Platform Data Strategy

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1. Introduction

Platform businesses (e.g., Alibaba, Amazon, Apple, Google, Lyft, 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 (Altman and Tripsas 2015) 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 plays a central role in monetization and revenue strategies centered around facilitating transactions (e.g., Uber, Facebook), while other platforms use collected and observed data to foster

innovation, not only internally, but also through external communities of complementors (e.g., Atlassian, SAP).

Given the central role data play in platform business models and the growing regulatory scrutiny into how firms, especially platforms, 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 face growing pressure to increase accountability related to data collection, storage, management, and sharing policies. Nonetheless, an *explicit* treatment of platforms' data strategies and systematic discussion of forces influencing such data choices has been conspicuously absent in the academic literature. The main objectives of this paper are first to propose a unified definition of platform data strategy and second to identify related research opportunities. These issues include threats to user privacy and anti-competitive behaviors by platforms, which are the most commonly considered perspectives in the platform literature (Rochet and Tirole 2003; Seamans and Zhu 2014; Martin et al. 2017) *and* opportunities created by data-sharing between platform participants, such as those related to innovation.

The paper is structured as follows. In Section 2 we elaborate on basic elements of platforms. Section 3 focuses on the strategic importance of accounting for not only individual consumers' attitudes towards data (e.g., privacy considerations), but also attitudes towards data by other (usually B2B) platform participants. Section 4 elaborates on platform data strategy issues related to operational efficiency and possible competition between platforms and their 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 connecting 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 economics of information intermediaries (e.g., Bhargava and Choudhary 2004). Over time, the literature expanded by investigating economics of two-sided markets and platforms (Evans 2003; Gawer and Cusumano 2002; Rochet and Tirole 2003; Parker and Van Alstyne 2005, Bhargava and Rubel, 2019; Bodoh-Creed at al. 2020), considering organizational challenges for platform firms (Altman and Tushman 2017), and exploring 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 crucial 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 (see e.g., Casadesus-Masanell and Hervas-Drane 2020; Goldfarb and Tucker 2012). We define *platform data strategy* to encompass all *data-related* rules undertaken by platforms to foster competitive advantage over the long-term (e.g., Porter 1989). These decisions include, for instance, which data the platform should collect (e.g., individual vs. aggregate data), how 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-parties), 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 for platform

businesses is that they coordinate value creation with and by partners via data sharing. This creates *interdependence* of the platform's data strategy with the choices made by platform customers and complementors and by regulators. For example, while a platform's data strategy impacts complementor choices, the reverse is also true (complementor choices may affect a platform's data strategy). Similarly, the new regulatory environment (e.g., GDPR) creates a legal threat to data mishandling and how data are shared through APIs, such that data are never exchanged in a personal identifiable way. Figure 1 illustrates the *centrality* of platform data strategy as it connects regulators' policies with complementors' and consumers' choices.

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

Platforms also differ from traditional firms in how contractual relationships are created. 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, Airbnb hosts and guests, etc.). Moreover, the participant base may not only be very large, but also heterogeneous and rapidly evolving. As a result, contracts are often automated and lightweight. More importantly related to platform data strategy, these relationships are often about data exchange. These differential contractual environments entail varying issues for platforms.

2.2 Transaction vs. Innovation Platforms

As platforms become increasingly prevalent and prominent across the global economy, scholars 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 rider, by matching and enabling payment between the two sides - an action relying on secure exchange of limited information. In contrast, the Android operating system provides software developers a foundation upon which they can innovate, i.e., develop apps providing or extending value to users of the operating system, rather than enabling transactions.

In practice, platform businesses are often hybrids, 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 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 Atlassian software users. At the same time, Atlassian also offers an Atlassian Marketplace, a central repository of third-party apps and 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 and data choices. To activate this discussion, Figure 2 employs the framework of Figure 1 to illustrate how platforms (Uber and Atlassian) differ in participant types. Specifically, Uber's data strategies are designed around individuals' (riders' and drivers') data attitudes and choices and subject to compliance with various regulations, in particular consumer privacy, whereas Atlassian's data strategies are

governed by enterprise customers' and third-party software developers' data attitudes and choices and corresponding governmental regulations.

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3.1. Individual Consumers' Attitudes Towards Data

Respect for consumer perceptions around data is a vital consideration for firms, especially because of the need for long-term financial relationships between firms and consumers. Like Goldilocks, consumers in the modern platform marketplace generally face three types of choices: (i) accept firms' collection and sharing of 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 (data collection and/or advertising). Examples include Hulu's ad-light premium subscription, and AT&T's optional $30 monthly discount for internet activity tracking. However, there are firms that present consumers with a stark "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 question: *Should platforms be allowed to hold final rights to data collection, storage, protection, and disposal?* This question is especially salient for consumer-focused transaction platforms because their customers have less infrastructure to address these issues, whereas institutional participants in innovation platforms usually have more processes that govern data management.

Exactly how consumers evaluate 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 demonstrates that consumers exhibit paradoxical behaviors regarding usage of their data (e.g., Athey et al. 2017), and heterogenous sensitivities to privacy (e.g., Turjeman and Feinberg 2019, Lin 2020). 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. These decision models should acknowledge that the importance of accessing individual level data might differ between transaction and innovation platforms. For transaction platforms, access and sharing of individual level data - in real-time - is often vital for ecosystem performance, hence constraints on data access and sharing create tensions between consumer privacy and efficient operations. These tensions are less of an issue for innovation platforms, where participants often require higher-level and aggregated data to identify emerging consumer trends and demand characteristics.

Granular customer data enable both transaction and innovation platforms to optimize marketing tactics such as cross-selling, personalized messaging, and content customization (Pattabhiramaiah et al. 2019). Machine learning-based methods enable 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. Complementors' and B2B Customers' Attitudes Towards Data

Platforms must consider data-sensitivity attitudes and choices not only of individual customers, but also of other platform participants - e.g., advertisers, B2B customers, developers, and so on. Network externalities can complicate this task (Miller and Tucker 2009). Thus far, data attitudes and choices of

B2B participants have received less attention in the literature, yet there is clearly a need to better understand such tensions. For instance, sellers on Amazon Marketplace may view sharing 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, different types of platform participants vary in their attitudes and choices towards data. For example, sellers on a transaction platform (e.g., sellers of batteries on Amazon) might view other sellers as cutthroat competitors. In contrast, for an innovation platform enabling developers to produce new apps and extensions for enterprise customers, third-parties 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). Additionally, in transaction platforms, sellers might view divulging of ratings, inventory, and other data as competitively disadvantageous. However, participants in innovation platforms might be willing to share data about their needs with the hope that doing so might fuel developer innovation. Similarly, developers have less concerns regarding data sharing about capabilities and skills, except that they might be concerned for competitive reasons about revealing data regarding innovative activities. This begs the 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 and choices towards data is markedly more nuanced for both transaction and innovation platforms relative to traditional firms because of two other considerations. First, transaction platforms have more novel forms of financial interactions with and between their participants. For example, consumers in traditional marketplaces pay the firm in exchange for access to a product or service. Transaction platforms, however, commonly provide a subsidized (or free) service to consumers with the expectation of "milking" other participants (such

as advertisers) for the privilege of connecting with platform consumers (e.g., Google search). Thus, *how do financial interdependencies between a transaction platform and its participants influence participants' attitudes towards data, and what influences do different attitudes exert on the design of the financial relationship?*

4. Platform's Strategic Priorities

A platform's motivations around data strategy will vary based on the platform's critical strategic business priorities, including the role of data in enabling key 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, prioritizing 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, etc.).

4.1. Balancing Operational Efficiency with Strategic Considerations

Transaction platforms enable and support bilateral matchmaking 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 delivery person). In contrast, innovation platforms typically need to provide aggregate (market-level, rather than individual-level) data to third-party developers that create new value-generating products 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 manage participant matching, transaction platforms such as Airbnb push the matchmaking function further to participants and thus must provide more comprehensive data about a larger number of partners (hosts and properties) to each participant (guests).

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) highlight this issue 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, in particular, *what types of 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" to fuel in-house innovation

activities. 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 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 data to provide higher quality matches or new innovations sourced from within.*

Finally, we should note that 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 versus on customer premises (especially for innovation platforms). By the nature of where data reside and code is executed, cloud-based innovation platforms have a more complete view of users' actions. Current circumstances and likely evolution towards *cloud-based* 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 increasingly more activities to cloud-based environments.*

4.2. Data Strategy and Competition

Platforms embody two types of competition - the first is between rival platforms, and a second is competition between platforms and complementors (the latter often fueled by data the platform collects from its complementors). In fact, Bonneau and Preibusch (2010) show that the more powerful a platform, the more personal information it demands from consumers. Intuitively, competition between rival platforms should lead them to adopt more consumer-friendly data policies (Ohlhausen and Okuliar 2015), although there is limited evidence of this (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 complicated by actions where Apple has placed monetization above privacy. The impact of competition on the consumer-friendliness of data policies is therefore still an open question.

The second type of competition (that between a platform and its complementors) poses even thornier questions. On 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, platforms may recognize that full information disclosure may not be optimal (e.g., Romanyuk and Smolin 2019). As such, platforms have a strategic choice to make on the level of data sharing with complementors. *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 data, especially because platforms can leverage system-wide data into becoming superior competitors against complementors (Wen and Zhu 2019; Hagiu et al 2020). This occurs, for instance, with Amazon Basics as Amazon selectively enters the turf of complementors by leveraging data visibility gained through the Amazon Marketplace, enabling the identification of fruitful opportunities for selling first-party products. Similarly, for platforms such as ServiceTitan, launched to serve a data-enabling role, there is potential for data to endow them with a significant advantage 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 into their data strategy such potential long-term threats (or advantages, depending on the player in consideration) and the resulting competitive dynamics.*

Data strategy tensions may also arise *within* multiple units of a platform, or between the platform and product divisions of the firm. Consider Google's Nest products for in-home energy management and other services. Initially, as a standalone firm and product relying 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 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

This article offers three main take-aways regarding platform data strategies. First, we observe that although firms are increasingly concerned with data strategy considerations, the extant academic literature on platforms does not yet adequately address nor define platform data strategy. This gap is even more salient when juxtaposed with platforms' current practices including frequent appointments of Chief Data Scientists and Chief Data Officers.

Second, we recognize that there are multiple platform types explored in the platform literature differing in circumstances, opportunities, constraints and dangers around utilizing data in varying ways. Thus, platform data strategies should vary based on platform types. The distinction between transaction versus innovation platforms provides a useful framework to organize our analysis of how data strategies might differ. For instance, individual data privacy issues might be more salient for transaction platforms making matches between platform sides (e.g., riders and drivers) versus innovation platforms using aggregated trend-level data to enable third-party product or service innovation.

The final take-away pertains to interdependencies between parties in a platform's ecosystem (e.g., consumers, complementors, and regulators), and their attitudes towards data. A platform data strategy must be incentive compatible for each of the parties interacting on the platform, and in particular take into account how their attitudes toward data and choices differ. Individual consumers' attitudes toward data might be more driven by privacy concerns, while complementors' attitudes toward data might be more driven by concerns of anti-competitive behavior threats.

In conclusion, by providing a definition of platform data strategy and by identifying emerging related research questions, we hope that researchers will conduct more systematic research related to the benefits, costs, and risks associated with data in platform-based firms and their ecosystems.

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Figure 1: Platform Data Strategy

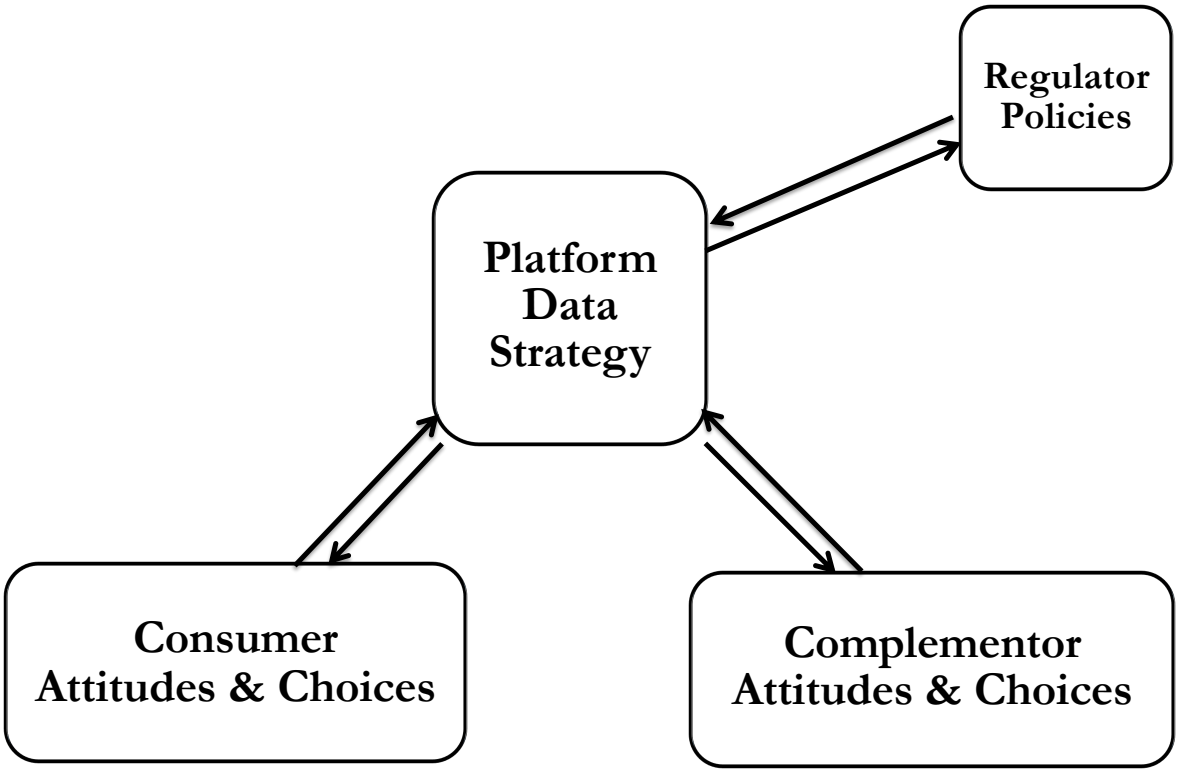
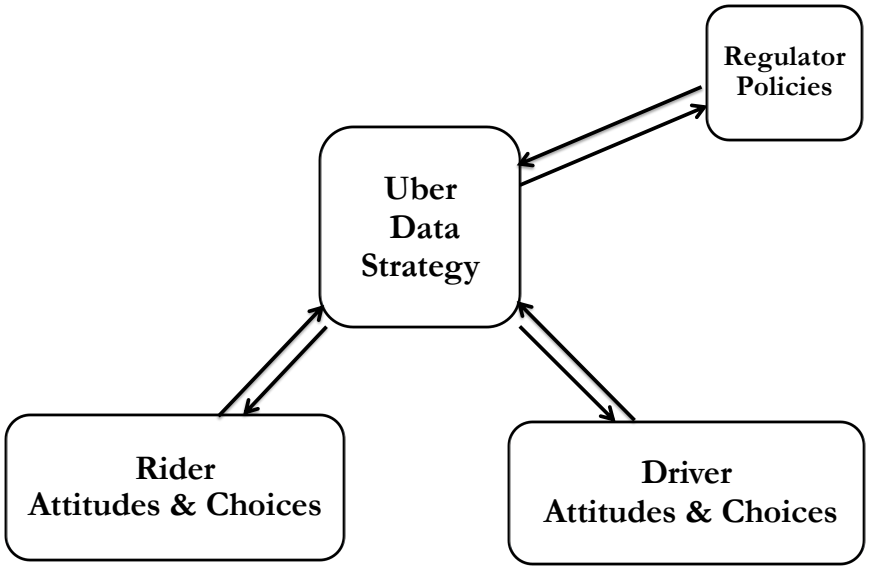


Figure 2: Uber vs. Atlassian

Panel A



Panel B