

THE DISRUPTOR'S DILEMMA: TIVO AND THE U.S. TELEVISION ECOSYSTEM*

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ABSTRACT

Firms introducing disruptive innovations into multisided ecosystems may confront the *disruptor's dilemma* – they must gain the support of the very incumbents they disrupt. We examine how these firms may address this dilemma through a longitudinal study of TiVo, a company that pioneered the Digital Video Recorder. Our analysis reveals how TiVo navigated co-opetitive tensions by continually adjusting its strategy, its technology platform, and its relational positioning within the evolving U.S. television industry ecosystem. We theorize how (a) disruption may affect not just specific incumbents, but also the entire ecosystem, (b) co-opetition is not just dyadic, but also multilateral and intertemporal, and (c) strategy is both a deliberative and emergent process involving continual adjustments, as the disruptor attempts to balance co-opetitive tensions over time.

MANAGERIAL ABSTRACT

New entrants confront a dilemma when they introduce a disruptive innovation into an existing business ecosystem, viz., *how can they gain the support of the incumbents that their innovation disrupts?* Confronting this “disruptor’s dilemma”, the disruptor must consider several issues: How might it pitch its innovation to attract end customers and yet reduce the threat of disruption perceived by ecosystem incumbents? How can the innovation be modified to fit into legacy systems while transforming them? Based on an in-depth analysis of TiVo and its entrepreneurial journey, we explore the strategies disruptors can deploy to address these issues.

There is considerable interest in studying disruptive innovations as posing threats to incumbent firms (Christensen, 1997; 2006; Christensen and Rosenbloom, 1995). Most discussions around disruptive innovations focus on the challenges confronted by incumbent firms (e.g., Christensen, 2006; Danneels, 2004; 2010; Hill and Rothaermel, 2003) and how these might be addressed (Ansari and Krop, 2012; Christensen and Raynor 2003; Wessel and Christensen, 2012).¹ What is missing is a consideration of the challenges that disruptors, often start-up firms, confront in establishing their innovations as the basis for firm survival and growth (Yu and Chang, 2010). This lack of focus is surprising given low survival rates for entrants (O'Reilly and Tushman, 2011; Stubbart and Knight, 2006).

We address this gap by drawing on several related literatures. The literature on industry ecosystems emphasizes not just firms operating in isolation, but also an ecology of interdependent firms (Adner, 2012; Iansiti and Levien, 2004; Moore, 1996; Wareham, Fox and Giner, 2014). An appreciation of ecosystem dynamics draws attention to the need for disruptors to stitch together their own value networks (Brandenburger and Nalebuff, 1996; Teece, 1986) to establish their disruptive innovations. These value networks may also include ecosystem incumbents with potentially conflicting interests, especially in multisided markets (Eisenmann, Parker and Van Alstyne, 2006; Rochet and Tirole, 2003).

The juxtaposition of the literatures on disruptive innovation and multisided industry ecosystems reveals a paradox. Specifically, to survive and grow, firms that introduce innovations that disrupt existing ecosystem dynamics (henceforth disruptors) may need the support of the very incumbents whose technologies, products or business models they disrupt. In other words, to graft its innovation into an existing ecosystem, the disruptor needs cooperation from the incumbents who, threatened by the innovation, may resist and even retaliate (Markman and Waldron, 2014). The presence of such

¹Disruptive innovations are new technologies, products or business models that are financially unattractive to incumbents (Christensen, 2006; Markides, 2006). They can be (a) “low-end” innovations that target customers “overserved” by the functionality of their current provider, such as discount department stores (e.g., Walmart), (b) “new-market” innovations that target “non-served” customers, i.e., those unable to access, use or even afford the product, such as online auctions (e.g., eBay), or (c) hybrids, that combine both overserved and non-consumers, such as low-cost airlines (e.g., Southwest Airlines) (Christensen and Raynor, 2003; Christensen *et al.*, 2004). While much of this work focuses on how disruption affects incumbents, disruptions that are systemic in nature may also jeopardize the existing linkages among the different members of an ecosystem.

simultaneous forces for cooperation and competition represents co-opetition (Bengtsson and Kock, 2000; Brandenburger and Nalebuff, 1996; Gnyawali and Park, 2011; Ketchen, Snow and Hoover, 2004).

When taken together, these literatures highlight a key question: *What are the challenges that an entrant, especially a start-up firm, confronts in introducing a disruptive innovation into an ecosystem, and how does it address them?* We address this question by conducting a longitudinal study of TiVo, a start-up firm that pioneered the Digital Video Recorder (DVR) within the U.S. television (TV) industry ecosystem. TiVo's DVR technology stood to fundamentally transform TV viewing and the relationships among members of the TV industry ecosystem. The DVR enabled asynchronous à la carte viewing of television programs that changed the network-centric program schedule to a demand-driven one (Gartner, 2005). Moreover, the DVR enabled the fast-forwarding of commercials by viewers, rendering ineffective the existing practice of placing (and charging premium prices for) commercials during primetime or popular programs.

Our analysis of the longitudinal data on TiVo and the TV industry ecosystem generated three themes that we develop in this paper. First, a disruptor confronts three co-opetitive tensions²—intertemporal, dyadic, and multilateral. Second, the disruptor continually adjusts its strategy to address these co-opetitive tensions as they arise. Third, as the disruptor's innovation and relational positioning within the changing ecosystem co-evolve, the disruptor has greater latitude to frame its innovation as being sustaining to the operations of ecosystem members. Overall, these themes contribute to an understanding of strategy as an emergent process (Burgelman, 1988; Mintzberg, 1978).

THEORETICAL MOTIVATION: THE DISRUPTOR'S DILEMMA

A steady stream of work has been published on disruptive innovations (e.g., Chandy and Tellis, 2000; Christensen, 1997; 2006; Danneels, 2004; Markides, 2006; Shanklin and Ryans, 1987) wherein a new technology, product, or business model adversely impacts the financial model of an incumbent (Christensen, 2006). Most studies are from the perspective of the firms that are “disrupted,” i.e.,

² By tensions, we mean the contradictory pressures that exist between the focal firm and other interdependent firms due to the presence of simultaneous forces for competition and cooperation.

established or incumbent firms that either lose ground and perish (e.g., Anderson and Tushman, 1990; Christensen and Rosenbloom, 1995; Danneels, 2010; Henderson and Clark, 1990; Tripsas and Gavetti, 2000) or survive and prosper (Chandy and Tellis, 2000; Leifer *et al.*, 2000; Richman and Macher, 2004; Tripsas, 1997). But, there are fewer studies that examine the challenges that disruptors encounter in their efforts to introduce and promote their innovation within an existing ecosystem (Ansari and Krop, 2012).

Industry ecosystems are business networks of interconnected firms that depend on one another for their mutual effectiveness and survival (Adner, 2012, Iansiti and Levien, 2004; Kapoor and Lee, 2013; Moore, 1996). Constituting an industry's ecosystem are producers (including suppliers, competitors, and complementors) from the supply side, distribution channels and consumers from the demand side, and regulators and other interested stakeholders from the institutional side (Adner and Zemsky, 2006; Garud and Karnoe, 2001). Each firm's value network, encompassing its respective suppliers, complementors, rivals and customers, overlap and become intertwined to generate multiple value propositions that may be complementary or substitutive (Brandenburger and Nalebuff, 1996).³ Such situations are especially likely in systemic industries (Garud, Jain and Kumaraswamy, 2002; Katz and Shapiro, 1985) forged around multisided platforms (Boudreau, 2012; Gawer and Cusumano, 2014; Rochet and Tirole, 2003)⁴.

Disruptive innovations disturb the business models of ecosystem incumbents who are likely to resist and counter-mobilize (Garud *et al.*, 2002; Glasmeier, 1991; Markman and Waldron, 2014). For instance, Sun Microsystems confronted resistance and then counter-mobilization from Microsoft – a dominant incumbent in the computer industry ecosystem – when it attempted to disrupt Microsoft's Windows franchise and gain platform leadership for its Java software technology (Garud *et al.*, 2002). In the browser space, Netscape faced strong counter-mobilization when it openly confronted Microsoft, which it labeled the “Death Star” while casting itself as the rebel alliance that would “liberate the galaxy” by making Microsoft obsolete (Cusumano and Yoffie, 1998; Yoffie and Kwak, 2002).

³ We thank Adam Brandenburger for clarifying this point.

⁴ Multisided platforms connect multiple groups or sides that seek access or links to one another. For instance, eBay and PayPal link consumers with merchants; Google's search engine connects advertisers and users. Other platforms, such as Microsoft's Windows, have several sides (application developers, users, and OEMs), as does the Blu-ray standard for DVDs (content providers, manufacturers of DVD players, and consumers) (Hagiu and Yoffie, 2009).

To add to the challenges, a firm that offers a disruptive innovation must gain access to complementary assets (Teece, 1986) lest its innovation remain confined to niche markets. Therefore, a disruptor introducing its innovation into an existing ecosystem needs to stitch together a set of transactions, rules and roles governing the arrangements, relationships and interdependencies, especially with established incumbents (Adner, 2012; Glasmeier, 1991; Jacobides, Knudsen and Augier, 2006; Santos and Eisenhardt, 2009). While this is difficult enough, the challenge is exacerbated in ecosystems built around multisided platforms, where disruptors have to contend with the conflicting interests and demands of different sides. For example, even Sony, a company with deep pockets, failed to consider the challenges its disruptive innovation posed for the other sides (i.e., authors and publishers) of the publishing industry ecosystem when it introduced the Reader for e-books in 2006 (Adner, 2012). Publishers did not sign on and, consequently, nor did readers.

These issues lead us to a central dilemma that disruptors confront. Disruptors risk retaliation from incumbent firms potentially disrupted by the innovation, but yet may need the support of these very incumbents to establish their innovation within the existing ecosystem. Underlying this *disruptor's dilemma* are conflicting pressures on disruptors to both cooperate and compete with other firms. This speaks to the notion of co-opetition (Bengtsson and Kock, 2000; Brandenburger and Nalebuff, 1996), which is the “sum of many different relationships and the cooperative and competitive parts are divided between different actors” (Gnyawali and Park, 2011:651). A narrower view, one that Gnyawali and Park specifically explored, pertains to dyadic co-opetition, i.e., the “simultaneous collaboration and competition between two firms and [how] the different parts of the relationship are divided between activities.” The task of managing such co-opetitive relationships is all the more challenging in systemic industries with multisided platforms and complex ecosystems.

Given all these challenges, evidence suggests that new entrants have low survival rates (O'Reilly and Tushman, 2011; Stubbart and Knight, 2006). These challenges are further exacerbated for start-ups (Markman and Waldron, 2014) because they are disadvantaged by a paucity of resources. While large

new entrants and incumbents may be able to endure challenges (such as the disruptor's dilemma) to gain market share over time, the innovations of start-ups may remain confined to niche markets; at an extreme, the firm may not even survive (Chen, 1996). These observations motivate our inquiry into how a new entrant, especially a start-up firm, can deal with the challenges of introducing its disruptive innovation into an existing industry ecosystem.

RESEARCH CONTEXT AND METHODS

We chose TiVo and the U.S. TV industry ecosystem to conduct our exploratory study for a number of reasons. First, the process that unfolded as TiVo introduced its disruptive innovation (the DVR) represents a “revelatory case” (Eisenhardt and Graebner, 2007). Second, the TV industry ecosystem comprises multiple sides such as broadcast networks and content providers, advertisers, content distributors, hardware manufacturers, audience measurement and ratings firms, regulators, and television viewers. Each side has different interests and motivations vis-à-vis TiVo and its DVR technology. The industry itself has systemic characteristics (Katz and Shapiro, 1985) and exhibits the complex interdependencies associated with multisided platforms (Rochet and Tirole, 2003). All these make the TV industry ecosystem a “strategic research site” (Merton, 1987) for the purpose of this study.

Sources of data

Table 1 summarizes our data and sources. We began by gathering extensive longitudinal data on TiVo and the U.S. TV industry ecosystem through keyword searches of publicly available archival sources between the years 1995 (two years before TiVo's precursor firm was founded) and 2012. We also gained access to scholarly articles and business cases on the U.S. TV industry ecosystem and TiVo. These publications dealt with the initial relationships among key incumbents of the U.S. TV industry ecosystem, the unfolding of DVR technology, the respective positions of TiVo and industry incumbents, and the changing behaviors of television viewers as the DVR was introduced. Besides, we downloaded all the US patents awarded to TiVo, and gained access to TiVo's SEC filings and company news releases over the years till 2012. Finally, to ascertain the perspectives of the industry regulator and diverse industry

participants on DVRs in general and TiVo in particular, we downloaded documents published by the Federal Communication Commission (FCC) and key industry associations.

-- Table 1 here --

In addition to archival sources, following Danneels (2010), Joseph and Ocasio (2012), Capaldo (2007) and others, we interviewed seven current and former senior executives of TiVo (including a company founder, the CEO, and the CFO) either telephonically or in person during visits to TiVo's headquarters. All these executives had been intimately involved in key facets of TiVo (such as strategy formulation, technology development and forging of ties with members of the TV industry ecosystem) during various stages of its growth. We started our open-ended interviews (ranging from 45 minutes to 90 minutes each) by requesting informants to describe TiVo's strategy, its evolving relationships with other members of the ecosystem, and changes to its technology platform over time. In addition, we gained access to audio-video files or transcripts of 24 interviews of TiVo executives conducted between 2002 and 2012 by others. Including the 7 interviews that we conducted, we had access to a total of 31 interviews. These interviews confirmed what our archival data highlighted and, in addition, enabled us to gain a more nuanced insider's view of how TiVo's executives attempted to deal with emergent challenges.

There are advantages of using diverse longitudinal data from multiple sources. *First*, as Burgelman (2011:594) noted, "historical methods are inherently concerned with longitudinal development, and involve reconstructing the unfolding of individual and collective action patterns leading up to relatively unique events." *Second*, triangulation across these data (Jick, 1979) generated a rich understanding of the dynamics that unfolded, and led to the identification of key themes based on rigorous analysis.

Data analysis

This corpus of data allowed us to create a robust chronology of events pertaining to TiVo and the U.S. TV industry ecosystem since 1995. Our approach was to triangulate upon critical events within a larger chronology of events to gain an understanding of the underlying dynamics. As suggested by Van de Ven and Poole (1990), we identified key actors in the ecosystem (e.g., TiVo, content providers, content

distributors, hardware manufacturers, ratings & measurement firms, viewers, regulators and industry associations), associated contextual factors, and the outcomes or effects (e.g., positive or adding value vs. negative or disruptive) on TiVo and others.

To conduct a more fine-grained analysis, we constantly compared data from various sources with our emerging theoretical insights (Glaser and Strauss, 1967). We used NVivo 10 to identify key sub-themes and themes in our data (Table 2 is an abridged examples of our larger thematic analysis). This thematic analysis was conducted in conjunction with the generation of a 24-page case narrative of the events that had transpired in the U.S. TV industry ecosystem since TiVo's entry. One TiVo executive read this case narrative and verified that the details and our interpretations of events were accurate. This step represents a member check (Lincoln and Guba, 1985) to confirm the accuracy and adequacy of our data and interpretations. In the next section, we present the findings of our analysis using an abbreviated version of our narrative to offer readers an overall context.

-- Table 2 here --

NAVIGATING THE DISRUPTOR'S DILEMMA

The origins of the disruption from DVRs (also called personal video recorders or PVRs) can be traced to 1999 when TiVo first introduced its DVR box and service. TiVo's DVR box contained a hard drive that made it possible for subscribers to record television programs in digital form. Its services included an up-to-date electronic program-guide, the possibility to record and watch programs at viewer's convenience, and an ability to fast-forward through commercials for a more seamless TV viewing experience. In addition, the digital technology offered the potential to transform television viewing into an interactive experience through two-way connectivity (initially through a phone line).

Prior to TiVo's introduction of its DVR, the traditional television-broadcasting model rested on "the logic of linear flow," with strategic program schedules designed by broadcast and cable networks to channel viewers' attention and generate advertising revenues during prime-time viewing. Consistent with this broadcasting model, the TV industry ecosystem during the late 1990s comprised multiple entrenched

and interdependent sides or groups. Television viewers, who valued access to interesting programs/content, constituted one side. Content providers – cable networks (e.g., Disney, ESPN, Discovery), broadcast networks (NBC, CBS, ABC and Fox) and movie studios (e.g., Universal, Sony) – constituted another side. Content distributors – cable and broadband providers (e.g., Comcast, AT&T, Cox) and satellite providers (e.g., DirecTV, Dish Network) – collated programming to offer various packages of content that viewers could subscribe to. To do so, they relied on technologies and products supplied by hardware manufacturers (e.g., set-top box manufacturers such as Scientific Atlanta and Motorola, and consumer electronics firms such as Sony and Philips). Advertisers who attempted to reach television viewers by purchasing commercial spots on popular channels and programs constituted yet another important side.

Not surprisingly, audience measurement and ratings firms (such as Nielsen) were also important. They kept track of the programs that were popular with television viewers so that interested players such as content providers, content distributors and advertisers could fine-tune their respective offerings. Finally, overseeing all members of the industry ecosystem was the Federal Communications Commission (FCC), the regulatory body that maintained appropriate security and decency standards, and also ensured that few powerful firms did not control either content or distribution. Though the different sides had negotiated revenue/profit-sharing arrangements among themselves, relationships between various sides were inherently conflict-ridden over who controlled access to television viewers and how value from such access was appropriated.

In introducing its DVR, TiVo's strategy was to create a platform that would result in a significant departure from the traditional television-broadcasting model and the negotiated relationships and agreements that this model implied. As noted in TiVo's final IPO prospectus (1999:3):

“The TiVo Service allows viewers to watch what they want when they want and creates a richer and more enjoyable television viewing experience by offering viewers greater control, choice, and convenience. The TiVo Service also serves as a new platform for programmers, advertisers and network operators to deliver new types of advertising and in-home commerce.”

Clearly, the introduction of TiVo's DVR, which enabled recording and time-shifting of programs and fast-forwarding of commercials, would disrupt many ecosystem incumbents. For content providers, time-shifting of programs and fast-forwarding of commercials would make it difficult to generate lucrative revenue streams by selling commercial spots during prime time or popular programs. Advertisers and marketers also would need to rethink the value of the prime time "30 second spot" (Buell, 2001) and find new ways of reaching viewers who fast-forwarded through commercials. Audience measurement firms such as Nielsen would be adversely impacted too, as monitoring/measuring viewers' preferences and behaviors would become more difficult. Equally importantly, the DVR had the potential to compromise the hitherto direct access to viewers that content distributors (i.e., cable and satellite providers) enjoyed through their distribution platforms. Finally, TiVo's DVR could replace proprietary cable or satellite set-top boxes, thereby hurting the manufacturers of these devices. In other words, TiVo and its DVR stood to disrupt the existing relationships between TV industry incumbents and, thereby, their business models and value propositions based on the traditional broadcasting model.

Our analysis of TiVo's attempts to enter and establish its innovation as a platform within the TV industry ecosystem reveals three themes. First, TiVo confronted three co-opetitive tensions because it was perceived as a disruptive force by the existing industry ecosystem. Second, TiVo had to make continual adjustments over time to address these emergent co-opetitive tensions. Third, TiVo's DVR platform and its relational positioning within the ecosystem evolved over time due to these continual adjustments.

Theme 1: Co-opetitive tensions and challenges in disrupting existing ecosystem

Our first theme underlines the disruptor's dilemma, i.e., the tensions and challenges disruptors confront in seeking the support of the very firms they disrupt. An analysis of the data revealed three co-opetitive tensions – intertemporal (i.e., short term vs. long term), dyadic (i.e., within dyadic relationships), and multilateral (i.e., across relationships spanning multiple dyads or multiple ecosystem sides).

Intertemporal co-opetition. From the beginning, TiVo tried to gain buy-in from ecosystem incumbents by offering a vision of future benefits from its DVR platform. For instance, TiVo's services

would generate fine-grained and real-time understanding of viewer preferences and behaviors. TiVo also would offer new interactive ways for advertisers and content providers to reach viewers, thereby transforming the passive consumer experience of viewing commercials on TV into an interactive experience tailored to specific consumer needs. A TiVo executive we interviewed described the company's strategy as "build it and they will come."

Despite the possibilities of reaping these benefits in the future, incumbents felt the disruptive effects of TiVo's innovation immediately. As one TiVo founder informed us: "Our DVR was especially disruptive to the networks (i.e., content providers) and advertisers." It was therefore not surprising that reactions to the DVR were negative: "[D]VR is fast becoming a four-letter word in some advertising and media circles" (Forkan, 2000: 18). This strong negative reaction is exemplified by TiVo co-founder Mike Ramsey's recollection during an interview:

"And, when they [ecosystem incumbents] saw this thing [TiVo's DVR], they'd just go completely nuts... (and show) every emotion [such as]...anger, hate...And not only did they have a negative reaction and throw us out of their office...but they talked to the press...and would tell them that we were evil and that, if this took off, it was going to have a massive negative impact on the US economy, and all sorts of doomsday kind of statements." (iinnovate.blogspot.com, 2006)

Not surprisingly, industry analysts and the popular media too portrayed the DVR as a disruptive technology. For instance, the headline of the lead article in the New York Times Magazine (Lewis, 2000) proclaimed: "The End of the Mass Market" and discussed "how new television technology could destroy advertising as we know it." In February 2000, Forrester Research analyst Josh Bernoff's report on DVRs was titled: "The End of TV (As We Know It)." Analysts also noted how TiVo had the "potential to change how people watch[ed] TV" (Greenberg, 2000) and how television viewers rapidly were becoming "used to the idea that they never have to watch a commercial again" (Walker, 1999).

Such media rhetoric, in turn, heightened the disruptive threat perceived by ecosystem incumbents, thereby making it even more difficult for TiVo to gain acceptance for its innovation. A former member of the executive team recalled the initial response from media companies: "When I first approached the CEO of a key media company, the first thing he said to me was: This is a cancer on my business, so what is it

that you really wanted to talk about?” Barry Diller, USA Networks chairman, reportedly asked TiVo executives who sought his support: “Let me see if I understand this. All the other companies are investing in you so they can preside over their own demise?” (quoted in Chen, 2001).

The potential for future benefits for ecosystem members along with perceptions of immediate disruption generated forces for both cooperation and competition between TiVo and incumbents that we label as intertemporal co-opetition. We define intertemporal co-opetition as a situation in which a newcomer’s innovation can offer ecosystem members benefits that might materialize only in the future whereas the innovation’s disruptive effects are felt immediately. Particularly threatening to incumbents is the uncertainty over how the disruptor’s innovation will redistribute revenues and profits among ecosystem members. Consequently, it is likely that the newcomer will not gain support for its innovation.

Dyadic co-opetition. Realizing well the incumbents’ adverse reactions, TiVo attempted to minimize the perceived threat of its DVR. For instance, TiVo offered a conciliatory gesture to the industry by choosing not to offer a commercial skip button (whereas its competitor Replay TV did), and instead offered its subscribers the option to fast-forward commercials. TiVo’s co-founder informed us: “Because of this, we were perceived by the industry as the relatively good guys among the disruptors.”

In addition, TiVo hired an executive familiar with the media industry to reach out to ecosystem incumbents and emphasize the potential benefits of its DVR. This executive (no longer with the company) explained to us TiVo’s efforts to forge relational ties with ecosystem incumbents:

“We started with people that I knew and began to explain through marketing, humor and vision where the world was moving for media/entertainment, and where the world could move with interactive TV/marketing that our DVR can provide. *Our intention was to find the champions of innovations within the organizations that we wished to partner with.* We wanted to embrace some of the forward-thinking media executives who saw the business potential of the DVR and wanted to take part.” (emphasis added)

TiVo’s co-founder also highlighted to us the persistence required to forge such relational ties despite being rebuffed repeatedly: “We knew that there will be a lot of resistance. We were thrown out of the office the first time and we just said that we will come back another time.” Such persistence generated initial cooperation from incumbents such as AOL Time Warner, DirecTV, CBS, NBC and Disney. These

companies were all early investors in TiVo. Some incumbents were prompted to engage due to a desire to “keep tabs” on TiVo’s new technology as well as the threat it posed to them. A network executive offered another motive: “NBC wanted to have a very loud voice in this” (Tedesco, 1999).

Another example of such cooperation was the joint initiative between TiVo and Nielsen to gather data on how viewers would use the DVR. TiVo’s technology enabled the measurement of viewing behavior not just during live broadcasts but also when viewers recorded shows and watched them later. This offered finer grained information for advertisers and content providers, and led to a new way of measuring viewership, potentially making Nielsen’s ratings more informative and valuable to its clients.

However, any such cooperation with TiVo also was accompanied by wariness on the part of incumbents. Even early investors were unsettled by the DVR’s ability to record content in digital format, as this would render valuable content produced by these companies worthless in the market. To safeguard their content and revenue streams, content providers (including TiVo’s investors such as AOL Time Warner, Discovery and Disney) formed a consortium called the *Advanced Television Copyright Coalition* and demanded that DVR manufacturers pay to license all content recorded by viewers for later viewing.

Likewise, Nielsen, which had agreed to collaborate with TiVo, realized that fine-grained measurement made possible by TiVo’s technology would continue to raise questions about the accuracy and value of its established methodology for measuring viewer preferences and behaviors. Also, given TiVo’s stated business model of eventually monetizing such finer-gained viewer measurements, Nielsen was wary of TiVo eventually becoming a competitor. Accordingly, Nielsen forged competing initiatives and collaborative ventures such as the one with Gemstar–TV Guide International to measure interactive program guide usage by DVR users (Donahue, 2004).

Such tensions were evident even in the TiVo-DirecTV partnership. DirecTV, the satellite television provider and TiVo’s first mass distribution partner, simultaneously engaged in competing initiatives with companies such as Microsoft and AOL, which also were developing digital and interactive television

technologies. TiVo, for its part, also pursued collaborations with other content distributors by conducting preliminary trials of its DVR service with Comcast and AT&T Broadband, both competitors of DirecTV.

These dynamics illustrate the simultaneous presence of cooperation and competition in the dyadic relationships between TiVo and other members of the TV industry ecosystem. Gnyawali and Park (2011) studied similar dyadic co-opetition between Samsung and Sony, two industry “giants.” In contrast, TiVo was a new start-up that had to deal with relatively large and entrenched incumbents. Capturing these co-opetitive tensions, one TiVo executive observed: “Early on, the networks and advertisers couldn’t decide whether to sue us or buy the company” (quoted in Wathieu and Zoglio, 2005).

Multilateral co-opetition. While it was challenging enough to contend with intertemporal and dyadic co-opetition, it was all the more difficult to manage them multilaterally (i.e., across multiple dyads or ecosystem sides). To successfully navigate multilateral co-opetition, a firm must manage relationships across a set of interdependent stakeholders, with changes in one relationship affecting others (Adner, Oxley and Silverman, 2013; Brandenburger and Nalebuff, 1996). Such multilateral co-opetition was inevitable, given TiVo’s need to create a critical mass of subscribers. As a research analyst explained:

“The long-term success of TiVo depends on its ability to quickly build a large subscriber base, integrate its functionality into a broad range of consumer electronics products, and develop new services and programming to enhance the TiVo service. In order to achieve these goals, the company has aggressively pursued strategic partnerships with cable and satellite network operators, television programmers, consumer electronics manufacturers, marketing support partners and suppliers of key components of the TiVo technology.” (Miller, 2000: 12)

TiVo began building a value network around its DVR to make it a viable platform and to offer a compelling value proposition to potential subscribers. However, in doing so, TiVo upset the precarious balance that existed in the relationships and revenue/profit sharing agreements of incumbents within the TV industry ecosystem. Placating one side inevitably upset another as exemplified by TiVo’s attempts to build a critical mass of subscribers around its DVR service. Beginning July 2000, TiVo launched an aggressive \$150 million marketing campaign that emphasized the disruptive nature of its DVR service and the convenience it offered to television viewers. For instance, one TiVo commercial showed a

television network executive being thrown out of a window with a voice in the background saying: “Who needs them?” and a message in bold letters stating: “Program your own network. TiVo, TV your way.”

However, this marketing campaign backfired with several networks including CBS (an early investor in TiVo) refusing to air TiVo’s commercials that disparaged network executives and emphasized the DVR’s disruptive potential. As an industry analyst noted: “This [TiVo’s campaign] angered the networks with whom TiVo was trying to partner, but did not help consumers understand what the TiVo service did” (quoted in Gartner, 2005). When asked about this initiative, a TiVo executive observed:

“We had to create buzz and grab the attention of consumers. But, this also meant that we were predicting the downfall of incumbents and making enemies. It took us a while to repair these relationships later on.”

Multilateral tensions were also evident in TiVo’s complex relationship with satellite television provider DirecTV. As described earlier, the relationship between TiVo and DirecTV was characterized by dyadic co-opetition. Such dyadic co-opetition spilt over when DirecTV was acquired by content provider, News Corp. and, soon after, announced a switch to an in-house DVR technology developed by a News Corp subsidiary in preference to TiVo’s DVR technology.

TiVo’s proposed partnership with Netflix in 2004 offers yet another example of multilateral co-opetition. This partnership involved the joint development of a service for TiVo’s subscribers to download movies to their DVRs over the Internet and watch them at their leisure. However, this partnership with Netflix, a content distributor, caused spillovers to another ecosystem side, the content providers. Specifically, movie studios were concerned with the lack of adequate safeguards against piracy of their valuable content and the potential for a significant loss of revenues. In response, they refused to license their content to this partnership, thereby stalling TiVo’s and Netflix’s initiative till 2008.

Theme 2: Continual adjustments as emergent strategy

As discussed earlier, TiVo had realized the disruptive potential of its DVR from the very beginning and made persistent efforts to engage with multiple incumbents within the TV industry ecosystem. To recapitulate, TiVo hired an executive familiar with the media industry, identified and forged relational ties

with forward-thinking executives in the media industry who realized the potential benefits of TiVo's innovation, and formed collaborative ventures with incumbents (e.g., TV networks) to highlight its innovation's potential. While such initiatives served to somewhat mitigate intertemporal co-opetitive tensions with incumbents, other tensions due to dyadic and multilateral co-opetition emerged. Securing and sustaining incumbent support and acceptance still remained a formidable challenge.

In a few cases, tensions due to co-opetition were hard to reconcile, such as the one inherent in the dyadic co-opetition between TiVo and Nielsen. Given its own vision of monetizing viewer measurements through new services offered to advertisers, TiVo realized that this tension could not be resolved satisfactorily. Accordingly, TiVo opted to let the tension remain, cooperating with Nielsen to the extent possible while at the same time working to realize its own vision of offering measurement and ratings services. When asked whether TiVo's initiatives with advertisers would make Nielsen's service less valuable, a TiVo executive responded: "I think that's happening whether TiVo offers an advertising product or not. Advertisers are already putting pressure on Nielsen and the networks with respect to program ratings and whether it's a viable currency" (quoted in Kerschbaumer, 2005).

In yet other cases of dyadic co-opetition, TiVo continued to engage with potential partners till a mutually acceptable balance could be achieved. For instance, Comcast began an initiative in 2000 to conduct limited trials of TiVo's DVR with its subscribers. However, modifying its technology to work with legacy cable systems and proprietary set-top boxes proved challenging for TiVo, a small company with limited resources. TiVo's inability (or even unwillingness) to make these changes resulted in Comcast deciding to withdraw and introduce its own generic DVR in 2003. Despite this setback, TiVo's executives persisted in wooing Comcast. Eventually in 2005, they signed an agreement with Comcast to offer TiVo's service on Comcast's DVRs and also to jointly develop an interactive advertising platform. Even after this agreement was signed, it took the companies nearly two more years to resolve technological incompatibilities and introduce the TiVo service on a limited basis to Comcast subscribers. Such persistence, however, paid off for TiVo in the form of several agreements with cable and broadband

providers (such as Cablevision and Cox) to offer TiVo service, and the extension of the distribution agreement with DirecTV even after DirecTV began to use its in-house DVR technology.

While such strategic adjustments mitigated some dyadic tensions, TiVo's initiatives to engage with members of one ecosystem side also spilt over to another side, highlighting multilateral co-opetition. In these cases, TiVo switched dynamically to engage with the side experiencing negative spillovers so as to address these spillovers. For instance, consider the events that unfolded because of the multilateral tension between TiVo's subscribers on the one hand, and content providers and advertisers on the other. As noted earlier, time-shifting of programs and fast-forwarding of commercials compromised advertisers' and content providers' efforts to reach television viewers as prime time viewing of programs was no longer be guaranteed. To offer a work-around, TiVo offered content providers and advertisers new options such as Network Showcases and TiVo Advertainment.⁵ TiVo even resorted to contests and prizes to entice its subscribers to watch commercials. These moves caught the attention of Walter Mossberg, *The Wall Street Journal's* influential reviewer and critic of consumer technology products, who complained that TiVo makes "annoying efforts to get you to watch certain shows. TiVo presents you with network showcases which are really just come-ons. TiVo also tries to suggest shows to you, and will record them to your hard disk unless you opt out. That 'feature' makes Personal TV less personal" (Mossberg, 2001). A TiVo executive explained the difficult balancing act involved in staying true to the company's commitment to subscribers while at the same time catering to the needs of other ecosystem sides such as advertisers:

"We draw a line and come back to core principles about how we like to be perceived by the customer. Is it worth the additional advertising revenue to alienate our customer base? We really focus on the right balance between what the consumer needs, and what the business needs. It's not black and white. At the end of the day, it's finding that 'sweet spot'."

In response to complaints about giving in to the industry, TiVo introduced a series of new tools to balance its subscribers' interests with those of content providers and advertisers. The guiding principle behind these tools was to offer subscribers a choice of whether or not to engage with potentially obtrusive

⁵ Network Showcases are infomercials and previews of movies, programs or products/services that may be longer than a typical commercial spot and offered exclusively to TiVo subscribers. TiVo Advertainment is an advertising program "that allows advertisers to repurpose and edit existing commercials or create entirely new advertainment executions without the usual time constraints for TV spots" (Elkin, 2002).

content such as commercials. One such tool was “tagging.” With tagging, advertisers could display a tag or logo with a short message even when TiVo subscribers fast-forwarded a commercial, and the subscriber could then choose to watch the full commercial by clicking on the tag. TiVo also offered its subscribers the ability to search for commercials on products or services of specific interest to them. A former executive explained to us how such tools converted the typically passive experience of viewing commercials on TV into an interactive experience that offered subscribers information relevant to their specific needs, and therefore received an “extraordinary response” from subscribers.

Events associated with the company’s TiVoToGo service in 2004 offer yet another illustration of such dynamic switching to balance tensions due to multilateral co-opetition. The TiVoToGo service allowed TiVo subscribers to transfer recorded content from their DVRs to their PCs, and later to mobile devices such as Windows Mobile devices and iPads. This service, though offering value to subscribers, alarmed content providers who feared that digital recording and transfer would encourage piracy. This prompted the National Football League and the Motion Picture Association of America (MPAA) to petition FCC to disallow TiVo’s service. However, the FCC determined that TiVo’s security safeguards were satisfactory and approved the TiVoToGo service (FCC 04-193, 2004). Notwithstanding FCC’s favorable decision, TiVo voluntarily addressed content providers’ concerns by strengthening security and limiting the number of devices to which subscribers could transfer content (Bangeman, 2004).

To offer an in-depth view of how co-opetitive tensions emerge and evolve, we longitudinally tracked the tensions within the TiVo-DirecTV dyad in Table 3. A key observation is that co-opetitive tensions within the dyad ebbed and flowed over time, as each party continued to pursue its own interests and the ecosystem itself changed. A second observation is that any resolution of co-opetitive tensions was only transient, with continual adjustments needed on the part of TiVo to keep them in “balance.”

-- Table 3 here --

TiVo also had to contend with more traditional competition to its DVR box and service. Its direct competitor, Replay TV, had proved to be a weak competitive threat after it strongly antagonized

ecosystem incumbents by offering features such as commercial skip and sharing of recorded programming among its subscribers. Replay faced lawsuits from major movie studios alleging copyright violations, and in 2003 was forced into a bankruptcy filing and sale. However, TiVo faced significant indirect competition from generic DVRs introduced by cable and satellite providers, and telephone companies that had entered the television industry. To mitigate such competition and also to defend its intellectual property, in 2004, TiVo sued Echostar, the parent of satellite TV provider DISH, alleging patent infringement. After several rounds of appeals and countersuits, TiVo conclusively won this lawsuit in 2011, with Echostar agreeing to pay \$500 million to TiVo over a period of 6 years and licensing the technologies in dispute. This verdict and settlement set a favorable precedent for TiVo, which also selectively sued telephone companies that had entered the TV business (e.g., AT&T, Verizon and Motorola Mobility Holdings) for patent infringement when they were not inclined to negotiate licensing agreements with the company. However, as a TiVo executive explained, the company had to balance its aggressive protection of its intellectual property by re-affirming its desire to collaborate with incumbents:

“Our basic technology can be duplicated. Cable and satellite providers could abscond with our technology so we had to instigate litigation to protect our IP...But we also had to weave our way into the fabric of the media industry. So, we then had to evangelize by highlighting our enhanced user experience and presenting a vision of how our technology can take them to TV’s future.”

As these illustrative examples highlight, TiVo made continual adjustments to its strategy to address emergent co-opetitive tensions and find a dynamic, workable balance between competing and cooperating with various ecosystem members. Such adjustments were facilitated by changes in top management (beginning 2002-03 and culminating in 2005) and the attendant business-oriented, more collaborative mindset. According to a TiVo executive:

“Despite trying to collaborate from the beginning, we still had an “engineering” mindset and an “us-versus-them” mentality with respect to our technology. It was not easy to deal with DirecTV and Comcast with such a mindset, but they became more receptive when they realized that the company was changing. We showed them that we could be flexible and deal with the complexity of their products (e.g., Comcast’s cable systems). Slowly, they realized it was a better deal for them to work with us. All this took time, though.”

Theme 3: Evolution of TiVo's technology platform and relational positioning within the ecosystem

Continual strategic adjustments made by the disruptor to address emergent co-opetitive tensions have consequences for its technology, capabilities and, eventually, its place in an ecosystem that itself is evolving. In TiVo's case, over time, such strategic adjustments resulted in significant changes to its DVR technology platform as well as its relational positioning vis-à-vis industry incumbents.

As TiVo engaged with multiple sides and dealt with emergent co-opetitive tensions, its DVR platform and service evolved. For instance, TiVo responded to competition from generic DVRs offered by cable and satellite TV providers by releasing new generations of its DVR with enhanced functionality and features. Examples include DVRs with the ability to access personal content from PCs through the Internet. In addition, as noted earlier, TiVo integrated innovative advertising tools such as tagging, which advertisers could use to offer targeted and interactive commercials only to interested subscribers. Besides, partnerships with a number of content distributors and providers such as Amazon, NY Times, CNET and the NBA increased the content options for subscribers.

With all these enhancements, TiVo's services became more popular, with one analyst even noting: "They are like Kleenex. Their brand name defines the entire product category" (quoted in Van, 2005). Later, based on CEO Tom Rogers's talk at Bear Stearns' annual media conference, another analyst noted: "The bottom line: TiVo is in transition from a company that sells subsidized DVR boxes to a company that sells viewer metrics, DVR software as a service over cable boxes, and expensive, unsubsidized hi-definition DVR boxes" (quoted in Frommer, 2008). A TiVo executive re-iterated this point to us:

"We are content agnostic, so wherever your content is from – tape, cable, over-the-air network broadcasts, Netflix, Amazon, Hulu, YouTube – we support all of them on our platform. What we want to create is the best user experience across all those platforms."

Indeed, TiVo was becoming the "Google of video content" (Grover, 2009).

To further explore the evolution of TiVo's DVR platform, we gathered and analyzed data on TiVo's portfolio of patents over time. Our analysis showed that TiVo aggressively built its intellectual property. For instance, TiVo's portfolio of patents increased from just 33 in 2000 to 238 in 2011. In

addition to patenting internally developed technology, TiVo also acquired or cross-licensed key patents pertaining to DVR technology from firms such as IBM and Digital. Moreover, TiVo continued to extend its existing IP to offer new DVR functionality and new tools and services. Whereas a third of TiVo's patents filed between 1998 and 2011 disclosed new inventions, another third were continuation patents (i.e., additional claims or extensions of an already disclosed invention) or continuation-in-part patents (i.e., disclosure of a new invention partially derived from an already disclosed invention).

Several TiVo executives whom we interviewed highlighted the importance of patents in increasing TiVo's bargaining power during negotiations: "Our strategy is 'Speak softly but carry a big stick'" and "We prefer to partner with others, but we reserve this (patent protection) for a rainy day if someone comes after us." However, TiVo's CEO also acknowledged to us the limitations of relying on patents:

"You can't hold a gun to people's head. (With this approach), you can't have the strategic partners that you need. So, you need patents but you also need a superior product going forward. You can extract value from IP but it can't be your backbone like your operating business...Patent earnings can be a band-aid but cannot sustain long-term viability."

TiVo's increasing technological prowess and its well-differentiated DVR platform resulted in partnerships with dominant content distributors such as Comcast and Cox, offering a degree of legitimacy to TiVo within the TV industry ecosystem. The increase in the company's subscriber base to over 4 million by 2006-07 also made it possible to recruit larger and more representative samples of viewers to track and offer real-time, precise data on viewer behaviors and preferences. In 2006, TiVo created a new division to offer research and analysis to advertisers, and also introduced services to track and report second-by-second viewing behavior to content providers. By 2007, TiVo, in partnership with Starcom, was tracking a panel of 20,000 subscribers, whereas Nielsen's ratings and audience measurements at that time were reportedly derived from a representative sample of just 5,000 television households.

A consequence of all these developments was a shift in TiVo's content and service offerings. With these new tools and services, the promised benefits of the DVR to various ecosystem sides began to be realized. Slowly, ecosystem incumbents too began to view TiVo not as an "ad-killer" or destroyer of "television as we know it" (Dignam, 2000) but as an ad-enhancer and enabler of interactive television.

TiVo's executives used these developments to reframe the company's relational positioning within the TV industry ecosystem as a 'connector' of various sides facilitating collective value creation, instead of a 'disruptor' perceived as destroying or appropriating existing value. Speaking directly to the notion of TiVo's changing role and perception within the industry, TiVo's CEO Tom Rogers, commented:

“Just a few years ago, we were viewed with great paranoia as the disruptor...Our goal now is to work with the media industry to come up with ways to resist the downward pressure of less advertising viewing and create a way for advertising on TV to become more effective, more engaging and closer to the sale.” (quoted in Stone, 2008)

He explained to us how TiVo accomplished this change in perception from disruptor to connector:

“We evangelized to everyone in the industry. We explained that we were not trying to destroy their business models. Rather, we were pro-consumer and promoting on-demand viewing which is more profitable...That we could help cable operators to recreate their business models. We communicated that we weren't just a technology company but a hybrid trying to develop both media capital and technology capital.”

Indeed, TiVo was already gaining wider acceptance within the ecosystem, increasingly viewed as a sustaining force instead of the initially perceived disruptive influence. For instance, the National Academy of Television Arts and Sciences recognized TiVo with Emmy awards in 2006 and 2007 respectively for its role in pioneering interactive television and advertising. This major change in the company's relational positioning was also manifest in the increasing willingness of key incumbents to partner with the company. Partly, as a research analyst noted, such willingness (especially on the part of content distributors) was driven by the fear of infringing TiVo's growing portfolio of patents:

“Pay TV operators who have not yet properly licensed the right to provide DVR services in the vein set forth by TiVo's patents might well be at risk of patent infringement claims. Therefore, in due time, we think that nearly all Pay TV operators will review their risks and opt to legitimize their DVR offerings.” (quoted in Simons, 2008)

In a virtuous circle, TiVo's platform gained further momentum as both established and new firms adopted its services. For instance, in 2007, NBC Universal began using second-by-second viewership data and ratings information offered by TiVo. Likewise, in 2008, Netflix partnered with TiVo to stream its movies on a variety of devices to TiVo's subscribers. A TiVo executive explained to us the bandwagon effect that key partnerships (e.g., Netflix) generated for the company:

“As consumers by the droves began to watch content on many devices like the iPad, television sets and iPhones, companies like Netflix began to feel, ‘Wow, this is scary; we have got to respond. We have got to work with these guys (TiVo).’ Netflix is now one of our biggest allies, and this has helped to change the perceptions of other incumbents.”

Summary: TiVo’s emergent strategy

Clearly, TiVo’s position within the ecosystem changed since its inception when it introduced a revolutionary product, one that in 2005 won PC Magazine’s third best product of all times just behind Apple II. A TiVo executive noted that TiVo was continuing to forge ahead from being a company that sold DVRs (which was becoming a commodity) to one that added value through its software, which he likened to “the operating system of a computer.” He noted that, looking forward, TiVo planned to solidify its position within the TV industry ecosystem, which was itself changing to accommodate the concept of “anytime, anywhere television experience” through a multitude of devices and services.

But, this new positioning had not come easily. TiVo’s DVR technology initially was perceived to be disruptive by key industry incumbents. Whatever benefits the technology promised was contingent on TiVo being able to gain the support of the very ecosystem incumbents it stood to disrupt, and attaining a critical mass of subscribers for its service. We labelled this tension as intertemporal co-opetition – whereas the benefits were uncertain and realized only in the future, the threat of disruption was perceived by industry incumbents in the present. As discussed earlier, TiVo attempted to mitigate intertemporal co-opetitive tension to the extent possible by presenting a more familiar face, making conciliatory gestures, and engaging with forward-thinking executives within incumbent firms. Whether motivated by a desire to keep tabs on the threat or to influence the technology’s evolution in ways beneficial to the industry, several key incumbents chose to invest in and collaborate with TiVo initially.

However, any such collaborations were beset by dyadic co-opetition because incumbents were still wary of the disruptive threat posed by TiVo’s DVR. In addition, given the inherently conflict-ridden relationships among various ecosystem sides, TiVo attempts to build a critical mass of subscribers and simultaneously engage with multiple incumbents, engendered multilateral co-opetition within and across ecosystem sides. Any attempt to mitigate one co-opetitive tension frequently led to the emergence of

others. TiVo attempted to deal with dyadic co-opetition by persistently engaging with incumbents, all the while making its offerings (and thus its brand) more valuable and visible to viewers and, thereby, making it in incumbents' interest to continue collaboration. TiVo also engaged different sides by introducing new tools that enabled workarounds to the disruptive aspects of the DVR in fast forwarding commercials and time-shifting programming. When engagement with one side caused negative spillovers to other sides, TiVo switched dynamically to engage with these sides to mitigate the effects of such spillovers.

However, as our analysis revealed, some tensions were irreconcilable. In such cases, TiVo collaborated to the extent possible and let the residual tensions remain. At an extreme, TiVo even took aggressive actions to protect its intellectual property and limit imitation (e.g., suing DISH for patent infringement). Such aggression had a cost, with TiVo being labelled "as a black hat" by wary industry incumbents, and the company then had to soften its image over time by emphasizing the benefits of its technology and its ability to be flexible in collaborative initiatives.

Over time, such dynamic adjustments paid off for TiVo. With new management promoting a more collaborative and accommodating mindset, TiVo became more receptive to incumbents' needs in introducing new features, tools and services. With each such enhancement, TiVo's technology platform evolved to offer more and more benefits to key ecosystem sides such as television viewers, advertisers, content providers and, thereby, to content distributors. With its subscriber base growing to reach critical mass, TiVo was able to deliver on its initial vision to offer more targeted and interactive reach to a broad demographic of television viewers. As benefits began to flow to various sides, the tension due to intertemporal co-opetition abated, and the relational positioning of TiVo within the industry too changed. TiVo's DVR technology came to be perceived as a sustaining (instead of a disruptive) innovation enabling the ecosystem to evolve towards the promised future of interactive television.

DISCUSSION AND CONTRIBUTIONS

We began the paper by asking how a firm, especially a start-up, can address the challenges in introducing its disruptive innovation into an established ecosystem. Our findings on TiVo's experiences

in introducing its DVR into the U.S. TV ecosystem offered several insights, which we articulated as themes in the previous section. In this section, we use these insights to propose a process model of the disruptor's dilemma and its potential resolution. We also highlight the contributions of our study to different literature streams.

A process model

Figure 1 highlights key process elements associated with the disruptor's dilemma. Disruptive innovations are 'double-edged' swords – innovations that are breakthroughs with the potential to spawn new markets also imply breaking apart existing ecosystem arrangements, and fueling adverse reactions from incumbents. Consequently, the disruptor confronts a dilemma; how to gain support and acceptance from the very ecosystem incumbents who stand to be disrupted. This dilemma is all the more difficult to resolve due to tensions generated by intertemporal, dyadic and multilateral co-opetition.

-- Figure 1 here --

Observations from the TiVo case highlight how these co-opetitive tensions play out over time, and how the disruptor's actions to mitigate some tensions may aggravate others. Our findings also show that not all tensions are attributable to the disruptor's actions, as for example the change in the nature of the TiVo-DirecTV relationship from a collaborative to a significantly more competitive one after DirecTV's acquisition by NewsCorp. Indeed, the balance between cooperation and competition continues to shift in such dynamic settings, and the disruptor needs to adjust accordingly.

The growing literature on paradoxes and their resolution (e.g., Cameron and Quinn, 1988; Poole and Van de Ven, 1989; Smith and Lewis, 2011) offers a holistic frame to understand how a disruptor can potentially manage co-opetitive tensions. A disruptor may choose to accept the tensions and harness these to its advantage. Alternatively, the disruptor may switch dynamically over time to deal with one or the other tension in turn, as exemplified in the notion of pivoting (Garud, Lant & Schildt, 2014; Marx, Gans and Hsu, 2014; Ries, 2011). Or, with time, the disruptor may offer a new frame that helps resolve the underlying tensions. As our findings demonstrate, TiVo resorted to each of these approaches at various

points till such time it was able to reframe itself as a connector facilitating collective value creation within the ecosystem. Such a longitudinal perspective enables an exploration of how tensions among different constituents of an ecosystem interact and evolve over time and, how a disruptor might transcend the traditional dualism between cooperation and competition.

In performing a juggling act to secure the support of ecosystem incumbents, a disruptor employs a mix of “soft power” and “hard power” (Nye, 2004). Soft power involves the exercise of what Fligstein (1997) termed social and political skills to generate desired outcomes. On the other hand, hard power involves the use of threats, sanctions or other coercive strategies to secure compliance (Wilson, 2008). TiVo employed both. It forged collaborative relationships, made adjustments to manage co-opetitive tensions and spillovers, and leveraged its growing brand and technological capabilities to generate *relational advantage* (Chen and Miller, 2015). The deployment of hard power was evident in TiVo’s aggressive pursuit of IP infringement claims against incumbents. These claims, once upheld in court, increased TiVo’s bargaining power, enabling it to solidify its position within the TV industry ecosystem.

To the extent that the disruptor’s technology offers degrees of freedom (Garud and Kumaraswamy, 1995) and the company has the technological skills to leverage them, all these accommodations lead to changes to its technological platform over time. For instance, TiVo was able to offer new interactive tools enabling advertisers to work around the tendency of DVR users to fast-forward through commercials. The company also was able to make its software compatible with cable manufacturers’ legacy systems and technology. These changes highlight the co-emergence of social and technical structures during the transformation of an industry ecosystem (Garud and Kumaraswamy, 1995).

Transformation of the disruptor’s technological platform represents changes in its overall co-opetitive capabilities. With such developments, the nature of value creation and appropriation too may change from a zero sum game to a positive sum game (Brandenburger and Nalebuff, 1996). Correspondingly, a shift occurs from an “egocentric” view wherein the introduction of an innovation breaks things apart to an “allocentric” view that emphasizes bringing actors together (Lado, Boyd and

Hanlon, 1997) through collaborative networks (Ansari and Munir, 2008). In TiVo's case, progressive changes to its DVR platform to accommodate different sides enabled it to morph from a hardware company offering DVR boxes to a software company offering an "operating system" for use in a variety of devices and, over time, to reframe its technology and relational positioning as being sustaining to ecosystem incumbents instead of being disruptive.

In sum, navigating the minefield of co-opetitive tensions is not an easy task for a disruptor, especially a start-up firm with limited resources. Though TiVo has so far managed to survive and gain acceptance within the TV industry ecosystem, success for the company and for other similarly placed start-ups is not guaranteed (Park and Russo, 1996). It is in these uncertain situations that a process model like ours, one that explores the drivers and dynamics underlying the phenomenon, adds value.

Indeed, our model resonates with the recent experiences of 'disruptors' in diverse industries. For instance, Uber Technologies, a smartphone-based ride-sourcing service has followed an 'in-your-face' expansion strategy as it "barreled" into new markets around the world. Uber and its executives have become known for their aggressive and confrontational stance towards the taxi industry, regulators, competitors, journalists who criticized the company, and even the company's own customers and drivers. Such a stance has led even Uber's supporters to ask whether the company's aggressive attitude might make it difficult for it to develop or maintain partnerships with other companies such as Starbucks that value their hard-earned image (Isaac, 2015). More recently, however, Uber executives have started adopting a new "gentler", "white glove" strategy of compromise and diplomacy (Isaac, 2015; Macmillan and Fleisher, 2015). For instance, Uber has hired seasoned executives to handle its public relations and communication strategy, negotiated with regulators in many cities around the world, strengthened its privacy policies to protect its customers' information, and engaged in charitable activities to soften its image. Even though Uber is not as dependent on ecosystem incumbents as TiVo was, its recent responses show how even a popular and rapidly growing disruptor needs to be more accommodative even as it attempts to transform the existing ecosystem.

An additional example that resonates with the key thesis of this paper is Pandora, a company that delivers audio to mobile devices and dominates Internet radio. Pandora antagonized the music industry by aggressively pushing for lower royalty rates, and unsustainable payments. Once it became the target of incumbent pushback and resistance, Pandora has tried to repair its relationships in the music world by creating a new division to engage with labels and artist managers, allowing access to its vast databanks, and experimenting with artist promotions through the Artist Marketing Platform (Sisaro, 2015).

As these examples from different industries illustrate, it is not unusual for disruptors to switch to a positive sum approach of engaging with industry incumbents to mitigate tensions and potentially gain acceptance. However, as our findings suggest, incumbents may be receptive to making accommodations with the disruptor only if it is able to attract a critical mass of consumers to its innovation.

Contribution to literature on disruptive innovation

Ever since Christensen (1997) highlighted the processes through which disruptive innovations eventually destroy an incumbent's core value proposition, the topic continues to attract both scholarly interest (e.g., Danneels, 2004; Govindarajan, Kopalle and Danneels, 2011) as well as popular attention (Lepore, 2014). Incumbents may be unable to renew their resource portfolio, or fail to develop capabilities to cope with environmental changes (e.g., Danneels, 2010; Helfat and Peteraf, 2015). In addition, their internal resource-allocation processes result in a systematic underinvestment in disruptive technologies. This poses a dilemma for incumbents (i.e., the innovator's dilemma) as to whether and how they themselves might invest in and pursue a potentially disruptive innovation, instead of focusing on the needs of their current customers and allowing others to disrupt their markets.

However, new entrants introducing disruptive innovations into an existing ecosystem also confront a dilemma – how to gain the support of the very incumbents that stand to be disrupted. Complicating matters, many aspiring disruptors also experience “liability of newness” (Stinchcombe, 1965) including lack of legitimacy (Lounsbury and Glynn, 2001), customer indifference (Rosenberg, 1982), incumbent

skepticism (Marx, Gans and Hsu, 2014) and lack of co-specialized assets (Teece, 1986), all of which undermine their efforts to introduce and establish their innovations.

By taking a disruptor's perspective, we add to an understanding of the challenges confronted by disruptors and extend the literature on disruptive innovation. *First*, while it has been acknowledged that disruption is not a one shot event or "a carefully planned forward march" but rather a process (Christensen, 2006; Christensen and Raynor 2003), our analysis highlights the various co-opetitive tensions that disruptors confront during the process. *Second*, our analysis shows how a disruptor might address these tensions, further extending classical perspectives that view innovations as being either disruptive or sustaining (Christensen, 1997). In contrast to such essentialist views, our analysis demonstrates the strategic actions available to a disruptor to frame its innovation in alternative ways (cf., Gurses and Ozcan, 2014), and the use of soft and hard power to secure cooperation from incumbents (cf., Santos and Eisenhardt, 2009). Specifically, such reframing involves a change in emphasis from the "disruptive" aspect of the innovation that upstages established incumbents, to the beneficial aspect of the innovation that can enhance the value generated for and by various incumbents within the ecosystem. *Third*, while disruptive innovations have often been characterized as having an impact on specific incumbent firms (typically direct competitors), our analysis demonstrates how such innovations may affect the entire ecosystem by reconfiguring the relational interdependencies among various ecosystem members. This dynamic is not limited to TiVo. Polaroid's landmark innovation, the SX-70 camera affected the entire photography ecosystem, including Polaroid's relationships with key stakeholders, such as its film and battery suppliers, Kodak and ESB, respectively (Garud and Munir, 2008). These observations highlight the need for adopting a systemic view of how disruptive innovations can affect various relationships within an ecosystem instead of focusing just on a specific set of incumbents.

Contribution to literature on co-opetitive dynamics

Insights from our analysis confirm and extend prior observations on co-opetition. Co-opetition between two firms is walking "a fine line between cooperating with partners in good faith and

maintaining a posture of vigorous competition with rivals” (Gnyawali, He and Madhavan, 2006: 509; Bengtsson and Kock, 2000). Besides such dyadic co-opetition, we highlight how disruptors must navigate dependencies and consequent spillovers across multiple dyads and multiple ecosystem sides (i.e., multilateral co-opetition) to realize the value proposition inherent in the innovation. This leads to a continual shift in the balance between cooperation and competition (Gnyawali and Park, 2011).

In addition, we highlight yet another kind of co-opetition – intertemporal co-opetition, i.e., how a disruptor has to gain cooperation from incumbents it disrupts with promises of benefits that might accrue only in an uncertain future. This is a classic “chicken-and-egg” problem, or the challenge of attracting sufficient number of adopters under uncertainty to build critical mass on different sides of a platform (Caillaud and Jullien, 2003; Evans, Hagiu, and Schmalensee, 2006; Rochet and Tirole, 2003). The disruptor may attempt to set future expectations through projective stories to attract the support of ecosystem members (Garud, Schildt and Lant, 2014). However, such expectations may also serve as a source of future disappointments (Ansari and Garud, 2009), especially when a disruptor’s attempts to accommodate one side create problems for another. Failure to manage such disappointments may result in a loss of legitimacy with certain ecosystem members and initiate a snowball effect with more serious and systemic consequences. Such considerations further complicate the disruptor’s dilemma, and highlight the importance of the continual juggling act a disruptor must perform to cope with these diverse tensions. As discussed in the entrepreneurship literature (e.g., Garud, Gehman and Giuliani, (2014)), a start-up must continue to re-contextualize its entrepreneurial journey on an ongoing basis.

Contribution to literature on industry ecosystems and strategy as process

Studies on industry ecosystems have shown how interdependent firms must work together to co-create value, and how the success of one firm depends on the success of others (Adner *et al.*, 2013). However, there is a presumption that pre-meditated roles and links among ecosystem members exist and remain stable over time. By contrast, our study highlights the evolution of the disruptor’s innovation and, along with it, the evolution of existing rules, roles and relationships within the ecosystem, as the disruptor

continually adjusts its strategy to deal with emerging co-opetitive tensions. This co-evolutionary process continues till an overall collective frame emerges within the ecosystem, one that can hold together the different actors around the innovation in a delicate balance. This represents a shift in the disruptor's relational positioning within the ecosystem from a standalone approach that entails exploiting other parties (*tertius iungens*) to an integrated approach that links disconnected parties through combinative activity (*tertius gaudens*) (Obstfeld, 2005).

These insights also add to the literature on strategy as process (Bower and Gilbert, 2005; Mintzberg, 1978; Mintzberg and Waters, 1985), which has seen resurgence of late (e.g., Mirabeau and Maguire, 2014). Our study shows that strategy for a disruptor is an uneven process that does not follow a natural trajectory or logic set in advance. Instead, it requires “muddling through” (Lindblom, 1959) and “logical incrementalism” (Quinn, 1978) within an ecosystem that itself is co-emerging. Eventually, as the ecosystem evolves to accommodate the innovation, the disruptor can shift its relational positioning from that of a value destroyer to a value creator, and thereby convert ‘head-winds’ to ‘tail-winds.’ Overall, our analysis shows how disruptors can gain a foothold within the ecosystem by limiting incumbents’ hostility and retaliation (Carmeli and Markman, 2011; Kotha, Zheng and George, 2011; Markman and Waldron 2014) and progressively establishing symbiotic relationships with them.

CONCLUSION

The typical advice given to firms is that they should take the initiative and become the disruptor to avoid being disrupted by others. Our study shows that disruption itself is not a straightforward process, and that the journey is fraught with challenges arising from co-opetitive tensions. In showcasing these challenges, our study raises several questions and opens up new avenues for research. For instance, how does a disruptor generate a vision of the future that is compelling enough to persuade incumbents to support its innovation despite the clear and present threat of disruption? Also, how might a disruptor's efforts to muddle through in addressing emergent co-opetitive tensions affect its legitimacy and its relational positioning within the ecosystem?

Yet other research opportunities emerge when we consider boundary conditions applicable to this study. TiVo's technological platform had sufficient degrees of freedom enabling it to marshal its technological skills to accommodate the needs of ecosystem incumbents over time. What if the disruptor's technology (or business model) were not so malleable? In such a case, what other strategies are available for the disruptor to manage co-opetitive tensions and gain acceptance? Another boundary condition pertains to the nature of the ecosystem itself. The TV industry ecosystem is systemic and complex, with multiple sides and conflict-ridden relationships within and across sides. However, other ecosystems may have different characteristics, some closed and others more open, some stable and others more dynamic, some with high levels of relational interdependencies and others with much lower levels (Koenig, 2012; Moore, 2006; Wareham *et al.*, 2014). By examining the process of disruptive innovation in these settings, we can generate a more robust set of insights.

For instance, to the extent that an ecosystem is closed and has lower levels of relational interdependencies among its constituents, multilateral co-opetition may be less of an issue. But, to the extent that an ecosystem is open and relatively unbounded, disruption in one industry ecosystem may reverberate across others associated with it. As an example, consider the auto industry, in which the recent emergence of a mobility ecosystem around "autonomous vehicles" or self-driving cars stands to impact not just auto manufacturers, computer/communication technology firms, energy companies and public transportation providers, but also regulators, infrastructure and construction companies, insurance companies, and city planners. Examining how previously distinctive industries dissolve into complex ecosystems is another promising research avenue.

In conclusion, our study builds upon existing literatures to offer new insights and raise questions for further exploration. Specifically, by theorizing on the disruptor's dilemma, our study sensitizes scholars to dynamics associated with disruptive innovations over time and the diverse co-opetitive tensions that a disruptor must manage. Additional research can help refine the themes that we have developed in this paper.

REFERENCES⁶

- Adner R. 2012. *The Wide Lens: A New Strategy for Innovation*. Portfolio/Penguin: New York, NY.
- Adner R, Oxley J, Silverman, B. 2013. Introduction: Collaboration and competition in business ecosystems. In *Advances in Strategic Management* **31**: 9-18.
- Adner R, Zemsky P. 2006. A demand-based perspective on sustainable competitive advantage. *Strategic Management Journal* **27**: 215-239.
- Anderson P, Tushman M. 1990. Technological discontinuities and dominant designs: a cyclical model of technological change. *Administrative Science Quarterly* **35**: 604-633.
- Ansari SM, Krop P. 2012. Incumbent performance in the face of a radical innovation: towards a framework for incumbent challenger dynamics. *Research Policy* **41**: 1357–1374.
- Ansari SM, Garud R. 2009. Inter-generational transitions in socio-technical systems: the case of mobile communications. *Research Policy* **38**: 382–392.
- Ansari, SM, and Munir K. 2008. How valuable is a piece of the spectrum? Determination of value in external resource acquisition. *Industrial and Corporate Change* **17** (2) 301–333.
- Bengtsson M, Kock S. 2000. “Coopetition” in business networks—to cooperate and compete simultaneously. *Industrial Marketing Management* **29**: 411–426.
- Boudreau K. 2012. Let a thousand flowers bloom? An early look at large numbers of software “apps” developers and patterns of innovation. *Organization Science* **26**: 1409-1427.
- Bower JL, Gilbert CG. 2005. *From Resource Allocation to Strategy*. Oxford University Press: Oxford, UK.
- Brandenburger A, Nalebuff B. 1996. *Co-opetition: A Revolution Mindset That Combines Competition and Cooperation: The Game Theory Strategy That's Changing the Game of Business*. Currency Doubleday: New York, NY.
- Burgelman R. 2011. Bridging history and reductionism: A key role for longitudinal qualitative research. *Journal of International Business Studies* **42**: 591–601.
- Caillaud B, Jullien B. 2003. Chicken & egg: competition among intermediation service providers. *Rand Journal of Economics* **34**: 309-328.
- Cameron K, Quinn R. 1988. Organizational paradox and transformation. In *Paradox and Transformation: Toward A Theory Of Change In Organization And Management*, Quinn R, Cameron K (eds.). Ballinger: Cambridge, MA: 1-18.
- Capaldo, A. 2007. Network structure and Innovation: The leveraging of a dual network as distinctive relational capability. *Strategic Management Journal*, **28**: 585–608.
- Carmeli A, Markman GD. 2011. Capture, governance and resilience: Strategy implications from the case of Rome. *Strategic Management Journal*, **32**: 322–341.
- Chandy R, Tellis G. 2000. The incumbent’s curse? Incumbency, size, and radical product innovation. *Journal of Marketing* **64**(3):1–17.
- Chen M.J 1996. Competitor analysis and interfirm rivalry: Toward a theoretical integration. *Academy of Management Review* **21**(1): 100–134.
- Chen MJ, Miller D, 2015. Reconceptualizing competitive dynamics: A multidimensional framework, *Strategic Management Journal* **36**: 758–775.
- Christensen C. 1997. *The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail*. Harvard Business School Press: Cambridge, MA.
- Christensen C. 2006. The ongoing process of building a theory of disruption. *Journal of Product Innovation Management* **23**(1): 39–55.
- Christensen C, Raynor M. 2003. *The Innovator’s Solution*. Harvard Business School Press: Boston, MA.
- Christensen C, Rosenbloom RS. 1995. Explaining the attacker’s advantage: technological paradigms, organizational dynamics and the value network. *Research Policy* **24**: 233-257.

⁶ References pertaining to TiVo cited in the paper are not included, but available from the authors upon request.

- Cusumano M, Yoffie D. 1998. *Competing on Internet Time: Lessons from Netscape and its Battle with Microsoft*. The Free Press: New York, NY.
- Danneels E. 2004. Disruptive technology reconsidered: a critique and research agenda. *Journal of Product Innovation Management* **21**: 246–258.
- Danneels E. 2010. Trying to become a different type of company: Dynamic capability at Smith Corona. *Strategic Management Journal* **32**: 1-31.
- Eisenhardt KM, Graebner ME. 2007. Theory building from cases: opportunities and challenges. *Academy of Management Journal* **50**: 25-32.
- Eisenmann T, Parker G, Van Alstyne M. 2006. Strategies for two-sided markets. *Harvard Business Review* **84**(10): 92-101.
- Evans DS, Hagi A, Schmalensee R. 2006. *Invisible Engines: How Software Platforms Drive Innovation and Transform Industries*, The MIT Press: Cambridge, MA.
- Fligstein N. 1997. Social skill and institutional theory. *American Behavioral Scientist* **40**(4): 397-405.
- Garud, R. Gehman, J. & Giuliani, A. 2014. Contextualizing entrepreneurial innovation: A narrative perspective. *Research Policy*, 43:1177–1188.
- Garud R, Jain S, Kumaraswamy A. 2002. Orchestrating institutional processes for technology sponsorship: the case of Sun Microsystems and Java. *Academy of Management Journal* **45**: 196-214.
- Garud R, Karnøe P. 2003. Bricolage vs. breakthrough: Distributed and embedded agency in technology entrepreneurship. *Research Policy* **32**: 277-300.
- Garud R, Kumaraswamy A. 1995. "Technological and organizational designs to achieve economies of substitution" *Strategic Management Journal* **16**: 93-109.
- Garud R, Munir K. 2008. From transaction to transformation costs: the case of Polaroid's SX-70 camera. *Research Policy* **39**: 690-705.
- Garud R, Schildt H, Lant T. 2014. Entrepreneurial storytelling, future expectations, and the paradox of legitimacy. *Organization Science* **25**(5): 1479–1492.
- Gawer A, Cusumano MA. 2014. Industry Platforms and Ecosystem Innovation, *Journal of Product Innovation Management*, **31**:417-433.
- Glaser BG, Strauss AL. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine Publishing Company: Chicago, IL.
- Glasmeier A. 1991. Technological discontinuities and flexible production networks: the case of Switzerland and the world watch industry. *Research Policy* **20**(5): 469–485.
- Gnyawali D, He J, Madhavan R. 2006. Impact of Co-opetition on Firm Competitive Behavior: An Empirical Examination. *Journal of Management* **32**(4):507-530.
- Gnyawali D, Park B. 2011. Co-opetition between giants: Collaboration with competitors for technological innovation. *Research Policy* **40**(5):650-663.
- Govindarajan V, Kopalle P, Danneels E. 2011. The effects of mainstream and emerging customer orientations on radical and disruptive innovations. *Journal of Product Innovation Management* **28** (s1): 121-132.
- Gurses K, Ozcan P. 2014. Entrepreneurship in regulated markets: Framing contests and collective action to introduce pay TV in the US. *Academy of Management Journal* (forthcoming).
- Hagi A, Yoffie D. 2009. What's your Google strategy? *Harvard Business Review* **87**(4): 74-81.
- Helfat CE, Peteraf MA. 2015. Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal* **36**: 831–850
- Henderson R, Clark K. 1990. Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly* **35**: 9-30.
- Hill C, Rothaermel F. 2003. The performance of incumbent firms in the face of radical technology innovation. *Academy of Management Review* **28**: 257-274.

- Iansiti M, Levien R. 2004. *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*. Harvard Business School Press: Cambridge, MA.
- Isaac, M. 2015. Hard-charging Uber tries olive branch. . *The New York Times*, February 2: B1.
- Jacobides M, Knudsen T, Augier M. 2006. Benefiting from innovation: Value creation, value appropriation and the role of industry architectures. *Research Policy* **35**: 1200–1221.
- Jick T. 1979. Mixing qualitative and quantitative methods: triangulation in action. *Administrative Science Quarterly* **24**: 602-611.
- Joseph J, Ocasio W. 2012. Architecture, attention, and adaptation in the multibusiness firm: General Electric from 1951 to 2001. *Strategic Management Journal* **33**: 633–660.
- Kapoor R, Lee J. 2013. Coordinating and competing in ecosystems: How organizational forms shape new technology investments, *Strategic Management Journal* **34**: 274–296.
- Katz M, Shapiro C. 1985. Network externalities, competition and compatibility. *American Economic Review* **75**(3): 424-440.
- Ketchen Jr. DJ, Snow CC, Hoover VL. 2004. Research on competitive dynamics: recent accomplishments and future challenges, *Journal of Management* **30**: 779–804
- Koenig G. 2012. Research note: Business ecosystems revisited. *M@n@gement*, **15**(2): 208-224
- Kotha R. Zheng Y, George G. (2011). Entry into new niches: The effects of firm age and the expansion of technological capabilities on innovative output and impact. *Strategic Management Journal* **32**, 1011– 1024.
- Lado A, Boyd N, Hanlon SC. 1997. Competition, cooperation, and the search for economic rents: a syncretic model. *Academy of Management Review* **22**:110-141.
- Leifer R., McDermott CM, O’Conner GC, Peters LS, Rice M, Veryzer RW. 2000. *Radical Innovation: How Mature Companies Can Outsmart Upstarts*. Harvard Business School Press: Boston, MA.
- Lincoln YS, Guba EG. 1985. *Naturalistic Inquiry*. Sage Publications: Newbury Park, CA.
- Lindblom C. 1959. The science of "muddling through." *Public Administration Review* **19**(2): 79-88.
- Lounsbury M, Glynn MA. 2001. Cultural entrepreneurship: Stories, legitimacy, and the acquisition of resources. *Strategic Management Journal* **22**(6-7): 545-564.
- MacMillan D, Fleisher L. 2015. U-turn: Hard-driving Uber gives compromise a try. *The Wall Street Journal*, January 30: A1.
- Markides C. 2006. Disruptive innovation: In need of better theory, *Journal of Product Innovation Management* **23**: 19-25.
- Markman GD, Waldron TL. 2014. Small entrants and large incumbents: A framework of micro entry. *The Academy of Management Perspectives* **28**(2):179–197.
- Marx M, Gans J, Hsu D. 2014. Dynamic commercialization strategies for disruptive technologies: Evidence from the speech recognition industry. *Management Science* (forthcoming).
- Merton R. 1987. Three fragments from a sociologist's notebooks: Establishing the phenomenon, specified ignorance, and strategic research materials, *Annual Review of Sociology* **13**: 1-29.
- Mintzberg H. 1978. Patterns in strategy formation. *Management Science* **24**(9): 934–948.
- Mintzberg H, Waters JA. 1985. Of strategies, deliberate and emergent. *Strategic Management Journal* **6** (3): 257-272.
- Mirabeau L, Maguire S. 2014. From autonomous strategic behavior to emergent strategy. *Strategic Management Journal*, **35** (8): 1202–1229.
- Moore JF. 1996. *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems*. Harper Business: New York, NY.
- Moore JF. 2006. Business ecosystems and the view from the firm. *The Antitrust Bulletin* **51**(1): 31-75.
- Nye JS. 2004. *Soft Power: The Means to Success in World Politics*. Public Affairs: New York, NY.
- Obstfeld D. 2005. Social networks, the tertius iungens orientation, and involvement in innovation *Administrative Science Quarterly* **50**: 100–130.

- O'Reilly CA, Tushman ML. 2011. Organizational ambidexterity in action: How managers explore and exploit. *California Management Review* **53**(4): 5–22.
- Park S, Russo M. 1996 When Competition eclipses cooperation: An event history analysis of joint venture failure. *Management Science* **42**(6): 875-890.
- Poole MS, Van de Ven AH. 1989. Using paradox to build management and organization theories. *Academy of Management Review* **15**: 562-578.
- Quinn JB. 1978. Strategic change: “Logical incrementalism”. *Sloan Management Review* **20**(1): 7-21.
- Ries E (2011) *The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, Crown Business: New York.
- Richman BD, Macher JT. 2004. Organizational responses to discontinuous innovation: a case study approach. *International Journal of Innovation Management* **8**(1): 87-114.
- Rochet J, Tirole J. 2003. Platform competition in two-sided markets. *Journal of the European Economic Association* **1**(4): 990–1029.
- Rosenberg N. 1982. *Inside the Blackbox. Technology and Economics*. Cambridge University Press: New York, NY.
- Santos F, Eisenhardt K. 2009. Constructing markets and shaping boundaries: Entrepreneurial power in nascent fields. *Academy of Management Journal* **52**(4): 643–671.
- Scot, M. 2015. What Uber can learn from Airbnb’s global expansion. *New York Times*, July 7, <http://nyti.ms/1J2AyNy>
- Shanklin W, Ryans J. 1997. *Essentials of Marketing High Technology*. Lexington Books: Lexington, MA.
- Sisaro B. 2015. Pandora making bid to unruffled music world. *The New York Times*, February 23: B1.
- Smith W, Lewis M. 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review* **36**(2): 381-403.
- Stinchcombe AL. 1965. Social structure and organizations. In *The Handbook of Organizations*, March JG (ed). Rand McNally & Co.: Chicago, IL: 142–193.
- Stubbart CI., Knight MB. 2006. The case of the disappearing firms: Empirical evidence and implications. *Journal of Organizational Behavior*, **27**(1), 79– 100.
- Teece D. 1986. Profiting from technological innovation: implications for integration, collaboration, licensing and public policy. *Research Policy* **15**: 285-305.
- Tripsas M. 1997. Surviving radical technological change through dynamic capability: Evidence from the typesetter industry. *Industrial and Corporate Change* **6**(2): 341-377.
- Tripsas M, Gavetti G. 2000. Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Management Journal* **21**(10-11): 1147-1161.
- Van de Ven AH, Poole MS. 1990. Methods for studying innovation development in the Minnesota Innovation Research Program. *Organization Science* **1**(3): 313-335.
- Wareham J, Fox P, Giner J 2014. Technology ecosystem governance. *Organization Science* **25**(4):1195-1215.
- Wessel M, Christensen CM. 2012. Surviving disruption. It’s not enough to know that a threat is coming. You need to know whether it’s coming right for you. *Harvard Business Review* **90**(12): 56-65.
- Wilson III, EJ. 2008. Hard power, soft power, smart power, *The ANNALS of the American Academy of Political and Social Science* **616**: 110-124
- Yoffie D, Kwak M. 2002. Mastering balance: How to meet and beat a stronger opponent. *California Management Review* **44**(2): 8-24.
- Yu D, Chang CH. 2010. A reflective review of disruptive innovation theory. *International Journal of Management Reviews* **12**(4): 435-452.

Table 1: Data Sources

Data source	Details
Interviews	<ul style="list-style-type: none"> • Interviews of seven current and former TiVo senior executives, conducted telephonically or during visits to TiVo headquarters during early 2015. • 24 audio/video files or transcripts of interviews (ranging from 3 minutes to 36 minutes and conducted between the period 2002-2012) of TiVo executives and industry analysts conducted by journalists in news programs (e.g., Bloomberg TV, CNBC, Fox News, NPR, CNET Reporter's roundtable, etc.) • Interviews of TiVo executives published in news articles by the business press and trade press, books and online blogs (e.g., WSJ's All Things Digital, Engadget, PVRblog, iinnovate.blogspot.com, thomashawk.com).
Published cases, articles and comments/commentaries, reports on TiVo and the entertainment/television industries	<ul style="list-style-type: none"> • Articles and comments/commentaries published in the business/trade press and online blogs between 1995 and 2012, accessed from databases (such as Lexis-Nexis and ABI/INFORM Global) and through extensive Google searches • 54 equities analysts' and industry analysts' reports on TiVo and DVR/television/entertainment industries published between 1998 and 2012, accessed from Mergent Online and ThomsonONE databases. • 7 Harvard Business School and Northwestern Kellogg School cases on TiVo. • Academic articles on TiVo and the entertainment/television industries downloaded through keyword searches of SSRN, JSTOR and Google Scholar.
TiVo website, and other online sources (e.g., SEC Edgar, Internet Archive)	<ul style="list-style-type: none"> • SEC filings (IPO prospectus, Annual reports, 10-Q reports and 10-K reports between 1999 and 2012) • TiVo news releases (since founding to 2012) • List of US patents covering technologies used in TiVo's DVR products/service
Company and industry directories, Trade/industry association websites	<ul style="list-style-type: none"> • Company histories on key industry players from directories such as Gales Directory, Hoover's. • Industry reports/outlook and publications from Standard & Poor's, Moody's. • News releases and reports published by industry associations (e.g., National Cable and Telecommunications Association, Motion Picture Association of America)
Federal Communications Commission website	<ul style="list-style-type: none"> • FCC news releases • Transcripts of speeches made by FCC commissioners at trade and industry associations/conferences • FCC industry reports • Filings, comments related to FCC rulemaking and reports (downloaded by keyword search of FCC's Electronic Comment Filing System and Electronic Document Management System) • Court appeals, briefs filed by industry actors and interest groups subsequent to FCC rulemaking
US Patent and Trademarks Office database and The Lens (http://www.lens.org/about/)	<ul style="list-style-type: none"> • US patents awarded to TiVo between 1998 and 2012

Table 2: Illustrative Thematic Analysis of TiVo and the U.S. Television Industry Ecosystem⁷

Data/Excerpts/Quotations/Vignettes	Sub-Themes	Themes
<p>TiVo's future vision: "TiVo believes that our TiVo Service will offer advertisers a new platform with more efficient and effective ways to reach their targeted audience." (2000 TiVo 10-K report, p8)</p> <p>Disruption in the present due to TiVo's DVR: <i>And then we had to think about (the fact that) ...broadcasters – television networks – rely a lot on commercials to make their money...(In) fact many of them rely exclusively on commercials to make their money, and here we are ... fast forwarding through commercials and messing around with prime time and surf."</i> (Mike Ramsay interview, iinnovate.blogspot.com, 2006).</p> <p>"They [the media companies] were already on razor-thin margins and it was logical for them to think of short-term effects of our DVR technology on their business." (TiVo executive we interviewed).</p>	<p>Intertemporal co-opetition</p>	<p>Co-opetitive Tensions</p>
<p><i>"TiVo, which allows viewers to digitally record programs and fast-forward through ads, is trying to sell ad spaces on its screens. It is in a footrace with other companies, including Cablevision, Cox Communications and DirecTV, to offer interactive alternatives to the zapped-through television spots. ..."</i> (Advertising, Apr 23, 2009) Note: <i>Cablevision, Cox and DirecTV are TiVo's distribution partners; DirecTV also offers its own DVR to subscribers, apart from TiVo's DVR.</i></p>	<p>Dyadic co-opetition</p>	
<p>"Some advertising executives said that they were excited at the prospect of having access to data from TiVo recorders, which can offer some details that are not captured in the industry's standard ratings by Nielsen Media Research....<i>Rogers said he hoped that TiVo's new research would help advertisers bargain for better deals from networks. "All this money has changed hands in the TV advertising business, when there has not been any data given by the rating agencies about the watching of advertisements," he said....Nielsen has started to measure how video recorders are used, but it has been caught in a fight between the networks and advertisers about how to classify the data it gathers.</i>" (International Herald Tribune Jul 26, 2006).</p>	<p>Multilateral co-opetition</p>	
<p>Receives equity investments from several leading media companies, cable companies, network broadcasters, including CBS, Comcast, Discovery, Disney. <i>"This round of investment marks a major step forward in the adoption and validation of TiVo's service"</i> (Mike Ramsay, TiVo co-founder, quoted in PR Newswire, July 27, 1999).</p> <p><i>"There was also a lot of emotional reactions in the executive suite. So, one of the very first thing I did was to sit down with the research icons of the TV networks and show them what we were doing. These folks are likely to be more objective and less emotional about data on how consumers were using the TiVo product and make the intellectual leap to the impact on their business – short-term and long-term – and the opportunity ahead to get into this stream of innovation and begin to provide feedback on the innovations."</i> (TiVo executive we interviewed).</p>	<p>Engaging with multiple incumbents initially to get buy-in</p>	<p>Continual adjustments by TiVo</p>

⁷ This is only a subset of our analysis, included here for illustrative purposes. The complete set is available from authors on request. Portions of the text have been italicized for emphasis.

Table 2: Illustrative Thematic Analysis of TiVo and the U.S. Television Industry Ecosystem (continued)

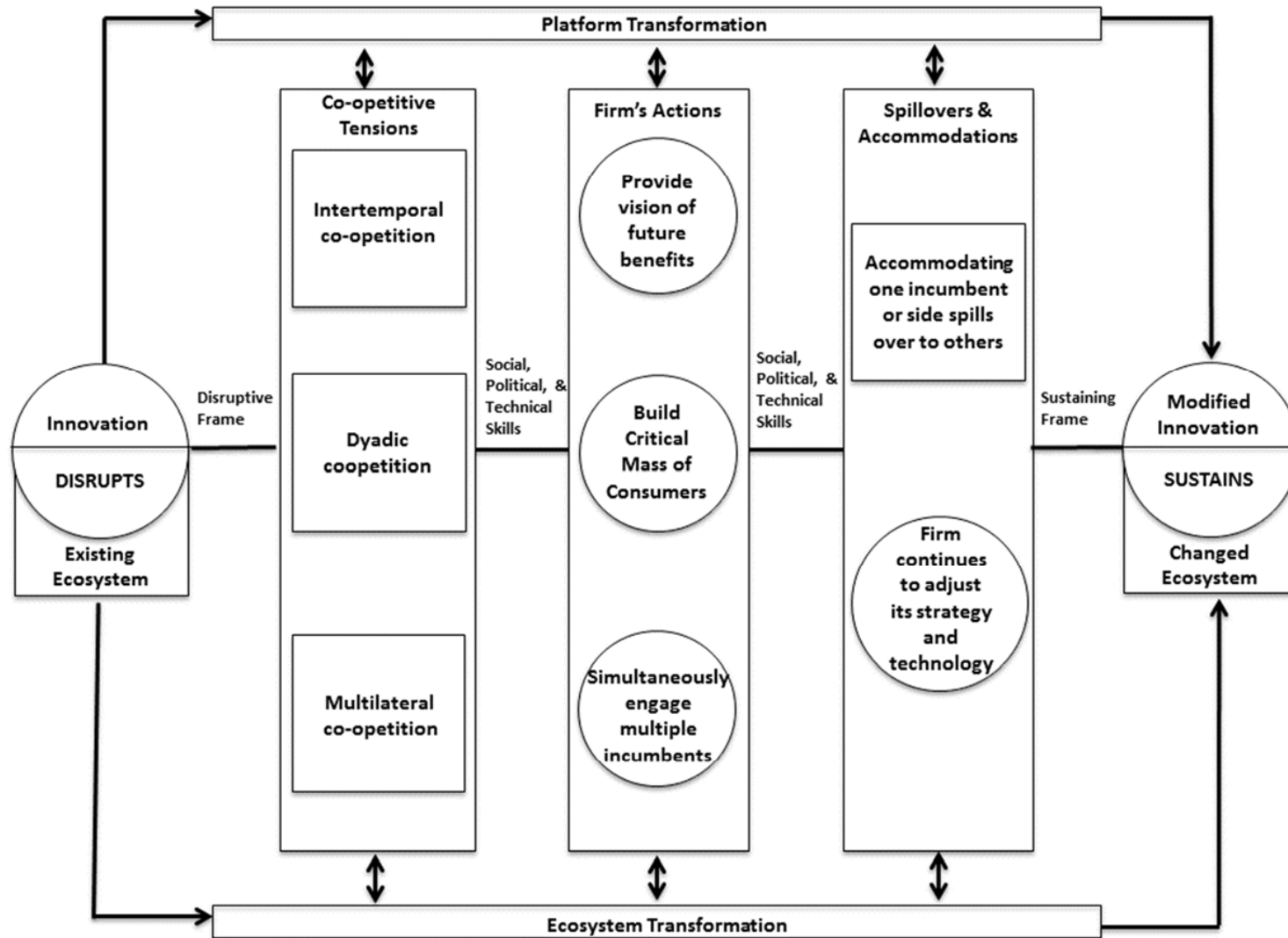
Data/Excerpts/Quotations/Vignettes	Sub-Themes	Themes
<p><i>I think that's happening whether TiVo offers an advertising product or not. Advertisers are already putting pressure on Nielsen and the networks with respect to program ratings and whether it's a viable currency".</i> ((Davina Kent, TiVo VP, national advertising sales, quoted in interview with Kerschbaumer, Broadcasting & Cable, December 2, 2005).</p> <p>"TiVo Inc. on Monday introduced a feature that lets television viewers send personal information directly to advertisers when they see certain commercials, a move designed to open up TiVo's technology to more markets. <i>The move underscores advertising's importance to the future of TiVo. It comes a few years after TiVo's introduction sent a chill through the ad sector with technology that let TV watchers skip over ads...</i> However, TiVo says the changes will not affect the way users view shows and skip ads, and will not force them to watch any ads they choose to ignore." (Los Angeles Times, July 19, 2005).</p> <p>"Unable to strike a deal with either of the major phone companies that offer TV services, TiVo on Wednesday sued them both...TiVo has already taken Dish for more than \$200 million and a judge has slapped a permanent injunction, now being appealed, against Dish..."We need to stop their continued use of our intellectual property," TiVo CEO Tom Rogers said Wednesday during a conference call with analysts to discuss quarterly financial results...Rogers was asked more than once why TiVo has been so selective about its lawsuits, leaving out cable operators and the makers of set-top boxes, for example...Rogers dodged such queries except to indicate that negotiations with cablers have been going better than they had with Dish and the phone companies. Comcast, for example, has launched its service with TiVo in New England and will do so soon in Chicago." (Adweek, August 27, 2009).</p>	<p>Living with hard-to-resolve tensions</p> <p>Dynamically switching to address negative spillovers to different side(s)</p> <p>Selectively dealing with DVR competition</p>	<p>Continual adjustments by TiVo (continued)</p>
<p>Growth in patents as indicator of TiVo's technological capabilities: # of patents in Dec 2001: 33 patents awarded; 99 patents pending, whereas the # of patents in Jan 2012: 238 patents awarded; 413 patents pending (TiVo 1999 IPO prospectus and TiVo 10-K reports).</p> <p>New sources of revenues due to the evolution of TiVo's technology platform and capabilities: "We primarily generate revenues from four sources: Consumer Service....Television Service Providers or MSOs....Media Services....Licensing Revenues..." (2012 TiVo 10-K, p. 6).</p>	<p>Evolution of DVR platform and services</p>	<p>Evolution of TiVo's Technology Platform and Relational Positioning</p>
<p>"For years TiVo was perceived as a pariah because it allows viewers to zip through TV ads. When former NBC executive Tom Rogers took over as TiVo CEO in July 2005, he made it part of his mission to smooth over relations with broadcasters, cable providers, and advertisers...The olive branches Rogers is offering TiVo's former adversaries, it turns out, are also areas of expected revenue growth. Last year, for instance, TiVo rolled out its Stop Watch audience measurement service, inking recent deals with NBC and CBS, to track consumers' minute-by-minute viewing habits. "With two major networks on board, other networks likely will have to subscribe to the data as well, as will the ad agencies and advertisers," noted Bear Stearns analyst, Kunal Madhukar. "And as such, CBS's decision was critical to the service gaining general acceptance in the industry." TiVo also unveiled a similar service that will provide advertisers with information about how viewers respond to (or fast-forward through) commercial spots." (CNNMoney, March 5, 2008).</p>	<p>Evolution of relational positioning from that of disruptor and value destroyer to one of partner and value creator</p>	

Table 3: Evolution of Co-opetitive Tensions within the TiVo-DirecTV Dyad

Year	Event	Tension and actions
1999	TiVo strikes mass-distribution deal with DirecTV	Beginning of collaboration between TiVo and DirecTV. Potential increase in dyadic and multilateral tensions with other content distributors (e.g., cable provider, DISH).
2000	DirecTV set top box with integrated TiVo service introduced in the market.	Mitigates dyadic tension.
2000	TiVo and Comcast deploy TiVo stand-alone DVRs and service to Comcast subscribers in NJ.	Increases dyadic tension in TiVo-DirecTV relationship due to initiative with DirecTV competitor (Comcast).
2001	DirecTV collaborates with Microsoft to launch Microsoft's Ultimate TV service.	Increases dyadic tension with TiVo; also lead to multilateral spillover in tensions.
2001	TiVo strikes a distribution agreement with AT&T Broadband.	Increases dyadic tension with DirecTV; multilateral spillover
2001	Agreement with DirecTV strengthened to include development and distribution.	Mitigates dyadic tension between TiVo and DirecTV.
2002	Comcast merges with AT&T Broadband; thereby stopping TiVo's trials with AT&T.	Mitigates dyadic tension with DirecTV; multilateral spillover.
2004	News Corp gains control of DirecTV; DirecTV to use in-house DVR technology and not TiVo's.	Increases dyadic tension with DirecTV; Potential for multilateral tension with NewsCorp., content provider and DirecTV's new parent.
2005	Comcast to distribute TiVo-integrated DVRs to its cable subscribers, and jointly develop interactive advertising platform.	Increases dyadic tension with DirecTV; multilateral spillover
2006	DirecTV and TiVo extend partnership to 2010. DirecTV will stop selling TiVo enabled boxes or service after Feb 2007. But, TiVo will continue to serve existing DirecTV subscribers.	Increases dyadic tension due to DirecTV's actions not to offer TiVo boxes or service.
2006	News Corp. swaps controlling interest in DirecTV for Liberty Media's stake in News Corp.	Decreases dyadic tension with TiVo.
2007	DirecTV buys most Replay TV related assets from D&M holdings	Increases dyadic tension with TiVo due to DirecTV's actions in buying competing DVR technology.
2008	DirecTV offers a new HD DirecTV DVR with TiVo service. But, DirecTV also is free to offer its own DVR services.	Increases dyadic tension due to DirecTV's actions in offering competing DVR.
2012	TiVo's HD DVR for DirecTV available nationwide.	Mitigates dyadic tension between TiVo and DirecTV.

Note: This is an abridged chronology of events pertaining just to one dyad, and offered for illustrative purposes.

Figure 1: A Process Model of Dynamics that Unfold During the Introduction of a Disruptive Innovation



Note: Circles in the figure represent the actions of the firm that introduces the disruptive innovation, whereas squares represent ecosystem dynamics.