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## **A new perspective on the innovator's dilemma - Exploring the role of incentives to transform markets**

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**Abstract:** Why do entrant firms sometimes gain the upper hand under conditions of discontinuous technological change? Previous research on this topic has either looked at the role of established competencies and/or firm incentives to invest in a new technology. In this paper we explore an alternative explanation. Drawing upon evidence from the ongoing transition from CCTV to digital, IP based video surveillance, we argue that entrant firms may be more prone to act entrepreneurially, i.e. more inclined to proactively create or transform markets and build ecosystems. As new technologies frequently require altered behaviour among customers and stakeholders, this capability is sometimes critical in order to succeed in a technological transition. Our contribution therefore lies in pointing out that not only may incentives to allocate R&D resources differ among entrants and incumbents, firms might also have different incentives to engage in entrepreneurial activities of creating or transforming markets.

**Keywords:** Disruptive Innovation; Entrepreneurship; Incentives; Technological Discontinuities; business model, ecosystem.

**JEL Codes:** O3030, O3033, O3032

## 1. Introduction

Much scholarly attention has been devoted to explaining how and why incumbent firms are displaced by entrants when an industry undergoes radical technological change (e.g. Cooper and Schendel, 1976; Christensen, 1997). There are many historical examples of established firms collapsing due to a technological discontinuity, including ice harvesting companies being toppled in the transition to mechanical refrigeration (Utterback, 1994) and analog radio manufacturers missing out on the shift to transistor radios (Henderson and Clark, 1990). The recent bankruptcy of the former photographic film giant Eastman Kodak can be largely attributed to the shift to digital imaging.

A growing body of research has sought to explain this pattern, sometimes referred to as the incumbent's curse (Foster, 1986). Broadly speaking this literature has either studied a technological discontinuity's impact on competencies (Tushman and Anderson, 1986) or incentives to invest in the new technology (Christensen and Rosenbloom, 1995). Less attention has been given to how entrants and incumbents differ in terms of their interactions with the surrounding environment.

In this paper we explore how entrant firms relate to the external environment during a technological discontinuity. Building upon important contributions to this area previously published in the *European Journal of Innovation Management* (Dew et al., 2008; Smith, 2012) along with literature on institutional entrepreneurship we offer an alternative, complementary explanation of entrant success and incumbent failure. Entrants may not only possess different incentives or competencies, we argue that they may also differ in being more capable of proactively changing institutions. As new technologies often require altered behavior on behalf of customers and end-users in order to be adopted, entrants might thus be at an advantage. Their agency is less socially embedded and less constrained by existing relations and thus, they seem to be more able to transform established institutions. In doing so, they also change the competitive dynamics of an industry, thereby leapfrogging incumbent firms.

We illustrate this argument through an in-depth case study of an entrant firm in the video surveillance (CCTV) industry. In the ongoing shift from analog CCTV to digital Internet (IP) based surveillance,

this entrant has grown significantly in recent years and toppled incumbent firms. While this firm arguably possessed different competencies and had different incentives, the case study also illustrates that IP video has imposed significant changes to the use of surveillance products. The studied firm has had an instrumental role in enacting those changes and as a consequence, competitive dynamics have been altered to its favor.

The paper is organized as follows. The next section reviews existing literature on incumbent failure and discontinuous technological change. Subsequently, we introduce theory on institutional entrepreneurship along with the methodology employed. The following sections contain an analysis and eventually a conclusion is provided.

## **2. Theoretical review**

There is abundant research on how and why entrants displace incumbents when an industry undergoes discontinuous technological change. This literature can be divided into two categories, one being concerned with firm-internal factors such as competencies and the other one addressing linkages to the market (Abernathy and Clark, 1985).

Starting with literature on firm-internal factors, much attention has been given to the role of competencies and whether those retain their value. If the knowledge required to develop a new technology differs significantly from the previously dominant one, entrant firms are often better positioned to benefit from a technological discontinuity (Tushman and Anderson, 1986). This argument was further developed by Henderson and Clark (1990), who argued that changes in product architecture might be equally difficult to handle for incumbents as their organizational structures are often designed for a particular architecture. Manufacturing skills and routines such as total quality management have also been shown to result in rigidities for incumbents, thus creating opportunities for entrants (Rosenbloom, 2000; Benner and Tushman, 2002).

Other studies in this tradition have highlighted the role of complementary assets and to what extent they remain intact. Studying four technological discontinuities in the typesetter industry, Tripsas (1997) found that entrants may not prevail despite having the right technological competencies, primarily because incumbents may possess specialized complementary assets that shelter them from competence destruction. Similar findings have been reported in several other studies (e.g Rothaermel, 2001; Sosa, 2009). In recent years, more behavioral perspectives on entrant-incumbent dynamics have been introduced. Incumbents may be disadvantaged by their established organizational identity, (Tripsas, 2008) and inability to get rid of old cognitive frames (Kaplan and Tripsas, 2008).

Another stream of research has explored how the market affects firm behavior. A technological discontinuity may not only render a firm's competencies obsolete, it could also affect its customers' and partners' knowledge, thereby opening a window of opportunity for entrants (Afuah and Bahram, 1995; Afuah, 2000; Ansari and Garud, 2009). Since the 1990s, this body of research has increasingly applied an open systems perspective, arguing that competence destruction is not the most important determinant of whether entrants succeed or not. Instead, it has been suggested that an established firm's existing, profitable market prevents it from exploring technologies that are not demanded by their customers (Christensen and Bower, 1995). The open systems perspective posits that organizations are influenced by those actors in the environment that supply it with necessary resources (Pfeffer and Salancik, 1978). Hence, an asymmetry of incentives might occur where it is financially irrational for incumbents to invest in a new technology as they face higher opportunity cost, while

small entrant firms might be highly motivated to develop a technology that initially offers low profits and is only appreciated by a fringe market (Christensen, 1997).

This stream of literature has become increasingly popular over the last decade and is frequently referred to as the Theory of Disruptive Innovation (Yu and Hand, 2009). The theory has expanded, both in terms of scope and application areas. Today, it also includes business models (Christensen, 2006; cf Markides, 2006) and has been used not only to explain competitive battles in industries, but also in areas such as healthcare and education (Christensen et al., 2008; Christensen et al., 2009). However, its core argument remains intact: entrant firms will prevail if a technology initially does not cater to the demands of incumbents' markets since established firms' resource allocation mechanisms are controlled by their current, profitable customers. In doing so, this literature has maintained a somewhat static perspective on markets. The market is assumed to be comprised of a set of segments of users (low-end, high-end or a new market) with a set of predefined preferences. Entrants and incumbents then act as servants to these different needs and depending upon their incentives, they address different markets.

Building on previous work on disruptive innovation, some scholars have pointed at other explanations of the competitive outcome under conditions of discontinuous technological change. Similar, albeit not identical terms have been used by many researchers in order to underline the importance of how firms relate to the market. These include customer competence (Danneels, 2004), transformational experience (King and Tucci, 2002) and expeditionary marketing (Kassiech et al., 2004). This line of reasoning was nuanced further by Dew et al (2008), who argued that the key differentiating property and determinant of entrant or incumbent success is related to a firm's ability to act entrepreneurially, i.e. to create new markets or transform existing ones. According to the authors, the main challenge is therefore not a matter of resource allocation or timing of entry, but of being able to build and change markets. This claim was constructed by drawing upon entrepreneurship research, a subject that is largely concerned with how firms create or discover new opportunities (Venkataraman, 1997). Scholars in this area have shown that entrepreneurs frequently employ effectual rather than causal reasoning, meaning that they use existing means but lack predefined goals (Sarasvathy, 2001). Dew et al. (2008) thus stated that the main distinctive feature of entrant and incumbent firms is not related to resource allocation but to their ability to craft and transform markets. While presenting an intriguingly different perspective, the authors did not provide empirical illustrations of their argument, nor did they theorize regarding under what conditions entrant or incumbent firms would be more capable of enacting such changes.

A more recent contribution in this journal sought to fill this gap by suggesting that differences in social and relational capital determine whether entrants or incumbents prosper. Drawing upon the notion of outsiders (Van de Poel, 2000), defined as individuals or firms that are only partially connected to a particular network, Smith (2012) argued that outsiders are not constrained by the same rules or norms and that they therefore are more likely to prosper under conditions of discontinuous technological change. Similar arguments related to the importance of approaching the market proactively have also been brought forward by other scholars (Assink, 2007; Sandberg and Hansén, 2004), but was not explicitly applied to explain differences between entrants and incumbents. As new technologies frequently drift into a socio-economic context through an iterative process of mutual adaptation of market and technology (Ciborra, 1997; Rogers, 1995; Holmström and Stalder, 2000), the ability to enact such changes can be expected to influence the competitive dynamics.

Summing up this literature review, it can be concluded that much research has been devoted to firm-internal challenges and how the market influences a firm's resource allocation processes. Less

attention has, however, been given to how incumbents and entrants relate differently to the environment. At the same time, this can be expected to have significant impact on their performance when undergoing a technological discontinuity, especially when adoption of a new technology requires significantly different behavior. A better theoretical and empirical understanding of how entrants and incumbents relate to the environment is therefore needed. In the next section we turn to literature on institutions and institutional entrepreneurship, a body of research that is largely concerned with the issue of embedded agency, i.e. how actors are constrained by the environment and under what conditions they are capable of transforming it.

### **3 Institutional entrepreneurship**

The importance of institutions and how they shape firm behavior has been increasingly recognized within the more general field of strategic management over the last two decades (Oliver, 1997; Peng and Heath, 1996; Peng et al., 2009). Institutions can be defined as “the humanly devised constraints that structure human interaction” (North, 1990, p. 3) and include issues such as laws, regulations, taxation, culture, habits and practice. When it comes to technology, principles and behaviors related to its usage and perceived benefits can be regarded as institutions.

Within strategic management, the institution-based view emerged as a criticism of other theories’ lack of attention to context and embeddedness. In this sense, it resembles literature on disruptive innovation described above as the institution-based view is generally concerned with how the surrounding environment imposes constraints on a focal actor.

While attending generally to context as a constraint, this body of literature has over time focused more on how actors change institutions, which is frequently referred to as institutional entrepreneurship. Institutional entrepreneurs are thus actors who initiate divergent changes, i.e. changes that alter an established institutional regime or create a new one (Battilana et al., 2009; DiMaggio, 1988). In doing so, they encounter challenges related to interdependencies with other actors and their abilities to obstruct. Institutional entrepreneurship is thus concerned with how actors are able to change institutions, despite depending on them (Holm, 1995; Seo and Creed, 2002 (Kalantaridis, 2004).

Institutional change is more or less likely to occur depending on certain circumstances. Institutional entrepreneurship is more successful when several institutions coexist as actors are then exposed to a range of different selections (Clemens and Cook, 1999). More generally, a higher degree of institutional uncertainty is expected to create opportunities for institutional entrepreneurship (Fligstein, 1997).

An actor’s social position also influences its ability to create divergent change. Several studies have shown that peripheral actors are more likely to act as institutional entrepreneurs since they are less bound by the established order (Garud et al., 2002; Haveman & Rao, 1997; cf Greenwood & Suddaby, 2006; Greenwood et al., 2002). Actors positioned at the intersection between different institutional fields often function as institutional entrepreneurs (Phillips et al., 2000) as they have less need to be considered legitimate by one institutional order (DiMaggio & Powell, 1983). Outsiders are also more likely to question established rules and norms and hence, they are more likely to enact institutional entrepreneurship (Cliff et al., 2006).

A wide range of different strategies for enacting institutional change have been reported by previous research. Institutional entrepreneurs are generally described as socially skilled and attentive to cultural

settings (Eisenstadt, 1980; Boxenbaum and Strandgaard, 2009). As divergent change usually meets opposition from other actors, it is often crucial to obtain support and to mobilize allies, cooperate with others and leverage their reputation in order to create legitimacy (Rao, 1998; Lawrence et al., 2002). Institutional entrepreneurs therefore need to identify protagonists, adversaries and understand how different actors are affected (Scully and Creed, 2005). They often drive institutional changes by generalizing from local stories and events, thereby altering the collective frames (Meyer and Rowan, 1977).

#### **4. Method**

In order to explore the topic explicated above, a single case study approach was chosen. This method is often appropriate when exploring a phenomenon that has been insufficiently dealt with by previous literature. When trying to build new theory rather than testing established theory, case studies are often used, since they enable a detailed description which makes it possible to comprehend issues that have only partly been addressed before (Eisenhardt, 1989).

The studied firm and the video surveillance industry were targeted for a number of reasons. First, it is currently undergoing a technological discontinuity where analog CCTV is being replaced by digital video cameras (IP video) that are connected over the internet. While analog technology still holds considerable market share, IP video has grown at a rate of approximately 25 percent since the mid 2000s and now accounts for more than 30 percent of the market. Analog manufacturers are currently shifting to IP, but interestingly, the technology shift has primarily been driven by entrants.

The studied firm is particularly interesting as it pioneered IP video, launching the world's first camera in 1996. It has been the undisputed market leader in IP video ever since and with the ongoing technological shift, the firm became the largest video surveillance camera manufacturer in 2011, toppling analog incumbents such as Pelco and Bosch. Founded in 1984, it has a background in the IT industry and has historically developed print servers and other IT products related to network connectivity prior to entering the video surveillance industry. The case is of special interest also as the company has met a lot of resistance and has actively tried to change the market since IP video requires significantly different behaviors.

In order to gather information about the firm and the industry, several sources of data were collected. Semi-structured interviews were conducted with nine key employees who have been working with business development and R&D for a long time. The questions concerned challenges the firm has encountered when introducing IP video and how it has gone about trying when transforming the industry. Each interview lasted for about 90 minutes. Notes were taken by the researcher and the interviews were also recorded in order to allow for subsequent validation of the notes. Several interviewees have read the interview documentation and been asked to confirm the interpretation of the data.

In addition to field interviews, extensive secondary data has been gathered and reviewed. These include annual reports, white papers, books about IP video and market research concerning the industry. While the authors have no formal ties to the studied firm, a close contact with senior management has been maintained over the last years, primarily resulting in a knowledge exchange. Through frequent exchange of emails, MSc thesis work at the company and regular meetings, a

broader contextual knowledge has been obtained. The case description below emerged when all these sources of data had been analysed.

## 5. Empirical data

The video surveillance industry is currently experiencing a shift from analogue CCTV to digital, IP-based cameras connected over the internet. For a long time, IP video offered lower image quality, but lately it has surpassed analogue technology along this dimension with the rise of megapixel cameras and HDTV quality in 2007-2008. At the same time, the technology has brought several new performance dimensions to the market. For instance, IP video is easier to integrate with other information systems, it is much easier to expand the system, and images can be viewed from any place that has access to an Internet connection.

The first IP-based video camera was at Axis Communications in 1996 by two engineers, Carl-Axel Alm and Martin Gren. Unlike webcams for consumers, an IP camera has its own web server and does not need to be connected to a computer. In the beginning, IP video cameras were often simply referred to as 'Axis cameras' since Axis was the only significant provider of such cameras. In the years 2000-2007, IP video grew about 40-50 percent annually, albeit from very low levels and had taken 15 percent of the surveillance market in 2007. In 2012, 40 percent of the market had shifted to IP and this figure continues to grow. Up until the shift to IP video, the CCTV industry had remained well consolidated and stable for several decades. CCTV is a standard that comes from the 1950s and the industry had been dominated by such firms as Panasonic, Pelco and Bosch.

As demonstrated in Table 1, incumbent firms have failed to dominate the new technology in the same way as they did with CCTV. Clearly, some incumbents have successfully grabbed market share in IP video, but Axis has remained the undisputed leader with a market share around 30 percent in 2006-2011 whereas number two (Sony) only had about 15 percent for several years. Outside the top five list in the IP video category there are several entrant firms such as Acti, DVTEL and Vivotek.

Market share	2006	2007	2008	2009	2010	2011
1	Axis	Axis	Axis	Axis	Axis	Axis
2	Sony	Sony	Sony	Panasonic	Panasonic	Panasonic
3	Panasonic	Panasonic	Panasonic	Sony	Sony	Sony
4	Mobotix	Mobotix	Mobotix	Mobotix	Mobotix	Hikvision
5	D-Link	Panasonic	Panasonic	Panasonic	Bosch	Mobotix

*Table 1 contains the top five vendors of IP-based cameras 2006-2011.*

As can be seen in Table 2, the shift to IP has also implied changes in industrial leadership. Most notably, Axis has climbed from number 8 in 2005 to being the largest supplier of video surveillance cameras in 2011. At the same time, some analogue incumbents such as Panasonic have thus far sustained a strong position while others like Pelco and Bosch have clearly lost market share to entrant firms.

Market share	2005	2006	2007	2008	2009	2010	2011
1	Panasonic	Panasonic	Panasonic	Panasonic	Panasonic	Panasonic	Axis
2	Pelco	Pelco	Pelco	Pelco	Axis	Samsung	Panasonic
3	Bosch	Bosch	Axis	Axis	Pelco	Axis	Samsung
4	Sony	Axis	Bosch	Bosch	Bosch	Bosch	Hikvision
5	Honeywell	Sony	Sony	Sony	Samsung	Pelco	Pelco

Table 1 provides the top five vendors of video surveillance cameras (both analog and IP) 2005-2011.

### The shift to IP video and Axis Communications

From the launch of the first IP video camera, Axis Communications has dominated this technology and remained the number one supplier of network cameras. As can be seen in Figure 1, revenues and profits have increased significantly over the last decade. The number of employees has risen from 421 in the year 2000 to 1403 by the end of 2012. In the late 1990s, Axis invested extensively in bluetooth technology and explored several business areas, one being video surveillance. As the promises of bluetooth failed to materialize the firm suffered large financial losses, had to emit new stocks and become a publicly listed company in order to survive. As video sales started to take off in 2002-2003, the company made a deliberate strategic decision to focus on video surveillance.

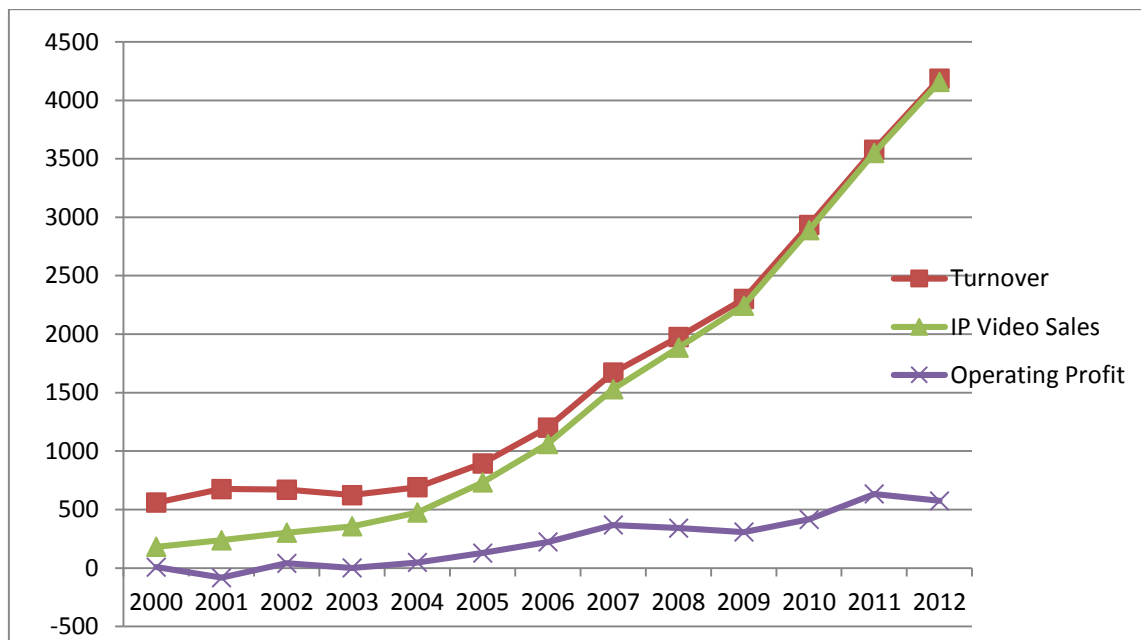


Figure 1 illustrates turnover growth, IP video sales and operating profit for Axis Communications 2000-2012.

Founded in 1984, Axis had a background developing print servers and other products aimed for increased connectivity. Regardless of product area, its business model has remained the same over the years and is based upon a couple of common denominators. Axis doesn't sell directly to end users and works together with many different partners, who integrate systems, act as distributors, develop software and sell various services. The business model seems to be very flexible – the firm makes money primarily on hardware but also to some extent on video management systems. The partners in



its network are free to develop their own ways of making money using both the company's products and its competitors'.

Throughout the shift to IP, Axis has often used standards and notions from the consumer electronics industry, partly in order to increase familiarity and gain legitimacy for the new technology. As the image quality of IP cameras improved over time, Axis has sought to communicate those benefits by introducing megapixel quality and subsequently HD quality, standards that are widely known by people. The introduction of HD quality in 2008 eventually forced analogue incumbents to form an industry group around HDCCTV where they tried to imitate digital technology and state that analogue surveillance could also offer HD quality.

While IP video and Axis has grown exponentially over the last decade, the technology has met a lot of resistance, for a couple of reasons. When installing an IP-based system, surveillance becomes more of an IT issue than a traditional security concern. Historically, the security industry has been characterized by a business logic that is very different from the logic in the IT industry. The security industry used to have limited price transparency throughout the supply chain and people who worked in the industry often had a background in the military or in the police. These actors had been used to doing business based upon strong relations. Integrators and distributors of IT products, on the other hand, are used to higher price transparency and weaker ties between the actors. Additionally, integrators of CCTV had a particular set of skills, primarily related to using co-axial wires and other analogues equipment. They do not command IP since the competence related to installing and maintaining such a system is significantly different. Another problematic issue has been the fact that security managers lose power vis-à-vis IT managers inside the customer organizations and therefore they have been reluctant to adopt the new technology.

The introduction of IP video thus had far reaching implications for most actors in the security industry and it has for a long time been regarded as highly controversial. In order to drive the shift from CCTV to IP video, Axis thus had to transform the industry towards more of an IT logic. The firm has sought to do so in a couple of different ways.

Firstly, it is interesting to note that increased competition was for many years not primarily thought of as a threat but rather a way to obtain more legitimacy for IP video. In 2006, CEO Ray Mauritsson stated that *"increased competition is generally a positive development as more actors are now driving the shift from analog to digital technology"*.

Axis has also sought to mobilize partners in order to drive the shift towards IP. Its Application Development Partner program (ADP) was launched in 2000 and aimed to build relations to software developers who could build applications to be used in the digital cameras. Two years later, a Channel Partner program was initiated where distributors, integrators and consultants could sign up to become a Partner. Table 3 shows that the amount of partners has grown significantly since 2004, fuelling the Axis' growth and market coverage.

	Number of Application Development Partners	Number of Channel Partners
2004	200	2000
2005	280	6000
2006	400	10000
2007	450	14000
2008	650	24000
2009	750	30000
2010	800	35000
2011	900	45000

*Table 3 shows the amount of Application Development Partners (ADPs) and Channel Partners for Axis Communications 2004-2011.*

A channel partner can buy Axis cameras at discount prices and receive support, both technically and when it comes to sales related to larger installations. There are three different categories of partnership: Authorized, Silver and Gold. In order to become a Silver Partner, you need to complete the first level of training at Axis Academy and to become a Gold Partner, you need to have done the second level as well, while also having showed strong business results. Axis Academy was started in 2005 and aims to educate integrators and other partners in how IP video is used. By Axis it is not primarily regarded as a source of profit, but rather as a way to drive the shift to IP as competencies need to be renewed in the security industry. *“They won’t know everything about IP surveillance from a one-day session, but they know much more and can learn more”*, a company representative recalls. By 2012, more than 30 000 people had taken part in these training sessions.

Initially, the studied firm sought to handle the aforementioned conflict between IT and traditional security by building separate channels according to the logic described above. They even sought to communicate the different logic by selling black products in the security channel and white or light grey products in the IT channel, as these colors are usually associated with the different industries. But at that point (1999-2001) the technology was still inferior in many respects, and hence the security industry saw little benefit in adopting the new technology.

The IT industry, on the other hand, had been hit by the dotcom-bubble in 2001-2002 and there were plenty of skilled persons who looked for jobs. The studied firm has therefore chosen to focus on an IT channel approach, and has grown significantly by doing so. As the technology has evolved, the traditional security industry has become more interested in IP video and come back to the firm. But when doing so, they had to follow the IT logic, based upon weak ties and price transparency.

The power and knowledge of security managers has continued to be a challenge for the studied firm. Axis has undertaken a couple of measures in order to deal with this issue. For instance, it initially targeted IT managers. One company representative said: *“It was easier to find an IT manager with an increased need of security than a security manager with an increasing need of IT”*. Additionally, the firm has sought to create a broader interest for IP video inside the customers’ organizations by being involved in many different marketing activities. It has put advertisements in the security industry press, released white papers comparing IP video and CCTV, published books on IP video and released more than 500 small customer case studies where the benefits of the technology are communicated. The studied firm does not normally know exactly how and where decisions are taken inside the customer organizations, and has therefore chosen to target a wider set of actors, thereby hopefully creating an

internal pressure to go for an IP-based system. It often tries to get the IT and security managers to attend the same meeting and reach an agreement between themselves.

According to respondents at the studied firm, one reason why the incumbents have so far lagged behind in IP video appears to be that they do not know how to approach customers with it. The logic of selling to IT departments is new to the industry and the analogue players are not used to doing so.

## 6. Analysis

The empirical data above shows how an entrant firm, Axis Communications, has both pioneered IP video surveillance and become the market leader for video surveillance, toppling incumbent firms like Panasonic, Bosch and Pelco. There are several different factors that together explain why this has happened, some of which are well documented in previous literature. Competence destruction (Tushman and Anderson, 1986) is arguably one such factor. With the shift to IP, the capabilities needed in order to develop a camera have changed. Knowledge about IP protocols and networks, image sensors and other digital technologies has to an extent replaced the knowledge required to create an analogue CCTV camera. With a background in print servers and IP network connectivity more generally, Axis probably had capabilities that were better suited for developing IP cameras than a firm like Pelco.

Axis was probably also in a favorable position as it had other incentives to invest in IP video than analog incumbents. Despite being threatened by IP video, the market for analogue CCTV has grown significantly over the last decade, primarily due to 9/11 2001 and an increased security awareness in the Western world. Hence, analogue incumbents were enjoying increasing revenues from its core business and therefore had little incentives to make significant investments in IP video. Having been hit by the dotcom-bubble and invested too much in Bluetooth, Axis was by the early 2000s trying to divest unprofitable business areas, focus its efforts and return to profitability. In the year 2000, Axis was one out of very few firms offering IP surveillance cameras and this business had a turnover of 181 MSEK, up 270 percent from the previous year. Hence, there seems to have been an asymmetry of incentives making it more rational for Axis to focus its efforts on IP video. Being relatively small and financially wounded, the firm had strong incentives to develop IP cameras whereas analogue incumbents already had a large, established and growing market making it seemingly irrational for them to bother about IP video.

The empirical description is therefore consistent with two important explanations of incumbent failure and entrant success. The shift to IP video was arguably competence destroying (Tushman and Anderson, 1986) and also disruptive (Christensen, 1997) in the sense that incumbents had little reason to invest in IP as they were captivated by their existing market. Below, we point out a new, complementary explanation of entrant success by arguing that Axis has in fact acted as an institutional entrepreneur.

### Axis Communications as an institutional entrepreneur

While not denying the importance of factors such as competencies and incentive asymmetries, the empirical description suggests that those theories can only partially explain the success of Axis and the failure of incumbents. Axis did not only possess different competencies and incentives than incumbents, the company has also transformed the industry for video surveillance and seems to have obtained a competitive advantage from enacting such changes.

The data above shows that IP video was largely incompatible with established institutions in the security industry and that Axis had to proactively change those institutions in order to successfully diffuse the technology and obtain a leading position. In this case, institutions such as legislation and regulations have not been changed, rather, institutions such as culture, habits and practice (North, 1990) have been transformed.

The empirical section described some of the practices and the culture that characterized the CCTV industry prior to the shift to IP video. CCTV cameras were sold with little price transparency, they were installed by blue collar workers who primarily knew coaxial cabling and analogue technology and the end customer was usually a security manager in a large organization. Clearly, the introduction of IP video was incompatible with these institutions and required significantly altered behaviors in order to be successfully diffused. IP cameras were sold through new channels, with full price transparency, their installation required significantly different competencies and they distorted the power balance between IT and Security managers in the end customer's organization.

It is clear from the description above that Axis has acted as an institutional entrepreneur in the security industry. Rather than aligning itself with existing norms and practices, the firm has proactively changed these institutions to its own favor. In doing so, Axis has leapfrogged analogue competitors who now have to compete in a new institutional setting. As incumbents are used to acting under the previous institutional order they are now trying to catch up and compete under circumstances they are poorly adapted to.

As stated in the literature review above, institutional entrepreneurs are often found at the crossroads of different institutional settings. In the case of Axis, the company had a background in the IT sector and had developed a business model based upon selling via distributors, working with open interfaces and co-creating value with partners. Axis brought these institutional attributes to the security industry and was thus able to transform it and gain a competitive advantage.

### **Strategies for enacting institutional change**

When looking at the strategies Axis has enacted in order to drive the shift to IP video, it is clear that it has in many regards behaved as the literature on institutional entrepreneurship would suggest.

In order to initiate divergent change, institutional entrepreneurs often need to mobilize allies as they are rarely in a position to implement such changes on their own (Fligstein, 1997; Greenwood et al., 2002). As a relatively small firm entering an established and mature industry trying to drive a technology transition, Axis has relied extensively on support from others. As demonstrated in Table 3, the firm has attracted an extensive network of partners of both software developers and integrators. Some of these firms had a background in the IT industry and gradually, more firms from the traditional security channel have become partners. The demands for becoming a partner have been rather low and partners are not obliged to use only Axis' products. With a distinction between Silver and Gold partners, Axis has created incentives for firms to become increasingly involved with their products over time. Its educational program, Axis Academy has also played an important role in mobilizing partners and changing established institutional practices in the security industry. Moreover, it is interesting to note that Axis' CEO did for many years not primarily regard increased competition as a threat, but as a way to gain increased legitimacy for IP video.

Axis has also deliberately applied institutions from the consumer electronics industry in order to drive the shift to IP surveillance. Introducing cameras that offer H.264 compression, megapixel and HD

quality has effectively communicated the benefits of IP video as most people are familiar with these standards. The fact that analogue incumbents then had to introduce their own version of HD (HDCCTV) can be regarded as an illustration of the changing institutional logic in the security industry.

Literature on institutional entrepreneurship also points out orchestration as an important strategy for initiating divergent change. By building stories and trying to theorize from them, institutional entrepreneurs redefine established practices (Greenwood et al., 2002). Ever since the early 2000s Axis has been involved in a wide range of marketing activities related to communicating and explaining the benefits of IP video. By publishing Customer Case stories, integrators and end customers can see benefits of IP video in a more tangible way. Also, the firm has released books and conducted various studies together with universities where the cost of IP systems is compared to the cost of traditional CCTV.

Institutional entrepreneurs also need to relate to Defenders, i.e. those actors that benefit from the current order and try to block changes (DiMaggio, 1988; Levy and Scully, 2007). In the beginning, Axis seems to have avoided such actors to an extent, focusing on IT managers and IT partners rather than more traditional security actors. Also, the firm tried for a while to act according to both the IT logic and the CCTV logic, the fact that Axis used to launch the same product with different colours for different channels can be regarded as one illustration of this strategy.

## **7. Discussion**

While we acknowledge the importance of competence destruction (Tushman and Anderson, 1986) and the role of incentives (Christensen, 1997) in explaining the entrant-incumbent pattern in video surveillance, we argue that those theories do not provide a complete picture. Christensen's work on disruptive innovation essentially suggests that entrant firms have different incentives than incumbents, but it does not assume any differences in how entrants and incumbents relate to the surrounding environment. This stream of literature rather suggests that entrants and incumbents passively adapt to predefined demands in different segments of a market.

This article therefore contributes to literature on technological discontinuities and incumbent failure by pointing out that entrant firms might be more capable to act as institutional entrepreneurs, especially in those cases when new technologies require altered behaviors and skills among users and other actors (Rogers, 1995; Ciborra, 1997). As entrant firms are not bound to follow established procedures and norms, they are more likely to introduce those technologies that require significant institutional changes. In doing so, we provide an empirical illustration of the entrepreneurial perspective on the innovator's dilemma presented by Dew et al. (2008). This paper also contributes to existing research by introducing literature on institutional entrepreneurship as a potential explanation of entrant-incumbent dynamics under conditions of discontinuous technological change.

The topic of institutional entrepreneurship and technological change merits further research, especially since this paper is based upon an exploratory case study. While the presented case suggests that entrants are more capable of institutional entrepreneurship, more knowledge is needed regarding under what circumstances this is the case. Detailed studies of how incumbent firms relate to the environment and the challenges they encounter when trying to enact institutional change are also needed.

## 8. Conclusion

This paper has explored how entrants relate to the surrounding environment when an industry undergoes a technological discontinuity. Our findings from the ongoing shift from analogue CCTV to digital, IP-based video surveillance suggests that entrant firms may displace incumbents since they are better positioned to act as institutional entrepreneurs, i.e. actors that initiate divergent changes and break established practices.

The studied firm, Axis Communications, had a background in the IT industry and invented the first IP surveillance camera in 1996. Axis has exhibited a very high growth rate over the last decade and became the world's largest provider of surveillance cameras in 2011, toppling incumbents such as Panasonic, Pelco and Bosch. Our findings suggest that Axis has transformed the CCTV industry over the last decade by introducing practices that were new to the industry and can thus be regarded as an institutional entrepreneur.

Based upon this empirical description we add to the literature on entrant-incumbent dynamics and technological discontinuities by arguing that entrant firms are more likely to act as institutional entrepreneurs. In those cases when a technology requires different institutions, this might be a competitive advantage for entrant firms. Our conclusions are therefore different from the ones advocated by previous research, which has argued that entrants either posit different competencies or incentives. In contrast to this work, we argue that entrants might be better positioned to redefine institutions and that they thereby change the competitive landscape to their favour, hence displacing established firms.

As stated previously, it is hard to draw general conclusions from a single case study. We therefore encourage future research to further explore how entrants and incumbents differ in terms of their abilities to act as institutional entrepreneurs.

## 9. References

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