Dependency Challenges, Complementor Maturity and Response Strategies: Joining a Multi-Sided Platform Ecosystem

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Abstract

Complementors gain market opportunities by joining ecosystems; they also face challenges from relationships with multi-sided platform ecosystems. This research focuses on managerial challenges and strategic and organizational responses of complementors joining ecosystems. Asymmetries lead to dependencies, which I categorize into three types: 1) technological, 2) information, and 3) values-based. Based on a longitudinal qualitative inductive field-based study, this research finds that over time the organization passes through three phases of complementor maturity. These phases correspond with three response strategies: compliance, influence, and innovation. This paper contributes to platform, ecosystem, complementor, and organizational theory research by: 1) exploring relationships between complementors and dependencies, 2) introducing phases of complementor maturity, and 3) articulating complementor response strategies and outlining how, when, and why an organization moves through maturity phases executing these strategies.

Keywords: Managing Innovation, Complementor Strategy, Multi-Sided Platform, Ecosystem, Dependence, Asymmetric Inter-organizational Relationships, Complementor Maturity
“You know how in America we never dip our flag to anybody? At the Olympic Games, you know... We never dip our flag, period. Well, I feel like we kind of dipped our flag.”
- Zuni manager, 2-8-12

“So, dipping our flag? I’ll dip...I’ll dip... because I know that I’m still in the end delivering a better experience than anybody else can.”
- The same Zuni manager, 8-26-14

Introduction

Some products work better when combined with others; a baseball glove is not useful unless one also has a baseball. A computer, smartphone or tablet becomes more valuable when a user downloads software applications (“apps”) or adds accessories. With the growing prevalence of products with open interfaces, products are becoming increasingly interdependent such that users purchase accessories, or complements, which they use to realize the full potential of their purchases (Brandenburger & Nalebuff, 1996; Adner & Kapoor, 2010). Accessories exist as software apps and as hardware products such as cases, keyboards, headphones, speakers, trackballs, etc. To access large markets, organizations that create complementary products join ecosystems and become dependent upon other firms to provide interface specifications, requirements, technological components, and so on. In many cases, firms that produce products that benefit from accessories operate multi-sided platform (MSP) businesses that facilitate interactions between buyers of their core products (e.g., smartphones) and producers of complementary products (e.g., smartphone accessories). As more of the world’s most valuable and influential firms operate platform-based business models (Gawer & Cusumano, 2002; Regalado, 2014), there is growing interest in the effects of these businesses on the complementors dependent upon them.

Examples of MSP businesses include: Android Market, enabling developers to sell apps to Android phone users; Amazon Marketplace, facilitating vendors selling used and new goods to consumers; and Internet dating sites, allowing individuals looking for relationships to interact. Research on MSP businesses is increasing with recent articles organizing platform literature and providing definitions and typologies (e.g., Baldwin & Woodard, 2009; Gawer, 2014; Thomas, Autio, & Gann, 2014). Much research focuses on emergence of platforms, competition between them, and network effects (Rochet & Tirole, 2003; Eisenmann, Parker, & Van Alstyne, 2006; Zhu & Iansiti, 2012). Burgeoning research emphasizes strategic decision-making in platform governance and competition outcomes identifying trade-offs in governance structures (Bresnahan & Greenstein, 2014). Throughout this research, MSPs are the focal unit of analysis and implications for complementors remain secondary or un-addressed.

Ecosystem research has focused on challenges and opportunities of ecosystem creation (Moore, 1993, 1996), competition (Iyer, Lee, Venkatraman, 2006; Adner, Oxley, & Silverman, 2013), and technology emergence and substitution (Christensen & Rosenbloom, 1995; Adner &
Kapoor, 2015). Ecosystem-focused scholars commonly find that creating and successfully managing a strong complementor ecosystem is beneficial to a focal firm (Adner, 2012; Iansiti & Levien, 2004), though governance of ecosystems may create tensions with emergence of contradictory logics and paradoxical tensions (Wareham, Fox, & Giner, 2014). Further, in emerging management-centered ecosystem literature, researchers study trade-offs in ecosystem management decisions such as opening participation to all actors versus limiting involvement via compliance criteria finding that the number of platform participants is linked to innovation and investment (Boudreau, 2012). Scholars are also applying the complementary asset framework (Teece, 1986) in the context of entrants into new industries exploring how complementarities and competition affect new entrant strategies (Kapoor & Furr, 2014). Still, with few exceptions, this research centers on MSP owners and managers and stops short of extending to managerial implications for complementors. These under-studied firms constitute a multi-billion dollar worldwide industry and increasingly face challenges associated with interfacing with large powerful platform managers (such as Apple, Samsung, etc.).

To study challenges and response strategies of complementors operating in multi-sided platform ecosystems, I explore the research question: What are the strategic and organizational issues associated with mature, independent organizations joining established ecosystems? In particular, what challenges does an organization face as it enters asymmetric relationships, and how does the organization respond to these challenges? Are these challenges and complementor strategies different in the context of MSP businesses and their complementors, or are they similar to those in other asymmetric interfirm relationships (e.g., buyer-supplier, alliances, etc.). Because of limited existing research, I utilize an inductive theory-building approach with a longitudinal single case study design that spanned three and a half years and included semi-structured interviews, observation, and archival research. I study this question from the perspective of an incumbent organization joining ecosystems as a complementor and investigate challenges experienced by a division of an accessory provider as it strived to balance maintaining its own independence and growth aspirations with an emerging need to operate as a member of ecosystems managed by large and powerful central firms.

The analysis in this paper shows we can use dependency, power, influence, and organizational identity theories to better understand challenges complementors face as they join ecosystems, particularly when these complementors are mature incumbents entering asymmetric relationships. I identify three types of dependencies prevalent in such situations: 1) technological, 2) information, and 3) values-based. I theorize the notion of complementor maturity, which progresses through phases over time and in which the complementor invokes three response strategies to manage dependencies: 1) compliance, 2) influence, and 3)

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1 Ecosystem research sometimes refers to systems of producers and markets as value networks such as in Christensen & Rosenbloom (1995). The value network definition, however, does not imply the existence of complementors; though, the study of these interdependent systems is valuable to understanding the phenomena of ecosystems including complementors.

2 For example, Strategy Analytics, a reputable industry analyst firm, recently forecast global total apps revenues of $33.7B (MacQueen, 2014).

3 Although the focal division was exploring options to offer complementor products in multiple ecosystems, during this study, its primary focus was providing products to work with Apple products. Thus, the vast majority of my data relates to the division’s interactions with, and challenges related to, offering products to work with Apple products.
innovation. As it matures, the complementor changes its relative emphasis on each of these three strategies. The findings suggest that the process of complementor maturity might be associated with the organization’s existing and evolving identity. I induce a model illustrating the relationships between theoretical concepts. This analysis of complementor maturity and response strategies provides a new way to understand complementor strategy when complementors engage with powerful MSPs. It also adds new insights to our understanding of dependencies in interfirm relationships.

**Theoretical Background**

**Multi-sided platforms, ecosystems, and complementors**

Across platform-related research, the term *platform* is used with varying definitions. Hagiu and Wright (2015a) define multi-sided platforms (MSPs) (also sometimes referred to as multi-sided markets or multi-sided networks) as organizations that enable or facilitate direct interactions between two or more groups of participants. I adopt this definition since my research is focused on platform businesses and their relationships with complementors, or firms that independently offer complementary products or services to mutual customers (Brandenburger & Nalebuff, 1996; Yoffie & Kwak, 2006). This definition envisions MSPs as enabling a triangular set of relationships in which both the MSP and the complementor maintain independent relationships with a customer. This definition contrasts with a supplier-buyer-customer (or reseller) business model characterized by linear relationships in which a supplier sells to a buyer (or reseller), which sells to a customer. (See Figure 1 for schematic diagrams contrasting linear with triangular business models.) Complementors, taken together with the MSP they complement, are sometimes referred to as an MSP’s ecosystem.

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4 Though firms investigated in this paper are technology-related, this research does not address computer platforms (Bresnahan & Greenstein, 1999), nor general technology platforms (Kim & Kogut, 1996; Meyer & Seliger, 1998; Economides & Katsamakas, 2006), nor decisions related to technology platform choices (Boudreau, 2010).

5 MSPs at the center of systems of complementors are also sometimes referred to as “platform managers” (Eisenmann, Parker, & Van Alstyne, 2006), which is terminology I also use. The term “platform manager” is particularly appropriate when an MSP, such as a smartphone provider, does not create its own platform technology, but adopts and modifies a technology (e.g., Android software), and manages an ecosystem associated with that.

6 When I refer to a complementor in this paper, I mean complementors to MSP-based businesses. At the extreme, any business model that includes a complementor can be considered an MSP.

7 While the term “business ecosystem” often encompasses suppliers and customers, for this paper though suppliers and customers are not explicitly excluded from the definition, the primary emphasis is on complementors in an MSP’s ecosystem. Additionally, when I refer to an ecosystem, I generally mean MSP-governed ecosystems in which an MSP is enabling interactions between complementors and customers.
Linear Business Model

Side A (e.g., Supplier) \(\rightarrow\) Direct Interaction \(\rightarrow\) Buyer/Reseller \(\rightarrow\) Direct Interaction \(\rightarrow\) Side B (e.g., Customer)

Multi-Sided Platform Business Model

Multi-Sided Platform Business

Side A (e.g., Complementor) \(\rightarrow\) Affiliation \(\rightarrow\) Side B (e.g., Customer) \(\leftarrow\) Direct Interaction

Figure 1 Business model schematics

Though not true of all MSPs, for ones most relevant to this research, indirect network effects generally play a role in platform success as the increasing presence of apps or complements on one side brings value to users on the other side (Rochet & Tirole, 2003; Eisenmann, Parker, & Van Alstyne, 2006; Zhu & Iansiti, 2012). This is true for smartphone and tablet ecosystems: the more apps and accessories available, the more value a user derives from a smartphone or tablet. However, these network effects are not necessarily beneficial for any given complementor because they encourage increased market entry for competitors enabling less power for any individual complementor. This dynamic is one of the main reasons why this paper focuses primarily on dependencies rather than interdependencies (Thompson, 1967) between complementors and MSPs. As more complementors join an MSP’s ecosystem, the MSP’s power to dictate terms of engagement, and thus the asymmetry in the relationship, increases.
Complementors remain dependent upon MSPs, but MSPs become less dependent on any particular complementor (Boudreau, 2012).

Complementor research generally addresses strategic decisions MSPs face relative to complementors, such as first-mover advantages and standardization (Cusumano, Mylonadis, & Rosenbloom, 1992), whether or not to treat complementors as complementors or suppliers (Hagiu & Wright, 2015a and b), pricing structures (Armstrong, 2006), implications of modularity on ecosystems (Baldwin & Clark, 2000), whether or not MSPs should compete against complementors (Gawer & Henderson, 2007), or more recently organizational challenges MSPs face as the locus of value creation moves to networks of complementors (Kapoor, 2013). In this paper, rather than keeping MSPs as the center of inquiry, I focus on complementor challenges.

There is scant work investigating the effects of core firm behaviors on complementors (Pierce, 2009). An exception to this is Venkatraman and Lee’s (2004) study of the U.S. video game sector, which provides an excellent explanation of the role of complementors. They found that game developers’ choices are affected by macro network characteristics (e.g., density) as well as platform attributes (e.g., newness). Whereas these researchers consider dependencies in complementor networks, they do not delve into types of dependencies nor address response strategies. Another exception is emerging work related to mobile applications. Researchers have found that the great volume of app entry creates marketing and commercialization difficulties, particularly causing challenges for entrepreneurs (Bresnahan, Davis, & Yin, 2014). Though Bresnahan, et al. (2014) is one of the few studies elucidating perspectives of complementors, it focuses on market-related challenges of product competition. This paper complements that work by centering on challenges associated with these organizations becoming complementors.

**Dependency**

Within organizational research, scholars have long noted that organizational structure and associated relationships often echo relationships between technological products and/or services (Barley, 1986; Tushman & Anderson, 1986). There is a similar pattern with MSPs and ecosystems of complementors; complementor products enhance MSP products/services and have connections to them (in some cases physically through hardware and software interfaces; in others, only virtually). Dependency between organizations has been the subject of much research related to interfirm relationships (Pfeffer & Salancik, 1978). Dependence (specifically resource dependence), interdependency, and relationships associated with these concepts have been studied by scholars in a range of fields including sociology (Emerson, 1962; Blau, 1964/1986), organizational theory (Pfeffer & Salancik, 1978), strategy (Zaheer & Venkatraman, 1995; Holm, Eriksson, & Johanson, 1999; Kim, Hoskisson, & Wan, 2004), and management (Buchanan, 1992; Bode, Wagner, Petersen, & Ellram, 2011).

Scholars have used resource dependence theory to consider organizations as entities relying on an exchange of resources with external organizations such as suppliers, competitors, regulators, and so on (Pfeffer & Salancik, 1978; Katila, Rosenberger, & Eisenhardt, 2008; Ozcan & Santos, 2014). These external entities are similar to complementors since they impact the performance of the focal entity; complementor products and services depend on products and technologies of MSPs to function appropriately. Thus, it is useful to consider organization-level dependencies between MSPs and their complementors. Put another way, not only do complementors have an affiliation with an MSP, they also experience dependencies from the
MSP since they rely on the MSP for certain critical resources. In the literature on dependency, power imbalance, and interfirm relationships, there is minimal research on effective strategies for organizations that are in the less powerful position such as the case with complementors joining powerful MSP ecosystems.

When an incumbent organization joins an ecosystem managed by a larger platform manager, an asymmetric relationship (Casciaro & Piskorski, 2005; Gulati & Sytch, 2007; Katila, Rosenberger, & Eisenhardt, 2008) is created between the two. Scholars have studied asymmetric inter-organizational relationships and found they exhibit dependencies (Uzzi, 1997; Doz, 1988; Staudenmayer, Tripsas, & Tucci, 2005). Gulati & Sytch (2007) studied procurement relationships and found that joint dependence improved performance of such relationships. With complementors, there also can be joint dependence, particularly early in an MSP’s development. Accordingly, these theories are pertinent to complementor relationships, and this paper extends the existing work by distinguishing more finely the types of dependencies between MSPs and complementors and response strategies to address them.

Customer and supplier relationships have also been the subject of considerable research exploring influence of dependencies on inter-organizational learning, value creation, and performance (Helper, MacDuffie, & Sabel, 2000; Gulati & Sytch; 2007). Alliance researchers have noted risks and dependencies may be accompanied by behavior monitoring that may generate tension between firms (Das & Teng, 2001). However, existing research does not articulate the nature and type of tensions, nor responses. Further, it does not articulate how dependencies and responses in the context of MSPs are similar in some respects, but quite distinct in others, due to the nature of MSP-based relationships. Beyond alliances and supplier relationships, Casciaro and Piskorski (2005) considered resource dependence in mergers and acquisitions where power imbalance and mutual dependence affected organizations in opposing ways, reducing dependency. These dependencies may be related to those in complementor relationships because they include power imbalance and mutual dependence, but the context of acquisitions is different than complementors because the outcome is dissolution of the original focal organization.

Since data in this paper spans a multi-year time period, I am able to examine how power imbalances and dependencies in MSP-complementor ecosystems affect an organization as it becomes a more sophisticated and more mature complementor and how this variation affects its responses to dependencies. For this study, I adopt a broad definition of dependency as situations in which an organization relies upon or needs important or critical resources from another organization and for which there are limited or no alternatives (Emerson, 1962; Pfeffer & Salancik, 1978; Buchanan, 1992).

Methodology

Research design and setting
This paper is based on a qualitative inductive field-based research study spanning three and a half years from 2011 to 2015 with the headquarters location of Zuni (a disguised name), a large well-established global technology-based accessory provider. Zuni participates as a complementor to MSPs. The MSPs are firms like Apple or Samsung, which by selling
smartphones that are customizable from both hardware and software perspectives, enable interactions between accessory providers and end users. It is important to note that Zuni retains its relationships with its customers, selling accessories directly and through retailers. This paper focuses primarily on one particular division of Zuni.

The selection of this setting was appropriate for this research inquiry because during the time of this fieldwork the focal division of Zuni was in the process of joining powerful ecosystems. It was actively starting to provide products compatible with one large platform MSP’s products (Apple’s). It was also considering joining other ecosystems (initially for Microsoft, Blackberry, and providers of Android products, and later for Samsung as it emerged as a market leader). Zuni’s competitors were starting to provide products for these ecosystems, so Zuni recognized the opportunity and need to do so. Environmental factors forced the division to make strategic decisions that it might not have otherwise chosen. This is important because in much of the platform and ecosystem literature there are implicit assumptions that firms join MSP ecosystems due to growth aspirations. Though there were clearly economic motivations in this case, there was also a sense of reluctance, unwillingness, and inevitability. If it had been possible for this division to maintain its growth trajectory without becoming a complementor to a powerful MSP’s constraints, it probably would have done so. Hence, this site provides an interesting window into a successful incumbent organization facing a new competitive reality in which growth is enabled via joining an MSP ecosystem, even if reluctantly.

Zuni has a long history as an independent company with a strong brand name. It had to modify its competitive strategy (Barney, 1986) and operations in a few divisions because technology evolved such that to develop and sell new innovative products it needed to establish relationships with firms providing products with which its products worked. The focal division at Zuni became successful during this study, and that success in large measure resulted from selling complementor devices that worked with (and connected to) Apple products. Sales and profit numbers for this division are unpublished, so cannot be included here. However, based on confidential interviews there is evidence the division grew steadily from an economic standpoint, and also in organizational size and market influence. Revenue and profitability increased substantially. The number of people in the division grew dramatically. Managers of this division took leadership roles for initiatives that spanned the parent corporation. Although this study includes primarily Zuni’s activities with the Apple ecosystem, by the end of the study Zuni was actively starting to participate in other similar ecosystems.

The qualitative case study research approach is an empirical inquiry applicable when investigating phenomena within a real-life context, and contributes to appropriate methodological fit when the phenomena lends itself to nascent theory building (Eisenhardt, 1989; Edmondson & McManus, 2007; Yin, 2009). This research employs a single holistic case study design in which the unit of analysis is a product division (Ragin & Becker, 1992). The division is a reasonable unit of analysis rather than the entire firm because the division is a self-contained business unit undergoing a specific business transition (see Galunic & Eisenhardt, 1996 for a review of division-centric research). The division is a fast growing part of the

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8 Though Zuni also supplies accessories directly to Apple as a small part of its business, the supply relationship with Zuni is not the focus of this inquiry. This is reasonable from a research design standpoint because the vast majority of Zuni’s products that work with Apple products are not sold through Apple, but rather through other retailers such as Best Buy or wholesale clubs in the United States.
business that contributes a significant share of profits to the parent firm. The study is a revelatory case (Yin, 2009) since researchers have not had prior access to this type of field site over a prolonged period of time to observe and analyze the phenomenon of a complementor’s evolving relationship with a more powerful platform manager.

Finally, this study is an extreme case where the phenomena can be clearly seen. This is true because both the primary platform manager (Apple) and the complementor (Zuni) have characteristics that are extreme compared to peer organizations. Apple is known to be exceptionally strict and challenging in its complementor relationships, thus providing a case of a highly demanding MSP. Further, this Zuni division is a well-known, highly respected, technology-driven, profitable organization. During this study, Zuni became highly dependent upon Apple for continued commercial success and growth.

Data collection
This study follows rigorous qualitative field-based research methods. The data include 60 longitudinal cross-functional and cross-level semi-structured field interviews and archival research. I conducted 56 semi-structured field interviews with all members of the division senior management team from 2011 to 2015 providing a rich set of longitudinal data. (See Table 1 for interview timing and distribution details).

Table 1. Data Collection: Interview Timing and Distribution

<table>
<thead>
<tr>
<th>Interview Round</th>
<th>Start Date</th>
<th>End Date</th>
<th>Approximate Timespan</th>
<th>Interview Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>September 2011</td>
<td>March 2012</td>
<td>7 months</td>
<td># 1 - #16</td>
</tr>
<tr>
<td>Second</td>
<td>March 2013</td>
<td>June 2013</td>
<td>4 months</td>
<td>#17 - #32</td>
</tr>
<tr>
<td>Third</td>
<td>March 2014</td>
<td>August 2014</td>
<td>6 months</td>
<td>#33 - #54</td>
</tr>
<tr>
<td>Confirmatory</td>
<td>February 2015</td>
<td>March 2015</td>
<td>1 month</td>
<td>#55 - #56</td>
</tr>
<tr>
<td>Expert Additions</td>
<td>January 2012</td>
<td>March 2015</td>
<td>4 years</td>
<td>#57 - #60</td>
</tr>
</tbody>
</table>

Interviews of the management team included the division general manager, direct reports, and those without direct reporting responsibility but serving on the senior leadership team, for example human resources and finance leaders. An interesting feature of this data set is that the focal division experienced essentially no turnover at the management level throughout this study. Thus, I was able to conduct repeat interviews with individuals on the management team over consecutive years. During interviews, once respondents became comfortable with the interview format, they were willing to tell stories and explain situations that did not always cast the division in a positive light, which were useful during data analysis. This was particularly true in later rounds, by which time respondents had known me for years and developed trust that led to disclosure of candid observations and organizational insights.

To test concepts and support development of interview questions, I conducted formal interviews with industry experts and former Zuni employees. Informal conversations with other
members of this and related industries informed research questions. The average interview lasted approximately 60 minutes ranging from approximately 30 to 90 minutes. Interviews involved cross-functional staff members, including employees from marketing, research, product development, etc. This eliminated bias that might result from interviewing employees only from specific functional organizations. Informants had a range of organizational tenures, though most had been there a long time (typical of Zuni). Interviews spanned organizational levels from the general manager of the division to a business analyst. By spanning functions and organizational levels, this study includes a rich data set capturing observations from a multitude of perspectives.

In addition to collecting interview data, I gathered significant archival data related to Zuni over the course of the study. These include press releases, advertisements, website clippings, media articles, product packaging samples, and retail display photographs from locations around the world. These data were instrumental in triangulating findings across sources and over time and contributed to ongoing revisions of interview protocols as iteration continued between data collection, data analysis, and theoretical development.

Data Analysis
Interviews were audio recorded with hand-written notes keyed to the audio via a LiveScribe pen. Interviews were transcribed resulting in over 1,000 pages of text, and coded with Atlas.ti qualitative data analysis software. Coding and theory development progressed iteratively throughout data collection to inform data gathering. As themes emerged and data analysis progressed, all interview transcripts were analyzed enabling searches for key coding terms. This enabled comparison of interviews over time to capture variability of perspectives by individual as well as variability across individuals.

Code development followed a three-stage process of qualitative analysis: 1) data reduction (organizing, coding, and summarizing data), 2) data display (creating tables, network views, and diagrams), and 3) conclusion drawing/verification (Miles and Huberman, 1994). This process was iterative requiring frequent re-examination of original transcript data while cycling between developing displays, generating initial conclusions, continued coding and re-coding, conceptual development and thematic identification (Gioia, Corley, & Hamilton, 2013). To avoid confirmation bias, data that both confirmed and contradicted findings were included in the coding process.

The transcript data were coded by “deriving and developing relevant concepts from the data” (Corbin & Strauss, 2008: 65). The first coding round stayed close to the respondents’ words and meanings, sometimes employing in-vivo coding (Corbin & Strauss, 2008), and developing first-order codes and concepts (Gioia, Corley, & Hamilton, 2013). Through use of Atlas.ti software to manage the significant amount of data, these codes were grouped into code families. Comparative analysis (Corbin & Strauss, 2008) was useful to compare incidents across interviews and timeframes. For example, multiple respondents used the same examples of Apple interactions to illustrate points; these were all coded together. Similarly, because the data are longitudinal, perceptions of concepts across time could be captured via coding. An example is the two quotes that open this paper from the same person separated by two and a half years.

I developed network views during second stage analysis. For code families emerging as most important, network views enabled visualization of relationships between codes and assisted
in abstraction to higher level categories, concepts, and themes. In the tradition of grounded theory research and building on modern qualitative inductive research techniques (Glaser & Strauss, 1999; Corbin & Strauss, 2008; Gioia, Corley, & Hamilton, 2013), from first-order code families, concepts emerged and second-order themes were induced. These mapped to three aggregate strategies Zuni used to address dependencies and led to theorization of complementor maturity. Figure 2 provides an example of the data structure and relationships between elements (Gioia, Price, Hamilton, & Thomas, 2010; Gioia, Corley, & Hamilton, 2013).
**First-order concepts**

- Receiving requirements for chip and other technology usage in product design
- Needing interoperability of connected products
- Being frustrated with communication processes – missing information related to products
- Balancing secrecy with the desire and need to share information
- Recognizing differences in values (e.g., backwards compatibility for customers)
- Seeing value in including other firm logos on packaging, but very protective of own brand

**Second-order themes**

- Technology Dependencies
- Information Dependencies
- Values-based Dependencies

**Response strategies**

- Compliance
- Influence
- Innovation

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**Figure 2 Data structure example**
(Figure adapted from Gioia, Corley, & Hamilton, 2013)
A Model of Complementor Maturity
As a result of data analysis, I developed a grounded theory model identifying relationships between ecosystem joining, ecosystem-related dependencies, and complementor maturity response strategies. Figure 3 provides a diagram of this model. The following sections explain the elements of the model and the relationships between them.
Figure 3 Grounded theoretical model of challenges, response strategies, and phases of complementor maturity associated with joining an MSP-governed ecosystem.
With powerful MSPs such as Apple, Microsoft, Samsung and others developing huge markets for smartphones, tablets, and other mobile devices, in 2011 a large market had developed for accessory products. Zuni recognized the opportunity to design products optimized to work with MSPs’ products, and enter Apple’s ecosystem by developing products that would be Apple approved and marketed with Apple’s “Made for iPhone” or “Made for iPad” certification logos. These decisions to create Apple certified products, and move the product portfolio substantially in the direction of creating complementor products for powerful MSPs, led to Zuni entering into an asymmetric relationship with Apple as a developer of complementary products.

Dependencies of Ecosystem Joining
As Zuni joined ecosystems of powerful MSPs, it experienced three types of dependencies: 1) technological, 2) information, and 3) values-based. I define and provide evidence for each.

Technological Dependency
When Zuni started creating and marketing products to interoperate with Apple products, it experienced technological dependency. I define technological dependency as situations in which Zuni needed resources and requirements from an MSP to create and deliver products and services as part of that MSP’s ecosystem. Frequently, these resources and requirements are technology related, however, this dependency encompasses all situations in which an MSP prescribes a particular way to do something, or a performance level that needs to be achieved. Essentially, whenever Zuni was being told what to do or how to do it, I consider it a technological dependency.

The data analysis shows technological dependency also includes sub-types of dependencies. These sub-types vary in restrictiveness imposed by an MSP on Zuni. For example, the worst case was when specific technologies and their implementations were prescribed by an MSP. A less restrictive example was when an MSP provided technological requirements or standards that Zuni must achieve. These situations imposed different dependencies on Zuni, yet both related to decision-making and resource needs so are technological dependency.

An example of restrictive technological dependency was when Apple required Zuni to use a specific type of chip for Zuni products to work with Apple products. Zuni had to choose whether to incorporate this Apple-required chip into its design and buy it from an Apple-specified vendor. Once Zuni agreed, there was little latitude in how it implemented the requirement for this technology. Additionally, there were intellectual property (IP) considerations because Zuni was forced to use (license via the chip fee) another firm’s IP. This felt to Zuni like a strong and restrictive requirement. An engineering manager explained,

“So, we had to license a chip. We had to actually utilize the [component from the supplier] that they recommended... And, we had to use their specifications for reference designs in order for it to work with all the varied devices: iPod Nano, iPod Touch, iPhone, iPad.” (10-25-11)

A fourth type of dependency, economic, could also be articulated. However, through the data analysis, it became clear this dependency was a product of the other dependencies. Thus, I have not articulated economic dependency as a separate type, but essentially captured its effects within the other three types.
Some of the technologies required by Apple forced Zuni to make performance trade-offs because Zuni believed its own designs would result in better products. An informant explained:

“Apple really did want to influence the design of the product. So, if you remember back, we were of the opinion at the time that our designs for the [product attributes] were better than what Apple was forcing us to use.” (2-8-12)

For decades, Zuni had been developing products to industry standards. Those standards were straightforward technologically and provided Zuni with significant implementation flexibility. When Zuni decided to create accessories for Apple approval however, Zuni had to adhere to Apple-developed stringent requirements. One manager noted:

“...this whole design is because of them. We used to have it [this way], but when you [interfaced it with] an iPhone or whatever, [there would be a problem] ... So, we had to completely change the design... But at the end of the day, it was all driven by them, by their products, and how people use their products.” (10-25-11)

Information Dependency

Another form of dependency Zuni faced was information dependency. I define information dependency as situations when Zuni needed information from an MSP to deliver product or services. To compare this with technological dependency, when Zuni was required to meet standards or perform in a certain way that was a technological dependency. In contrast, when Zuni needed to communicate about standards, obtain information about them, learn about them, and so on, that was an information dependency. Information dependency encompassed difficulties in communication between Zuni and an MSP with challenges obtaining information related to product design and distribution.

As with technological dependency, the data analysis showed sub-types of information dependency. Two types included: 1) availability or completeness of information, and 2) timing obtaining information. In some circumstances the challenge was to get information that was not being released. In other situations, the difficulty was trying to obtain information faster than it was being offered. Related to the former, one manager said:

“It is a little bit hard to get answers from them. They have a lot of people, and then they have this certification, ‘Made for iPod, iPad’ certification that can be a little bit of a pain too, and they have a whole suite of tests but they'll never tell you which ones they'll run...”(10-25-11)

Because of lack of information availability, Zuni spent more time and resources than would have been necessary if it had obtained better information. As a member explained,

“So, you spend a lot of that time because they are so secretive and don’t tell anybody anything... spending a lot of your time sort of speculating, ‘if this, then we’ll do that,’ and having contingency plans.” (2-28-12)

Apple provided Zuni with various forms of requirements (technological, packaging, financial, etc.) and controlled information flow. There were many times Zuni wanted more information about topics like compliance testing and product design. One manager noted:
“You know they're very closed about what they do technically...very closed. So, it's really difficult to figure out what their product roadmap is.” (4-24-13)

Even once the relationship between Zuni and Apple was well established and Zuni was more sophisticated in its interactions with Apple, Zuni faced information dependencies significantly impacting product development. A manager explained the difficulty,

“Another thing that was a real pain in the neck, even though we’re a great partner and they want to work with us, just like everybody, nobody got to know what the size of the iPhone 5 was going to be. We guessed.” (8-26-14)

Values-Based Dependency
A third dependency Zuni experienced was values-based. I define values-based dependency as situations in which Zuni’s core values were challenged or threatened as a result of Zuni’s attempts to participate in an MSP-governed ecosystem. Examples of this type of dependency were challenges to how Zuni treated customers or managed interfirm relationships. For example, Zuni had a different view of customer relationships than did some MSPs. As Zuni became a member of MSP ecosystems, those MSPs began to shape boundaries that governed Zuni’s customer relationships and Zuni began to lose control of the boundaries. Values-based dependencies include sub-types such as: 1) values threats, and 2) values clashes.

Zuni prided itself on customer service and ensuring products lasted a long time. Zuni informants often mentioned the need to assure products continued to work with older (and newer) generations of products (a.k.a., backwards (and forwards) compatibility). Zuni noted a mismatch with MSPs on expectations of appropriate product lifecycles, which threatened Zuni’s values. A member explained,

“...it was just these very small mechanical changes that they require that make things incompatible with previous versions... and so their whole philosophy of not worrying as much about backwards compatibility as we do, is a disconnect sometimes.” (11-8-11)

Another informant also noted the difference in perspectives:

“It was very important to us, but it takes a lot of bandwidth to do this... Because they don’t have a lot of backwards compatibility drive. As a matter of fact, they have said to us, ‘You guys are nuts. It’s not compatible anymore. Tell them to buy a new one.’” (10-25-11)

The values-based dependency went beyond product compatibility to encompass an overall approach to product development. In 2012, a manager summed up the tension and how that derived from the values of the organization.

“I still don’t want to be a part of these ecosystems. That’s still where I am. I recognize the need and I recognize how I can be successful, but I would still rather not be a part of it... It’s just not the way we were raised here. We’re not supposed to do that. It’s just not right.” (2-8-12)
Zuni experienced another values-related dependency related to interfirm relationships and expectations. Before joining Apple’s ecosystem, Zuni managers noted Zuni had not placed high value on working with other firms. One manager noted:

“There’s a saying around Zuni, which is quote-unquote, ‘We dip our flag to no one.’” (10-7-11)

Zuni didn’t acknowledge a need to work with other organizations, particularly where another party had more power and could dictate activities. However, there was growing recognition of the asymmetry of the relationship between Zuni and Apple and the dependency that created. A manager commented,

“So, that was a philosophical change. ‘Okay, they win. They win. We used to be bigger, they were smaller. Now they’re a heck of a lot bigger, and we’re a heck of a lot smaller than they are, and they win. We dip our flag and we’ve got to learn to work with them.’” (10-28-11)

**Complementor Maturity and Response Strategies**

Over time, Zuni matured as a complementor as it learned to manage its relationships with MSPs, improved its ability to respond to dependencies associated with joining an ecosystem, adopted new behaviors, and shifted attitudes toward being a complementor. Zuni developed a variety of response strategies to cope with MSP ecosystem dependencies. The data show evidence of three types of response strategies: 1) compliance, 2) influence, and 3) innovation. Leveraging the temporal element of this data set, enables me to take a process perspective and identify an arc of stages through which Zuni passed as it matured as a complementor to Apple. As Zuni matured, Zuni used combinations of these strategies with varying emphasis on each. I use the evolution of Zuni’s maturity to distinguish three phases (or stages) of complementor maturity mapping to the three response strategies: 1) compliance-centric, 2) influence-centric, and 3) innovation-centric.

Using this data set and related analysis, I identify a strategic process Zuni followed as it increased its performance as a complementor to Apple. The complementor maturity phases align closely with the data collection rounds as they match Zuni’s evolution as a complementor.

- **Phase 1** (compliance-centric) aligns with the first interview round since the focal division had recently started offering products optimized for Apple’s ecosystem.
- **Phase 2** (influence-centric) aligns with the second interview round and the early part of the third interview round. During this time, the division’s product portfolio had become almost entirely Apple-centric, thus Zuni was working to influence Apple and align product planning to Apple product launches.
- **Phase 3** (innovation-centric) aligns with the later part of the third interview round when Apple began to more aggressively compete with Zuni by entering Zuni’s markets, and Zuni realized it needed to design and market more products that were less dependent on Apple.

Later in the study, as Zuni started to more aggressively join other ecosystems, it is also clear in the data that Zuni began to move through similar stages. In subsequent ecosystem joining, such as with Samsung, Zuni started to move quickly through the phases, but still started at the first phase.
Phase 1 – Compliance-centric
In the first phase, which I refer to as compliance-centric, Zuni expended a great deal of effort reacting to new rules and mandates imposed upon it as it became a more active ecosystem participant (e.g., technological requirements, branding guidelines, etc.). Not only was Zuni figuring out how to become compliant, but it was also wrestling with decisions about to what extent it was comfortable with following requirements. Though compliance-centricity represents the amount of attention being paid to the notion of compliance, it is important to recognize that some of this effort was towards figuring out ways not to be compliant. Still, the data shows a good deal of effort being placed focusing resources and attention on how to become compliant. An informant explained the difficulties of compliance:

“...engineering never goes like it’s supposed to. Simply being handed a card or handed a spec or handed a requirement... it’s not rocket science, but I think it’s more work than a lot of people would guess... you can make A work and you can make B work, but when you plug A and B together, you always get unexpected interactions, period.”(11-8-11)

Zuni’s inclination was to think in terms of technological innovation. Joining an ecosystem, and thinking about compliance, began to affect how Zuni was innovating from a product perspective. Another informant explained,

“... the whole relationship with Apple is quite new... We developed products on our own terms. Now, we have this external force that is coming and giving us nudges to what is right and wrong. As an organization, for the last 30 years, we decided what was right and wrong.”(3-15-12)

Zuni recognized that Apple requirements were not only dictating product design decisions (the heart of the organization), but also leading to designs with diminished performance. Still, after weighing trade-offs, Zuni chose to comply, as one manager explained,

“We had a lot of conversations about whether or not the performance they were dictating was up to the standards of being a Zuni product. We had a lot of conversation about that. Finally, in the end we agreed that it was acceptable, but it was certainly not preferred.” (10-28-11)

An example of compliance-centricity in branding and packaging involved highly emotional discussions of ecosystem compliance logos. Zuni initially strongly resisted adding any other brand to packaging and struggled with branding requirements. However, it eventually chose to allow the logos. An informant explained,

“And then the fact you have to put Apple mandated stuff on your packaging - that made it tougher... So, if I can finally accept the fact that our product is an accessory and not a product, which...don’t tell anybody in the company I admitted that. Then, it behooves the customer at the point of sale to be able to know: ‘Can I use this accessory with the thing I want to use it with?’” (2-8-12)

During this phase, Zuni did not yet actively adopt the influence response strategy and try to influence Apple but rather recognized it did not have a relationship in which it could provide input. An employee explained,
“They’re not asking us, ‘So, what are you trying to do? What experience are you trying to create?’ There’s none of that.” (10-25-11)

Still, supporting the notion that Zuni was following a multi-pronged strategy, a senior manager noted that Zuni needed to start thinking along the lines of an influence strategy:

“We’ll learn from our relationships with Apple to make sure we do things better in the future, but I think at this point everything is moving so fast, we’ve got to ramp up our ability to contribute to this ecosystem, as well.” (2-8-12)

Similarly, Zuni was not yet significantly adopting the innovation response strategy, yet Zuni was starting to develop an innovation response. Zuni senior managers were beginning to think about innovation to address the dependencies. A manager explained,

“It’s time for us to start to think about, how can we create a new category? We need to be looking at technology that is not just going to be subservient to them. How can we create an experience that is independent of this ecosystem? Ideally, it would be one that doesn’t even need this ecosystem. So, that is actually where I’m putting my creative juices emphasis...” (2-8-12)

**Phase 2 – Influence-centric**

While compliance is associated with acceptance, *influence*, in contrast, reflects the notion of not accepting circumstances and aiming to change them. In the second phase, which I refer to as *influence-centric*, the angst associated with being newly saddled with compliance requirements seemed to abate somewhat. Zuni continued to mature as a complementor and shifted its attention towards relationship building and influencing circumstances. With regular compliance-related interactions somewhat under control, Zuni attempted to improve circumstances and test the boundaries of the constraints under which it was operating. Whereas the compliance strategy was most aligned with responding to technological dependencies, the influence strategy applied across all three dependencies: responding to technological dependencies by trying to alter requirements, information dependencies by endeavoring to gain better and timelier information, and values-based dependencies by attempting to change values-challenging situations. Making the link between dependencies and Zuni’s influence strategy, a manager explained,

“...we sort of said to ourselves a few years ago we need to get in deeper. We’re so dependent on them. We need to try to get in deeper, and the only way to get in deeper is to offer them value... To help them establish the standard for something new.” (3-14-14)

There were occasions in which requirements caused problems and Zuni attempted to influence Apple to change these requirements. Explaining a performance trade-off dilemma, an informant explained:

“...sometimes it’s like, ‘Well, that’s not what we were going to do and really that’s not the best way to do it,’ and so we’ll argue with [Apple] sometimes, but I gather that we’re actually one of the few people that argue with them about that sort of stuff.”

Zuni developed a liaison process with regular meetings, documentation, etc. A participant explained,
“So, we have a standing meeting that we call the MFi meeting...some of us were chosen to make sure we fully understand how to introduce a new product for Apple. We sit down and we discuss all the issues that we're having ... We then document all those issues and give them to one of two people.” (5-21-13)

Similarly, a manager explained another interaction in which Zuni influenced the situation:

“So, we went back to them and we said, ‘We are not implementing [that technology],’ and their reaction was typical which is, ‘Why not? We told you to.’ And then, we provided data that said it degrades the experience - we cannot do it. They reacted well to that...” (5-21-13)

During the compliance-centric phase, Zuni’s dependency-responding activities were focused within the boundaries of its own organization. During the influence-centric phase, Zuni’s efforts expanded outwards and emphasized interfirm relationships. The activities in this phase centered on interactions outside organizational boundaries, and captured instances in which Zuni attempted to influence sensemaking (Weick, 1995) and activities of another party.

While operating in this influence-centric phase, Zuni also began to steadily incorporate an innovation response as it began to recognize that dependencies were causing inefficiencies. While explaining a technological dependency, a manager explained,

“So now I’m always thinking of ways around that because that annoys me. It just makes the [part of the Zuni product] expensive and it’s not value added to the customers... It doesn’t degrade the experience but it’s not adding value to the customer, so it bothers me that I pay for it when I could use that money elsewhere to enhance the experience.” (5-21-13)

Phase 3 – Innovation-centric

Though in Phase 2 the data show examples of Zuni beginning to innovate to avoid dependencies, it is in Phase 3, which I label innovation-centric, when Zuni more substantially starts to use innovation as a significant dependency response strategy placing more management emphasis on innovation than compliance or influencing. These innovation activities can be grouped into two types, 1) those aimed at making Zuni a better complementor within an MSP’s ecosystem (e.g., developing innovative approaches (possibly technologies) that enable it to comply better with requirements), and 2) those aimed at Zuni avoiding dependencies by creating products that do not require compliance even though they still work with an MSP’s products (e.g., by using a standard industry interface or developing products to work with competitive products).

Operating within an MSP ecosystem (the first innovation type), innovations might be product-design-specific (e.g., less Apple-dependent product designs), or marketing and other functional area related (e.g., new product color or innovative advertising). Zuni realized that even with an ecosystem, compliance did not limit flexibility along all dimensions. Pursuing the second type of innovation, Zuni also began to innovate with other technologies that had less dependency on ecosystem requirements (e.g., Bluetooth interfaces). These initiatives were aimed at Zuni being able to offer products that worked with an MSP’s products, but would not require specific ecosystem compliance.
In this phase, Zuni spent less management attention on compliance processes because these behaviors had become routines and part of a normal operating mode. A manager explained,

“We’ve gotten a lot more mature... There’s a lot more organizational ownership of working to their specs. I’ve set up a whole cross-functional team and they’re mostly running on their own. We’ve got much more internal buy-in that this is what we’re doing...we all grump about it sometimes but people understand why we’re doing it and we do it ...it’s just part of our standard work.” (4-25-14)

Similarly, yet somewhat counter-intuitively, in this phase Zuni also started to reduce its emphasis on influencing as a response strategy. Zuni became more sophisticated with its communication approaches and its influencing attempts. By Phase 3, senior managers recognized Zuni was not going to be successful in building the type of relationship with Apple to which it had initially aspired. A manager commented:

“So, I think the lesson that we’ve sort of learned here is...there really isn’t a two-way ecosystem. There really isn’t something where two companies who are competing in a marketplace really...really want to work together for mutual benefit because one is always bigger than the other.” (8-26-14)

Apple had started to aggressively enter Zuni’s markets and compete head-to-head with Zuni products. Zuni’s influencing efforts reverted to focusing primarily on tactical changes to technical specifications and bug fixes that improved Zuni products.

Zuni’s primary emphasis in this most mature of the three phases was on innovation and determining how to continue to offer differentiated competitive products while living with the dependencies imposed by operating within a large ecosystem controlled by a more powerful organization. A manager explained,

“If I don’t pursue these other side opportunities I think the way that Apple has evolved is going to prevent me from getting the growth I need. That’s why I need to do it.” (8-26-14)

As part of these efforts, Zuni not only focused on innovation within its own boundaries, but also on actively engaging with other ecosystems run by large MSPs (e.g., Samsung, which by this time had emerged as another powerful market leader).

To summarize, Zuni progressed through three phases of complementor maturity. In each phase, Zuni deployed three response strategies (compliance, influence, and innovation) to varying degrees to counteract the effects of dependencies they experienced as they joined an MSP ecosystem. Figure 4 summarizes shifts in management attention through the phases.
Phase 1: Compliance-centric
Phase 2: Influence-centric
Phase 3: Innovation-centric

<table>
<thead>
<tr>
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<th>Phase 1: Compliance-centric</th>
<th>Phase 2: Influence-centric</th>
<th>Phase 3: Innovation-centric</th>
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<tbody>
<tr>
<td>Compliance</td>
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<td>○</td>
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<tr>
<td>Influence</td>
<td>○</td>
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<tr>
<td>Innovation</td>
<td>○</td>
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<td>●</td>
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</tbody>
</table>

Key: ● = substantial management attention
○ = medium management attention
☐ = less management attention

Figure 4 Management attention variation by complementor maturity phase

Reading down the columns shows the relative emphasis on strategies in each phase. In the first phase, Zuni focused primarily on compliance with less attention on influence and innovation. In the second phase, Zuni placed much emphasis on influencing, yet still worked on managing compliance while also starting to increase attention on innovating to respond to dependencies. In the third phase, Zuni shifted attention towards innovating while still emphasizing influencing (mostly around tactical topics like software bugs). In this phase, Zuni had established norms and operating procedures to address compliance, so exerted less management effort on compliance. Reading across rows shows how each response strategy shifted through the phases.

Various indicators provided evidence as to when Zuni moved through different stages of complementor maturity. For example, during later interviews, informants mentioned organizational structures, liaison processes, and standard operating procedures that had been established to address compliance so that compliance was no longer a primary concern. Similarly, informants explained routines related to meetings with Apple, which provided data supporting the notion that Zuni’s influencing strategies had become institutionalized and Zuni’s concerns had shifted to a more innovation-centric approach.

Table 2 provides examples of how Zuni applied response strategies in each phase to each of the ecosystem dependencies. The responses along the upper left to lower right diagonal (i.e., complying to cope with technological dependence, influencing to resolve information dependence, and innovating to address values-based dependencies) are the ones that might have been expected. The off-axis responses provide more surprising and interesting findings.
example, Zuni’s struggles related to compliance in the context of threats to core values, and Zuni’s efforts to innovate to reduce information dependency, show the broader scope and applicability of the theoretical framework and highlight how it can be used to uncover subtle challenges and responses of MSP-complementor relationships, particularly in the presence of power asymmetries.

Table 2. Complementor maturity phases mapped to ecosystem dependencies

<table>
<thead>
<tr>
<th>Complementor Maturity Phase</th>
<th>Technological dependence</th>
<th>Information dependence</th>
<th>Values-based dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1: Compliance-centric</td>
<td>• Comply with specifications (e.g., technical, packaging, processes)</td>
<td>• Proceed with info received and don’t share to influence</td>
<td>• Comply with logo guidelines and work to understand intention of MSP; Focus on interpretation and customer implications</td>
</tr>
<tr>
<td>Phase 2: Influence-centric</td>
<td>• Provide feedback to fix and improve specs</td>
<td>• Create liaison process and appoint contact people to negotiate</td>
<td>• Suggest standards and logo compliance guidelines; aim to change intentions and customer experience</td>
</tr>
<tr>
<td>Phase 3: Innovation-centric</td>
<td>• Design products taking into account platform requirements and re-define how to differentiate</td>
<td>• Design products less dependent on platform info</td>
<td>• Offer products less sensitive to backwards and forwards compatibility to reduce customer concerns</td>
</tr>
</tbody>
</table>
Discussion
In this paper I explore how firms that join MSP-governed ecosystems as complementors cope with dependency challenges and become more mature in their responses over time. I highlight three phases of complementor maturity and outline response strategies employed during these phases. The theoretical framework illustrates how a less powerful firm joining an ecosystem experiences dependencies and addresses these challenges over time by modifying a hybrid set of response strategies.

A complementor perspective - The majority of research literature on MSPs and ecosystems focuses on platform managers governing these systems and barriers to growing and competing in ecosystems such as the “chicken and egg problem” (Caillaud & Jullien, 2003) and winner-take-all concerns (Cennamo & Santalo, 2013). Scholars have proposed solutions to these problems that include types of pricing strategies (Hagiu, 2009), governance mechanisms (Boudreau, 2010), and approaches to building and growing ecosystems (Eisenmann, Parker, & Van Alstyne, 2011). By looking at platforms and ecosystems from the perspective of an accessory provider joining ecosystems as a complementor, and focusing on an organizational perspective, I contribute new insights to our understanding of these systems including those related to dependencies, complementor maturity, and response strategies.

Complementor maturity - Research on ecosystem governance has considered technology ecosystems at different maturity stages exploring how ecosystem evolution may affect generativity and innovation of entering complementors particularly in the face of contradictory logics and paradoxical tensions (Boudreau, 2012; Wareham, Fox, Cano Giner, 2014). Wareham, et al. (2014) note that from a population perspective complementor maturity is relevant and they call for further exploration of generativity as ecosystems evolve. This work does not, however, explore strategic and organizational changes undertaken by complementors as they mature in ecosystem participation as outlined in this paper.

MSP-complementor relationships differ from other types of interfirm relationships - Whereas supply chain and alliance researchers study interfirm relationships similar to complementor relationships that also exhibit joint dependencies with shared risks and outcomes (Gulati & Gargiulo, 1999; Helper, MacDuffie, & Sabel, 2000) and potential asymmetric power dynamics, the MSP-complementor relationships studied here have characteristics that distinguish them from these other interfirm relationships. In MSP relationships both the MSP and the complementor establish relationships with end customers. In contrast, in supplier relationships and alliances, one entity (usually the buyer or larger alliance partner) owns the customer relationship and ultimately provides the added value (Brandenburger & Stuart, 1996). In complementor relationships, the MSP offers a product or service and the complementor offers a distinctly different product or service (e.g., an accessory product) that builds upon the initial offering to add increased value (Brandenburger & Nalebuff, 1996; Yoffie & Kwak, 2006). MSPs have some similar characteristics to other forms of interfirm relationships, but are distinctly different (see Hagiu & Wright, 2015b for a comparison of MSPs with other business models). It follows then that dependencies associated with MSP-complementor relationships are likely to be different than those in other interfirm relationships.
Why do complementors choose specific response combinations as they mature? - Why Zuni chose the response strategies it did during each phase, and why it moved from one phase to another might be attributed to a number of factors. One plausible set of explanations relates to Zuni’s strong and long established organizational identity (Albert & Whetten, 1985). Joining an ecosystem governed by a much more powerful player may have challenged Zuni’s identity (Dutton & Dukerich, 1991; Elsbach & Kramer, 1996). Zuni considered itself a fiercely independent technology-centric product organization. It also believed in “doing the right thing” and behaving with utmost integrity. Thus, when Zuni started to participate in an ecosystem, its first concerns were those related to technological performance and complying with the imposed requirements. Additionally, Zuni struggled with being a complementor and becoming significantly dependent upon other organizations. Early in the study, Zuni’s behaviors were consistent with an independent organization trying to comply, but on its own terms. As the organization gained experience in the ecosystem, it started to recognize how dependent it had become on another organization and began to more actively test boundaries, resist rules, and work to change them; it moved into the influence-centric second phase. Over time, as the results of the influencing were not progressing to the organization’s liking, and the organization became more accustomed to its role in the ecosystem and its ability to be successful as a member, it fell back on its strong heritage and organizational identity characteristics as an innovator.

Future Research
A construct not thoroughly covered in this research, yet commonly associated with ecosystems is co-opetition in which an organization joining an ecosystem is both cooperating with, and competing against, the MSP (Brandenburger & Nalebuff, 1996; Afuah, 2000). The notion of organizations competing and cooperating is not new (Deutsch, 1968), and organizations operating within MSP ecosystems are often confronted with the dynamic since MSPs sometimes compete with complementors they enable (Gawer & Henderson, 2007). Because data in this study provides insights into new frameworks of dependencies, complementor maturity, and responses, I chose to focus on internal challenges and responses rather than competitive dynamics. However, there is great potential to continue this research considering co-opetition dynamics and tying more tightly to co-opetition research.

Though we can use organizational identity theory to consider when and why an organization might invoke response strategies, this study focused almost entirely on organizational identity in terms of insiders’ views of organizations. An extension might be to include how insiders account for how others perceive them and also how others perceive the organization. Also, since identity theory spans both micro- and macro-levels, future research could tie this work to micro identity themes. It could also complement work on ambivalence in organizations (Pradies & Pratt, 2010; Ashforth, Rogers, Pratt, & Pradies, 2014) since that research shares considerations with identity research and spans levels.

Conclusion
As one of the first empirical studies to take the perspective of a complementor participating in MSP ecosystems, this paper contributes to burgeoning research on MSPs, ecosystems, and complementors by elucidating challenges, complementor maturity, and response strategies as organizations join complementor ecosystems. This paper represents the first time dependency,
power, influence, and organizational identity theories have been brought to bear to understand organizational and managerial challenges associated with platforms and ecosystems. The managerial implications of this work are numerous. Complementor managers can use the frameworks to consider dependencies they might face and how to respond. MSP managers can consider dependencies and responses as they create ecosystems and better understand how they may be affecting complementors.

References


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WORKING DRAFT


