketplace) may view sharing of their personal data with the platform and its consumers, as a necessary aspect of doing business. Yet, concerns regarding leaking business secrets to competitors, and skepticism regarding the platform's ability to act primarily as a market facilitator/active channel partner are common.

Moreover, a sizable diversity in the attitudes of different types of platform participants exists. For example, suppliers in a transaction platform (e.g., sellers of battery backup devices on Amazon) might view other sellers as cutthroat competitors. In contrast, for an innovation platform (such as AWS) that enables third party developers to produce new apps and extensions for its enterprise customers, the second side (third party developers) routinely view other developers as direct collaborators through sharing of assets such as code libraries (Boudreau 2007; Ceccagnoli et al. 2012) or indirect collaborators in a value co-creation setting (Bhargava 2020). This begs the following question:

- *How should a platform's data strategy evolve as a response to attitudes towards data held by participant types (e.g., individual v.s. B2B customers) with diverse/divergent interests?*

The consideration of participants' attitudes towards data is markedly more nuanced for platforms because of two other considerations. First, relative to traditional firms, platforms have more novel forms of financial interactions with their participants. For example, consumers in traditional marketplaces *pay the firm* in exchange for access to a product or service. Platforms, however, commonly provide a *subsidized (or free) service* to consumers with the expectation of "milking" *other participants* (such as advertisers or suppliers) for the privilege of connecting with the platform's consumers (e.g., Google search, Facebook).

- *How do these financial dependencies between a platform and its participants influence participants' attitudes towards data, and what influences do different attitudes exert on the design of the financial relationship?*

Finally, for empirical researchers to analyze whether a consumer's willingness to pay for constraining data sharing increases or decreases as more unknown participants join the platform, they must first define "unknown provenance" to the users, which may require additional data outside of traditional revealed preference data. That said, the effect is not ex-ante obvious: with more unknown participants, a consumer may be willing to pay less given the uncertainty (quality and risk) around these players, but also could be willing to pay more given the likelihood of entering into a higher quality match.

4. Platforms' Strategic Priorities

A platform's motivations around data strategy will generally vary based on the platform's key strategic priorities, including the role of data in enabling key business activities (e.g., current operations vs. long-term innovation) and influencing its competitive position within the ecosystem (e.g., aggressive use of data to fortify market position, prioritize the

retention of complementors on one side, etc.), as well as its stage in the evolutionary journey (focus on short- vs. long-term success metrics).

4.1. Balancing Operational Efficiency with Strategic Considerations

Transaction platforms enable and support bilateral transactions between entities on each side of the platform through functionalities such as discovery, matching, and fulfillment support. Generally, these operational activities would require the platform to collect and share highly detailed, individual-level data about platform participants with other participants (e.g., a consumer's residential address and drop-off details with a driver or delivery person). In contrast, innovation platforms would typically need to provide aggregate (market-level, rather than individual-level) data to third-party developers that create new value-generating goods or services (e.g., apps) for the benefit of both the platform and its complementors. However, these contrasting motivations are more nuanced, and additional research is needed to develop a better understanding of their influence on the platform's data strategy. We pose a few research directions below.

First, the extent and level of data sharing may vary substantially even *within* transaction platforms based on their strategic priorities and mode of performing key functionalities such as discovery and matching (i.e., operational needs). A transaction platform might *not* wish to provide detailed individual-level data to participants for fear of "platform data leakage" (e.g., caregivers who use Care.com to find a customer and then move long-term business interactions off the platform), even if this reduces operational efficiency or increases transaction complexity. This is an area that has received little research attention, despite the vital role that potential data leakage plays in the growth and success of platforms. Similarly, in contrast to platforms such as Uber that actively manages participant

matching, transaction platforms such as Airbnb push the matchmaking function down to participants and thus must provide more comprehensive data about a larger number of partners (hosts and properties) to each participant (guests). This inevitably increases costs and risks pertaining to data sharing. *Empirical research into such design problems can provide a richer understanding of data-related costs and risks and how different types of platforms balance these costs against generating operational efficiencies (that platforms tend to actively prioritize and promote).* Such insights can guide theoretical and empirical research towards optimal decision models, methods, and processes for making systematic design choices.

Second, an innovation platform that also builds first-party apps or devices (e.g., Google) may not be fully transparent in revealing market trends to developers, and conversely, developers might be wary of the platform's comparative advantage due to its broader view of market data and intelligence about developers. Gawer and Cusumano (2002) pointed this issue out in their work with Intel Labs. Notably, the dependency between data strategy and the platform's broader strategic considerations such as the level of openness and control (Parker and Van Alstyne 2018) is bidirectional, i.e., platforms must be cognizant of data implications when making both operational and strategic design choices. These considerations present promising opportunities for empirical and theoretical research to answer important questions such as

- *Does data openness lead to faster innovation in platform environments?*

Third, the need for long-term innovation vs. generating routine operational efficiencies imposes different tradeoffs based on the core mission of the platform. While innovation platforms have a strong incentive to promote the sharing of data and market intelligence with third-party developers, transaction platforms plausibly prefer to "hoard data" in order to fuel their innovation activities that are typically performed "in

house." Nonetheless, even transaction platforms routinely face strategic choices involving both the sharing and utilization of granular/individual level data - these choices create a need for research into the delicate balance between short term monetization priorities and the acceptance of longer term "costs" related to consumer privacy. *Empirically, it is important for transaction platforms to ascertain whether sharing data leads to faster growth than the internal use of the data that could provide higher quality matches or new innovations sourced from within.*

Finally, we should note that the views pertaining to in-house data access/utilization held by transaction platforms relative to innovation platforms are somewhat blurred when platform technology is implemented in the cloud as opposed to on customer premises (especially for innovation platforms). By the very nature of where data reside and where code is executed, cloud-based innovation platforms have a more complete view of their users' actions. Current circumstances and likely evolution towards *cloud-based* (compared to on-premises) execution makes it useful to examine *how the incentives to hoard or share data, by both platforms and their partners, will change as firms migrate more and more activities to cloud-based environments.*

4.2. Data Strategy and Competition

Platforms embody two types of competition - the first of which is the "traditional" kind between rival platforms, and a second form that relates to competition between the platform and its complementors (the latter often fueled by data the platform collects from its own complementors). In fact, Bonneau and Preibusch (2010) show that the more powerful a platform is, the more personal information it demands from consumers. Intuitively, competition between rival platforms should lead them to adopting more consumer-friendly data policies (Ohlhausen and Okuliar 2015), although there is limited evidence of this in

practice (Marotta-Wurgler 2016). Apple's recent publicity on data privacy as a fundamental right of smartphone users might suggest that platform competition has the intended and desirable effect. However, this example is also blurred by specific actions whereby Apple has placed monetization above privacy concerns. The impact of competition on the level of consumer-friendliness of data policies is therefore still an open question. The second type of competition, i.e., that between a platform and its complementors, poses even thornier questions which we discuss next.

On the one hand, firms such as Uber encourage drivers to prioritize requests from locations with high mismatches in supply and demand, by charging higher prices (via surge pricing) in these areas and advertising these prices to drivers via a Heat Map. While data sharing can help the platform coordinate its complementors' actions (e.g. Karacaoglu et al. 2019), platforms may recognize that full information disclosure may not be optimal. As such, platforms have a strategic choice to make on the level of data sharing with complementors. While some work exists on how much information to share or restrict (Romanyuk and Smolin 2019), and on whether to share data only with a subset of complementors (Liu et al. 2019), *additional research is needed to understand the consumer welfare implications of various data sharing options with complementors by the platform.*

On the other hand, platforms and complementors often engage in a tug of war for the data, especially because platforms can potentially leverage system-wide data into becoming superior competitors against their complementors (Wen and Zhu 2019). This occurs, for instance, with Amazon Basics. As Amazon selectively enters the turf of suppliers by leveraging its data visibility gained through the Amazon Marketplace, this enables the identification of fruitful opportunities for selling first-party products. Similarly, for platforms such as ServiceTitan that are launched to serve a data-enabling role, there is the potential for

data to endow them with a significant advantage that they could exert against home services firms that are currently their "partners." Another example of this is in firms' use of a "general login" whereby specialized sites rely on large general platforms for user acquisition and authentication. However, in such cases, they also surrender vital data and expose themselves to future competition from the platform (Krämer et al 2019). These patterns raise the need for additional research to identify *how platform complementors (or platforms) should incorporate such potential long-term threats (or advantages, depending on the player in consideration) and the resulting competitive dynamics into their data strategy.*

Data strategy tensions may also arise *within* multiple units of a platform, or between the platform and specific product aspects of the firm. Consider Google's Nest products for in-home energy management and other services. Initially, as a standalone firm and a product that relied on observation of deep personal data and habits, Nest's data policy was extremely respectful of consumer sensitivities on data sharing and analysis. After being acquired by Google, Nest was able to continue these policies, unaffected by Google's data strategy. Nonetheless, today, as Google desires greater integration and service quality from its variety of hardware-software devices that can monitor users' activities inside and outside the home, Nest faces a strong corporate push for cross-integration (i.e., obligatory data sharing), creating a conflict with the preferences of Nest product managers and their user base. In light of such internal tensions,

- *How should data strategies be managed as organizational changes occur and strategic intents evolve?*
- *Empirically, how do data policies change with the growth of the ecosystem (e.g. Apple, Android)? Do they loosen or become more rigid?*

5. Conclusion

Data strategies are instrumental to a platform's operations, allowing it to internalize critical connections between regulators' policies and complementors' and consumers' choices, into its decision making - all of which today, inevitably revolve around data. To the best of our knowledge, the extant literature does not offer a cohesive treatment of data strategy for platform firms. As data are the "new oil," both platform-native firms as well as traditional firms embracing a platform business model stand to benefit from charting situation-specific data strategies. This paper describes the landscape around the development of data strategies that fit the platform's strategic environment, examines interdependence of the platform's data strategy with the choices of complementors, customers and regulators, and proposes several promising areas of research inquiry, with a view towards encouraging interdisciplinary research into platform data strategy. We hope that a richer understanding of data-related benefits, costs and risks, will help platforms to formulate data strategy that balances operational efficiency and strategic considerations.

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Figure 1: Platform Data Strategy

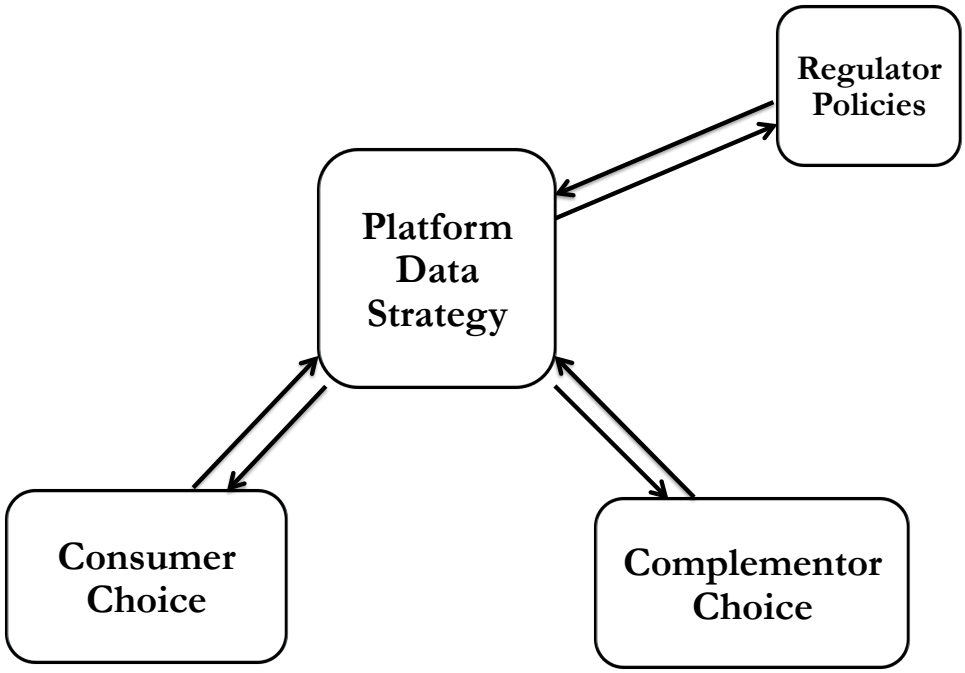
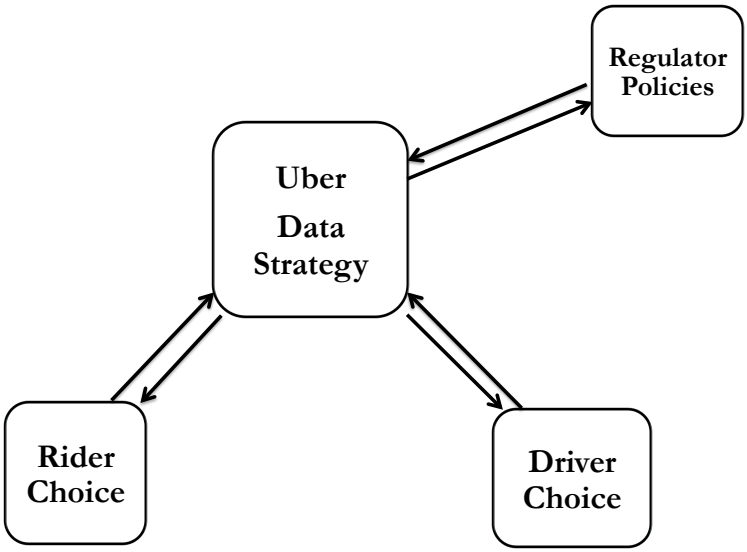


Figure 2: Uber vs. Atlassian

Panel A



Panel B