A Strategic Method to Establish Sustainable Platform Businesses for Next-Generation Home-Network Environments

by

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ABSTRACT

The situation of the consumer electronics industry has become severe due to the rapid growth of digital hardware technology, and sophisticated open source technology. Every product of this industry has become commoditized very rapidly due to the emergence of those technologies, and many firms have been suffering from very thin profitability.

Under such severe circumstances, the firms in the high-tech industry that enjoy overwhelming market share, profitability, and sustainability are the firms doing “Platform business,” such as Intel and Microsoft, rather than those doing low margin “product selling business.” Looking at the great sustainability of those firms, many high-tech firms have aimed to be successful Platform leaders, but to do so is not easy.

In this paper, I define key success factors for consumer electronics firms to be able to be profitable and sustainable Platform Leaders, especially focusing on the “home-network platform business” where many high-tech firms have tried to be a dominant design holder.

I explore how to let a company’s own technology and business model become a dominant design in the home-network business, how to establish a successful Platform business with the dominant design, and how to maintain sustainability and high profitability of the Platform business as a Platform leader. Concretely, based on Platform Leadership levers defined by Cusumano and Gawer, I define the Enhanced Platform Leader Model, EPLM, as newly redefined key success factors for being a successful Platform leader, by analyzing past successful and unsuccessful Platform business cases of new home-network businesses.

In addition, through proposing an appropriate Platform architecture and other key elements for being a sustainable Platform leader, I propose a new business model for a high potential next-generation home-network business that takes advantage of “intuitive operation” technology, and I also propose appropriate strategies to make the business model successful, using EPLM.

The views expressed in this paper are those of the authors and do not reflect those of Sony Corporation.

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1. Introduction

The firms in high-tech industry which enjoy overwhelming market share, profitability, and sustainability are the firms doing “Platform business,” such as Intel Corporation and Microsoft Corporation. Looking at the great sustainability of those firms, many high-tech firms have aimed to be successful Platform leaders, but to do so is not easy. In their book, *Platform Leadership*, Michael A. Cusumano and Annabelle Gawer defined key success factors for being a profitable Platform leader by thorough analyses of Microsoft, Intel, Palm and other Platform leaders.

Among high-tech industries, especially, the consumer electronics industry has become severe due to the rapid growth of the Internet environment, very affordable hardware chips, open source technology, and advanced technologies. Every product of the industry has become commoditized very rapidly due to the emergence of such digital technologies. In addition, the fusion of PC technology and home appliance technology, and the integration of broadcasting, communication, and the Internet have made the consumer electronics industry change very fast. Adapting to this rapid changing of industry circumstances, the characteristics of consumer electronics products have changed from “single products” to “products with network capability,” and the usage of home electronics appliances also has drastically changed by connecting “products with network capability” with each other. For instance, a user can enjoy any kind of video content stored in a “home video server” anytime. A user can transmit data from a home appliance to another home appliance through home network very easily.

Under such circumstances, several players, which aimed to be sustainable Platform leaders in the consumer electronics industry, proposed numerous technologies to realize easy and
smooth interoperability among consumer electronics products of different firms. We can find many examples of those technologies or proposals for standards such as USB, i.Link, Ethernet, Wi-Fi, Bluetooth, HAVi, Internet Home Alliance, and ECHONET. Among many trials by many players desiring to be sustainable Platform Leaders, only a few succeeded. And there were very few cases in which a product successfully became a dominant design in the home electronics industry and which brought the proposing company great profitability and sustainability such as Intel, Microsoft, and Palm successfully have enjoyed.

In this paper, I redefine key success factors for consumer electronics firms to be able to be profitable and sustainable Platform Leaders especially in the “home network platform business.” I explore how to let a company’s own technology and business model become a dominant design in the home network business, how to establish a successful Platform business with the dominant design, and how to keep sustainability and high profitability of the Platform business as a Platform leader. Concretely, based on Platform Leadership levers defined by Cusumano and Gawer, I define the Enhanced Platform Leader Model as newly redefined key success factors for being a successful Platform leader, by analyzing past successful and unsuccessful business examples of new home network businesses.

In Chapter 2, I summarize the Platform Leader key success factors defined by Cusumano and Gawer. And I redefine new key success factors, Enhanced Platform Leadership Model: EPLM, through analyzing past successful and unsuccessful Platform businesses of consumer electronics businesses. In EPLM, I introduce key success factors with five important categories and eight levers.

In Chapter 3, I explore which levers out of eight a Platform leader should focus on the most during the time frame of a Platform business cycle.
In Chapter 4, I define what kind of architecture is the most appropriate to establish a successful Platform business, by analyzing several academic theories, actual technology development examples, and recent trends of technology development environments. Here, I propose a new idea about the relationship with modular architecture and innovations by arguing Christensen's innovation model.

In Chapter 5 and Chapter 6, I analyze and discuss two past cases of businesses that became successful and unsuccessful in the Platform business respectively. In those chapters, I analyze whether or not the EPLM is appropriate to indicate new key success factors for Platform leader business.

In Chapter 7, I propose appropriate business strategies for being the Platform leader for an actual future home network business case, *Near Field Communication NFC*, which Sony Corporation, Nokia Corporation, and Royal Philips Electronics started in 2004. Currently, NFC is thought to be a high-potential home network technology, but NFC's actual business has not been started yet.

In Chapter 8, I summarize this paper and make a conclusion about newly defined key success factors, *EPLM*, necessary for becoming a sustainable Platform leader for the future home network business.
2. Enhanced model for successful Platform Leadership in the home network business

In this chapter, I summarize the Platform Leader key success factors defined by Cusumano and Gawer. And I define new key success factors, Enhanced Platform Leadership Model: EPLM, through analyzing past successful and unsuccessful Platform businesses especially in the home network business. The newly defined EPLM is based on the key success factors proposed by Cusumano and Gawer in the book, Platform Leadership. In EPLM, using original theory, I introduce key success factors with five new important categories and eight levers.

2.1. Platform and Platform Leadership

The very profitable high-tech $10 billion revenue companies, such as Intel, Microsoft, Palm, NTT-DoCoMo, and Sony PlayStation, have an obvious commonality: they successfully established profitable Platform businesses taking advantage of their dominant technologies or business models in their industries even if the businesses were relatively young. Interestingly, those great rapidly grown players or businesses are definitely not for so-called “old industries” such as the automotive industry and heavy manufacturing industry but for so-called “new industries” such as the mobile communication industry, high-tech home electronics industry, and Internet industry.

Intel enjoys the dominant position in production of CPU, which is the brain of a PC, and Microsoft monopolizes the operation system, Windows. NTT-DoCoMo dominates with i-mode, which is an Internet-accessible software platform for mobile communications, and Sony PlayStation enjoys the monopoly with PlayStation game platform in the worldwide game industry. All these successful players keep their platforms, which competitors can rarely imitate. All these successful Platform leaders control their “new ecosystem” by successfully
locking in numerous complementors on their sustainable platforms. Cusumano and Gawer defined a Platform as “an evolving system made of interdependent pieces that can each by innovated upon.” The approach of those successful platform leaders makes it possible for the platform leader and complementors to make innovations at increasing speed, and made the “new ecosystem,” which the Platform leader established, very sustainable in the longer term. In this paper, I name the business model or technology that is the heart of its “new ecosystem” the “Platform,” and the primary promoter, who establishes and evolves Platform business, the “Platform Leader.”

The typical positive spiral, which can be seen in successful Platform business, is depicted in Figure 2-1.

![Figure 2-1 Self-Reinforcing Cycle of Installed Base and Availability of Complementary Goods](Source: Schilling, M. A., *Strategic Management of Technological Innovation*, Mcgraw-Hill College, 2005)

The success of a Platform business means that the Platform leader successfully established the above reinforcing loop in the new ecosystem that the Platform leader established.

A Platform leader can benefit from the innovations which its complementors made. In addition, a Platform leader and its complementary innovators collaboratively are able to make the ecosystem larger, turning it into a new industry itself. According to Figure 2-1, the more products complementors provide, the higher the Platform’s value will be. Indeed, this
reinforcing phenomenon explains the rapid growth of the Platform business that Microsoft and Intel realized in their own new industry.

Cusumano and Gawer describe the roles which Platform leader has to pay attention as the following.

- Focus on expanding the “pie”
- Maximize their own profits or market share

In order to play the above roles, the Platform leader especially has to do the following the three most important things at the same time.

- Drive architectural and systemic innovation
- Stimulate innovation by complementors
- Coordinate the ecosystem

2.2. **Annabelle Gawer and Michael A. Cusumano’s frame work**

In the book, *Platform Leadership*, Cusumano and Gawer used thorough analyses of Microsoft, Intel, Palm, NTT-DoCoMo, and open source Linux to define the four most important levers which Platform leaders have to take care of when establishing and evolving the Platform business.

- **First Lever:** Scope of the Firm
- **Second Lever:** Product Technology
- **Third Lever:** Relationship with External Complementors
- **Fourth Lever:** Internal Organizations
Cusumano and Gawer say, “We believe that each of these levers is critical for achieving or sustaining platform leadership. The Four Levers cover both strategy formulation and implementation issues, which are intertwined.”

2.3. **Enhanced Platform Leadership Model (EPLM) for home-network technology and business**

2.3.1. **Definition of EPLM**

In this paper, I redefine the most important key success factors for becoming a sustainable Platform leader in the next-generation home-network business of the consumer electronics industry, which has been especially competitive and where the speed of technology shifts has been very rapid compared to that of other industries. The new key success factors are called Enhanced Platform Leadership Model (EPLM) in this paper.

EPLM was defined by the analyses of recent failures of home network technology or business model such as HAVi, i.Link and Jini, in addition to the context which Cusumano and Gawer originally defined in *Platform Leadership*. I evolved their Four Levers to EPLM. Concretely, I defined Five Categories, which are more MECE, mutually exclusive and collectively exhaustive, than Four Levers by Cusumano and Gawer, and Eight Levers, which belong to one of the Five Categories. Four Levers of Cusumano and Gawer are included in the Eight Levers of EPLM, which is depicted in Figure 2-2.
5 Categories to succeed in a new Platform business

- Innovative Idea
- Competences for Platform Management
- Competences for Internal Management
- Commitment to be Platform Leader
- Competences for External Management

8 Levers to succeed in a new Platform business

- Lever 1: Innovative Technology or Business Model
- Lever 2: Product Technology
- Lever 3: Competences to Manage Platform
2.3.2. Five Categories and Eight Levers

All these eight levers included in five categories are crucial for a would-be Potential Platform leader to use to establish a new home network business, evolve it, and make it sustainable in the longer term. Especially, we can learn a great deal from examples of failures. When I compare the successful and unsuccessful Platform businesses, I find that there are many cases in which unsuccessful firms seem not to have paid attention the Eight Levers of EPLM equally. On the other hand, it is obvious that successful Platform leaders seem to have covered most of all eight levers well. The analyses of actual cases are described in Chapter 5 and Chapter 6 in detail.

I explore whether EPLM is appropriate to depict key success factors for both strategies and implementations on which a company desiring to be a Potential Platform leader has to focus.

2.4. Eight Levers in EPLM

2.4.1. Lever 1 Innovative technology or business model

To enjoy dominant Platform business, the potential Platform leader first has to have an innovative technology or innovative business model which could be the core of Platform business. Without at least either innovative technology or an innovative business idea, a Platform leader cannot even establish a Platform business from the beginning. Especially, the
possibility to establish sustainable Platform business looks better when the potential Platform leader has innovative technology rather than an innovative business idea. The CPU of Intel, Windows of Microsoft, Emotion engine and game console of Sony PlayStation and Compact Disk format of Sony and Philips were very advanced and sophisticated Platform technology rather than business models. Of course, even if the success rate is not so high compared to the case of having innovative technology, i-mode of NTT-Docomo, Palm OS of Palm, and Internet working Operating System (IOS) of Cisco Systems were very innovative business ideas which became sustainable Platform businesses. But the greater the degree of innovativeness of the technology the potential Platform leader has in the beginning, the higher the success rate of Platform business will be, because more innovative technology is more difficult to imitate.

Analyzing successful Platform businesses, I found that innovative technology or an innovative business model require the following characteristics, which Cusumano and Gawer also point out.

- The innovative technology or business model should not be a completed product or service but be the heart for completed products or services. (The unsuccessful case, which did not follow these characteristics, is discussed in Chapter 6.)
- The innovative technology or business has to a core part of a system which evolves continuously.

An obvious tendency of successful Platform businesses is that the Platform leader successfully locks in numerous complementors firmly through their innovative technologies or business ideas. This phenomenon of business success has been described by Arnoldo C. Hax of MIT as the Delta Model, the essence of which is depicted in Figure 2-3.
In the Delta Model, even if it doesn’t refer to the success of Platform leader, to enjoy sustainable business requires a company to move from the position of Best Product, to the position of Total Customer Solution, and finally to the position of System Lock-in in its business along the triangle. To succeed, the firm needs better products first. Then, the firm has to build strong relationships with customers, and finally the firm should aim to have complementors and infrastructures locked in around the firm. As the Delta Models represents insightfully, to make efforts to be a market leader in its ecosystem, as a result, the Platform leader has to keep the good position as a technical leader as well. In other words, taking both technical leadership and market leadership are fundamentally important to be a sustainable Platform leader as a whole. In any case, the potential Platform leader has to have its own innovative technology or business model first.

2.4.2. Lever 2 Product Technology

This lever corresponds with Lever 2 defined by Cusumano and Gawer. They say that the success of the Platform business largely depends on how it handles its architecture, interfaces, and intellectual property. The degree of modularity of the core platform architecture and the
degree of openness of the interfaces to the platform, and how to disclose the information of platform to outside firms are sensitive and important issues. The degree of openness of these parameters might weaken or strengthen the position of the potential Platform leader.

2.4.2.1. Controlling Architecture

Most importantly in terms of handling platform architecture, the Platform leader has to control its own core architecture all the time. It is controversial, but to provide complementors with complete modular type architecture, with which it is possible to do plug-and-play freely is the most appropriate way for Platform leader. I discuss this point more deeply in Chapter 4. The Platform leader has to avoid redesigning the whole system every time it updates its core architecture by choosing complete modular type architecture from the beginning, because complementors hate to adapt their complementary products to all versions of core platform architecture in each case. In such a case, the Platform business would fail immediately.

In the book, *Platform Leadership*, there is an example of how Intel handled this issue effectively. To introduce the PCI-bus as the peripheral bus of Intel’s CPU, Intel provided complementors with the PCI-bus specifications so that any PC manufacturer and any complementors could plug-in their complementary products into the PCI-bus the same way anytime. And Intel focused on designing the PCI-bus not to make outside players change their products’ design every time the PCI specification was updated. Intel says that redesigning the whole system cannot be allowed every time the version of the CPU is changed. Under such consideration, Intel designed the core architecture of the PCI-bus very carefully from the beginning.
On the other hand, I believe that the integrated architecture, which is opposite the modular type architecture, is not appropriate for the platform, because to make complementary products on integrated architecture would be costly and technically difficult due to the unstable interfaces between the platform and outside parts. For this reason, a Platform leader must not use integral architecture in the first place. Cusumano and Gawer describe how the successful Platform leaders seem to keep their technical competitiveness by establishing modular type architecture and opening all the information about the interfaces between the platform and outside parts. To focus on this sensitive issue about the degree of the modularity of the architecture and the openness of the interfaces seem to require the potential Platform leader to do very costly activities, but it is an important investment for the future success of the Platform business.

In terms of controlling its core architecture, what the potential Platform leader should do is design modular type architecture from the beginning, and to try not to cause any technical conflicts between the version of core architecture the Platform leader provides and the version of outside modules complementors provide. The comparison of modular type architecture and integral architecture is discussed in Chapter 4 in detail from different points of view.

2.4.2.2. Controlling Interfaces

As described previously, a Platform leader has to manage the interfaces between the core platform module it provides and outside modules complementors provide from the beginning to the end of the Platform business. In addition, the interface has to be reasonably open so that as many complementary firms as possible can make innovations on the Platform. If the
interfaces aren’t open properly in order to protect the technology of the Platform leader, the worth of the platform module might become much lower.

As described in Platform Leadership, Intel never tried to earn profits by making its own technologies, the PC architecture and interfaces, proprietary. Rather, Intel focused on making sure all interfaces were open to any outside firms.

On the other hand, a Platform leader has to be very careful of duplications of its technology by making the interfaces open beyond necessity. If outside firms can do reverse engineering of its core architecture by knowing the interfaces in detail, the Platform leader has to reconsider carefully whether or not to do so.

Technically, once the interfaces are fixed even in the beginning of the platform business cycle, the Platform leader will be tied up with open interfaces. Therefore, the interfaces have to be well prepared from the beginning, and the specifications of the open interfaces have to be available for longer terms, keeping the original structures.

2.4.2.3. Controlling intellectual property

A Platform leader has to manage most appropriately the strategies concerning intellectual property for its own core architectures and systems. In general, high-tech firms should file patents for any new technologies so that the firms can lock out competitors by gaining intellectual property rights faster than others. However, in the case of potential Platform businesses, it would be much more complicated. A potential Platform leader cannot establish its successful and sustainable position by only protecting intellectual property. As all successful Platform leaders did, the potential Platform leader has to enable complementors to
use intellectual properties by opening its own technologies. Probably, opening intellectual properties freely is the best strategy for Platform leaders. There are three reasons for this.

➢ To stimulate any outside complementors to develop innovations by freely using the intellectual properties the Platform leader provides
➢ To lock out competitors which are trying to create standard technologies that are similar to technologies with which the Platform leader is going to establish a new platform business
➢ To give incentives to complementors to stay in the ecosystem the Platform leader is trying to expand.

In conclusion, a Platform leader basically should freely open the intellectual properties so that complementors can take advantage of them to make innovations. However, the Platform leader has to file patents of any new technologies regarding the core architecture, interfaces, and systems before starting the Platform business to keep its technical bargaining powers against all outside players.

2.4.3. Lever 3 Competences to Manage Platform

This is a new lever not included in the Four Levers of Cusumano and Gawer. A Platform leader has to keep competences internally to establish Platform business, to lock in complementors, and to sustain the Platform business for longer terms. To do so, the Platform leader has to do the following.

➢ Make a clear vision and advocate the visions both internally and externally
➢ Keep very high technical capabilities from the Platform fluid phase to the Platform mature phase
➢ Manage the entire ecosystem with an appropriate process
By keeping the above competences, the Platform leader can evolve the Platform business securely and make it sustainable.

2.4.3.1. Advocating and implementing a clear vision

A Platform leader has to make a clear vision about which kind of Platform business the leader is going to establish internally and externally. In *Platform Leadership*, Cusumano and Gawer also conclude the following. “The essence of platform leadership begins with a vision that extends well beyond the business operations of one firm or the technical specifications of one product or one component. It is a vision that says the whole of the ecosystem can be greater than the sum of its parts, if firms work together and follow a leader. The vision and decisions of platform leaders can affect not only the immediate competitive environment but also the evolution of technologies and entire industries.” By keeping advocating clear visions consistently for longer time periods, the Platform leader can provide the sense of security which encourages complementors to make more innovations in the ecosystem.

2.4.3.2. High technical competences

A Platform leader has to keep very high technical capabilities internally to evolve its core architecture, interfaces, and entire system from the Platform fluid phase to the mature phase. High technical capabilities are mandatory for the following purposes.

- To professionally define and design its core architecture and interfaces between its core platform and complementary products
- To make its own platform technology difficult for competitors to imitate
- To make complementary products by the Platform leader if necessary to evolve the ecosystem more effectively
➢ To keep stronger technical bargaining power against complementors
➢ To develop tool kits for complementors to develop complementary products more easily and effectively

Intel, Microsoft, and Sony keep very high technical capabilities not only to provide platforms but also to provide complementary modules and products to customers. In addition, those leaders provide professional tool kits for complementors so that they can develop complementary modules or products easily. In Sony’s PlayStation2 business, Sony prepared several tool kits for software game vendors to develop innovative games that effectively work on the technically sophisticated game CPU, Emotion-Engine. To play both roles to provide core architecture and complementary products is important in terms of not only keeping the leader’s technical capability but also keeping the driving force of the entire ecosystem and establishing credibility in the targeted industry. However, launching both the Platform core module and complementary products by the Platform leader might cause conflicts internally and externally in some cases. I discuss this point later.

2.4.3.3. Managing appropriate process

There is a cardinal rule of process that the Platform leader has to facilitate to sustain a huge Platform business properly. In the book, Platform Leadership, Cusumano and Gawer found the following pattern of appropriate process for Platform leaders.

➢ After designing specifications of the interfaces, the Platform leader should work for standardization with a very limited number of complementors, which are called “rabbits.” The smaller the number of complementors is, the better, because important decision making can rapidly proceed.
After completing standardization, the Platform leader should collaborate with potential outside complementors as many as possible to give fixed information about interfaces.

To play the role of a key coordinator in the ecosystem, the Platform leader definitely needs strong communication capabilities as well.

2.4.4. Lever 4 Scope of the Firm

This lever is corresponding with Lever 1 defined by Cusumano and Gawer. They say, “This levers deals with that the firm does inside and what it encourages others to do outside.” A Platform leader has to consider the most appropriate common ground for this boundary. But this exactly depends on the type of Platform business. The Platform leader decides first whether it wants mainly to make complementary products or to provide its own core platform. In Chapter 6, I discuss this point in detail using the case of Sony, which pursued both roles and failed in the Platform business.

This decision is crucial because it is directly related to competences, future plans, and visions that the Platform leader has to consider.

2.4.5. Lever 5 Internal Organization

This lever corresponds with Lever 4 defined by Cusumano and Gawer. “This lever allows platform leaders and wannabes to use their internal organizational structure to manage external and internal conflicts of interest more effectively.” External and internal conflicts happen when the complementary products which outside complementors develop are the same as those the Platform leader launches. In this case, the Platform leader has to manage internal and external organizations effectively not to discourage related players and not to
lose the credibility the Platform leader has to keep. The Ethernet PCI card of Intel and DTP application software of Microsoft are examples of the conflict that happened outside of the Platform leader. In addition, Cusumano and Gawer point out that there are more cases of internal conflicts which happen between divisions that develop core architecture of the Platform and divisions that develop complementary products in the same company. Especially, these internal conflicts happen more frequently in bigger company such as Intel, Microsoft, and Sony rather than smaller firm such as Palm and NTT-Docomo.

In order to manage these internal and external conflicts properly, the Platform leader should do the followings.

➢ Cultivate managers and organizations internally to be able manage this problem
➢ Have firm’s principles when conflicts happen from the beginning to manage this problem
➢ Establish an internal culture to encourage discussions between divisions that conflict with each other

Most importantly, the Platform leader has to avoid losing the credibility that is necessary to establish a new ecosystem with outside complementors collaboratively.

2.4.6. Lever 6 Commitment

This is a new lever not included in the Four Levers of Cusumano and Gawer. To establish a successful and sustainable Platform business for longer terms, the Platform leader has to consistently commit to make efforts to evolve the Platform business externally. The essence of the Platform business is that the primary objective which the Platform leader has to pursue is not to earn profits by selling its own products, which include its own platform technology, but to encourage outside complementors to make innovations around the Platform securely.
This is a fundamental difference between a short-term business selling its own products and a long-term Platform business. To do this effectively, the Platform leader needs to devote itself to evolve the Platform business by sometimes sacrificing its own short-term benefits. Especially, the Platform leader needs to make a commitment not to invade the business category of its complementors. As Chapter 6 shows, Sony didn’t pay attention to this issue in its high-speed serial bus, i.Link, business. In addition, the past unsuccessful firms that tried to establish a Platform business on home-network environments seem to have failed due to their lack of longer-term commitments. In contrast, Intel successfully kept commitments to nurture its ecosystem by disclosing private information about the product road map, sending talented engineers and marketers to transfer technical expertise and share knowledge about the market, and making equity investments in key third parties to give incentives to make innovations on Intel’s PC architecture.

Based on the above examples, potential Platform leaders should do the following to show commitments externally.

- Keep any formal and informal promises made with complementors, whatever the reasons are
- In some cases, spend money explicitly not for their own matters but for the entire ecosystem
- Keep distributing key technical and business information continuously to complementors
- Assign very skilled engineers, managers, and marketers as promoters when communicating with potential complementors

The Platform leader has to commit internally and externally, and implement its Platform business by preparing itself for longer term commitment rather than reacting nervously to short-term profits.
2.4.7. Lever 7 Credibility

This is a new lever which Cusumano and Gawer don’t have. A Platform business is exactly the business of entire ecosystem because the platform core module itself cannot bring profits. The success of a Platform business fully relies on whether or not complementors can bring innovations around the core platform. Accordingly, a Platform leader has to successfully establish win-win relationships with complementors by not pursuing own short term profits. The most important thing to encourage complementors to make numerous innovations around the Platform is to establish high credibility in the ecosystem. From the book, *Platform Leadership*, and analyses of past successful and unsuccessful Platform businesses, Platform leaders need to do the following.

- Establish a strong reputation for not impulsively and heedlessly invading the business area where complementors do business
- Clarify the boundary between business area where the Platform leader does business and where the complementors do business
- Actively play a role as an ecosystem “negotiator” who tries to solve any kind of problems that happen in the Platform business even if the problem is not directly related to the leader
- Provide complementors with a sense of security by showing that the Platform leader works not for itself but for the entire ecosystem
- Collaborate, meet, converse with complementors frequently

Due to numerous firms which have completely different own objectives in the same new ecosystem, the cost, that the Platform leader has to pay, which sometimes is not for its own profits, is typically very expensive. However, without these investments, the Platform leader cannot succeed at establishing its Platform business. If the leader does not pay the appropriate
cost for outside innovations, complementors will not have any incentives to make innovations for the leader. Craig Kinnie, Director of Intel, says, “You can’t just mandate trust. You have to earn it.”

2.4.8. Lever 8 Relationship with External Complementors

This lever corresponds with Lever 3 defined by Cusumano and Gawer. To establish a sustainable Platform business, many innovative complementary products by many complementors are necessary on the Platform. Although I already discussed many important aspects to obtain as many complementors as possible and to motivate outside firms to make innovations, the following are also important for Platform leaders.

➢ Technically, the Platform leader has to make efforts with important complementors to come to a consensus about technical standards and specifications to let the core platform and complementary products operate together smoothly.

➢ Technically, Platform leader has to make efforts to keep controlling the platform, architecture, interfaces, and other technical issues for longer terms to let the core platform and complementary products work smoothly beyond the difference of the versions of the core platform and outside modules.

It is crucial for Platform leaders to keep enough bargaining power in both technology and management aspects. To rely heavily on outside innovations which complementors bring sometimes causes a gradual loss of technical knowledge that the leader used to have when establishing the Platform in the fluid phase. Eventually, the Platform leader could lose the technical knowledge which is necessary to examine whether or not a complementary product is good enough. This tragedy could cause the absolute collapse of the Platform business. To avoid this situation, as described with Lever 3 of EPLM, the Platform leader has to keep its
technology level very high, and if necessary the leader should be prepared to develop complementary modules by itself to show the technical competences to complementors. Cusumano and Gawer explain that even if competitiveness and cooperativeness between the Platform leader and complementors are contradictory, both aspects are important, and the leader has to navigate those aspects in the ecosystem very effectively.

2.5. Brief criteria to assess the Platform leadership by EPLM

Table 2-1 shows the brief criteria to assess whether or not the strategies the potential Platform leader takes are appropriate when establishing and evolving the Platform along each lever. These criteria focus on only the most important factors which the Platform leader should consider, as described previously. These criteria are designed for not only the Platform business on home network environments that this paper focuses on but also the Platform business in other industries. Although the firm that aims to establish a sustainable Platform business need not necessarily satisfy all the criteria in Table 2-1, the more the Platform leader values these criteria, the higher the success rate of the Platform business will be.
<table>
<thead>
<tr>
<th>Competences for Platform Leadership</th>
<th>Competence</th>
<th>Description of Competence</th>
<th>Major criteria for each lever</th>
</tr>
</thead>
</table>
| **Innovative Idea**               | 1          | Innovative Technology or Business Model | - Is the technology or business model for the Platform innovative?  
- Does the Platform have a potential to create a new market or drastically expand the existing market?  
- Is the idea for Platform business difficult for competitors to imitate? |
| **Competences for Platform Management** | 2          | Product Technology | - Is the degree of modularity appropriate to gather complementors?  
- Are the interfaces between Platform and outside modules properly designed?  
- Is the degree of disclosure of interface information to complementors appropriately considered?  
(Intellectual property management) |
| **Competences for Platform Leadership** | 3          | Competencies to Manage Platform | - Can Platform Leader completely design the fundamental architecture of the Platform?  
- Can Platform Leader develop a prototype of Platform or final products that use the Platform by itself or with third parties?  
- Can Platform Leader cover all necessary important information of the Platform? or Does Platform Leader know who the best third party to do the Platform business is?  
- Can Platform Leader access necessary technology faster than any other companies?  
- Is Platform Leader willing to take any risks to establish the Platform business and Can it keep high motivation for longer term to be a successful Platform Leader? |
| **Competences for Internal Management** | 4          | Scope of the Firm | - Is the strategy about what the firm does inside and what it encourages complementors to do outside clear?  
- If so, when is the best timing to execute the strategy? |
| **Commitment to be Platform Leader** | 5          | Internal Organization | - Does Platform Leader have appropriate company culture to create new Platform business?  
- Does clear vision to be the Platform Leader penetrate the company entirely?  
- Does Platform Leader motivate active internal communication?  
- Does Platform Leader make appropriate organizations depending on the phase of Platform business cycle?  
- Does Platform Leader take advantage of appropriate process to establish Platform business? |
| **Commitment to be Platform Leader** | 6          | Commitment | - Can Platform Leader manage new business taking advantage of the platform module based on prepared commitment?  
- Can Platform Leader keep the commitment until the end of platform business?  
- Can Platform Leader pursue expansion of the entire targeted "ecosystem" rather than pursuing its own short-term profit? |
| **Competences for External Management** | 7          | Credibility | - Can Platform Leader focus on establishing win-win relationship with others rather than pursuing its own business profit? |
| **Competences for External Management** | 8          | Relationship with External Complementors | - Can Platform Leader generate technical and managerial bargaining power against all complementors?  
- Can Platform Leader make an appropriate strategy about how collaborative versus competitive the relationship between the Leader and complementors should be? |
3. **Platform Business Cycle and EPLM**

In this chapter, I explore what levers the Platform leader should pay attention to the most, and when, and what strategies of each lever should be determined until when, in a Platform business cycle. I take advantage of the “innovation life cycle” depicted by an S-curve, which was defined by James Utterback of MIT in *Innovation Dynamics*, as the “Platform business cycle”. For convenience, here I regard one innovation life cycle of the S-curve as one Platform business cycle.

Along with the Platform business cycle on the S-curve, the condition and status become different depending on the phase. Accordingly, Platform leaders have to change the strategy of which levers it has to pay attention to the most depending on the Platform business cycle phase. For instance, the Platform leader should set up some levers, but it is not necessary to focus on the rest of levers in the very early phase of the Platform business cycle. In addition, this chapter suggests which detailed strategies the Platform leader should especially focus on in the same lever depending on the Platform business cycle. For example, the Platform leader has to do something in a lever in the early stage of the cycle, but it should be careful with the other strategies in the same lever in the different stage of the cycle. This represents that even in a same lever, the Platform leader needs to change the detailed strategies to determine along with the Platform business cycle. Since the resource of the Platform leader is very limited in the real world, this idea helps the potential Platform leaders to use and shift the appropriate resources along with the Platform business cycle effectively and efficiently.
3.1. **Platform Business Cycle and S-curve**

3.1.1. **S-curve and EPLM**

In this section, I propose the framework of EPLM on an S-curve as depicted in Figure 3-1. I define the five phases in a Platform business cycle as Fluid phase, Former Transitional phase, Latter Transitional phase, Mature phase, and Next Fluid phase. Figure 3-1 represents levers the Platform leader has to focus on the most and to determine as gray in each phase of the Platform business cycle. However, it does not mean that the Platform leader does not need to value each lever, which is depicted by not gray but white, in each phase.
3.1.2. Definition of five phases in a Platform business cycle

In this section, I discuss briefly about five phases of the Platform business cycle.

3.1.2.1. Fluid Phase

This is the phase when a potential Platform leader starts providing completed products or services along with a limited number of complementors taking advantage of the leader's own innovative technology or innovative business idea. For example, in Fluid phase, Intel completed development of the CPU, PCI-bus, and chip-sets for the PCI-bus, made a limited
number of complementors develop the motherboard, PC parts, and completed PCs, and made PC manufactures start providing completed PCs to customers through complementary sales channels. In Fluid phase, Intel was deeply engaged in the standardization of the PCI-bus with its key complementors.

As a characteristic of this phase, nobody can predict whether or not the completed products that use young innovative technology or business ideas provided by the new potential Platform leader will be a dominant design that will establish a new ecosystem in the future. It is obvious that a lot of potential Platform leaders disappear in this phase in general. In addition, even if some Platform leaders are successful in shifting to the Former Transitional phase, most of them must have only small profits, and fewer complementors and complementary products.

3.1.2.2. Former Transitional phase

In this phase, the potential Platform leader starts having confidence in the future success of its own Platform business because its completed products, which use the core platform, are well sold. In addition, the core platform itself starts to be recognized as a dominant design in the industry, based on the obvious increase of complementary products and complementors. For example, in Sony’s PlayStation game business, even though no one predicted the future success of Sony’s PlayStation business when Sony launched the PlayStation game console in the traditionally competitive game industry, Sony started having strong confidence in its future great success based on the drastic sales increase of complementary software games and DVD video movies. Sony started getting the return on investment faster and faster. However, Sony still continued to make a large of investment to stimulate complementors, which
developed software games and peripherals for PlayStation business, to make innovations not for other game consoles such as Nintendo but only for Sony.

As a characteristic of this phase, the Platform business is surely recognized as a new dominant design that is going to generate a new ecosystem, and the centripetal force of the company as a Platform leader becomes stronger. However, the Platform leader still has to continue to invest to lock in more complementors into the new ecosystem.

3.1.2.3. Latter Transitional phase

The complementors, which had not decided yet to enter the new ecosystem that the new Platform leader established until Former Transitional phase, enters the new ecosystem faster and faster. In this phase, the Platform leader also launches some family core platform modules to broaden the ecosystem as a successfully established dominant design. For instance, Microsoft launched Windows95 in 1995 as the next line-up platform module of Windows. The market share of Macintosh of Apple Computer, which was a strong competitor at that time, was forced to decrease to 4% in 1998 from 8.4% in 1994. In this phase, a lot of complementors shifted to get into the ecosystem of Windows95 PC rather than the Macintosh ecosystem.

As a characteristic of this phase, the industry starts admitting that the Platform business will be able to continue sustainably in the future. In this phase, the potential Platform leader completes the first stage of large investment in developing the core platform, disclosing necessary information to outside, standardizing the interfaces, and stimulating complementors to get into the ecosystem. In this phase, as shown in Figure 2-1, the winner is naturally becoming a stronger player. Also in this phase, the family core platforms modules,
which keep original architecture and interfaces for complementary modules, are enriched; for example, Windows98, which had basically the same architecture as Windows95, was launched as the line-up OS of Windows family in 1998.

### 3.1.2.4. Mature phase

In this phase, the increase of new complementary products and complementors slows down, as does the enlargement of the ecosystem. The Platform leader fully enjoys the profitability of the Platform business. The great investment and numerous efforts in the past unstable phases were done for the Platform leader to enjoy the monopolized profitability of this phase. Complementary products and the decline of all related costs such as logistics and parts in the ecosystem, bring the maximum profit to the Platform leader and complementors in this phase. On the other hand, the functionality and the quality of complementary products that use the core platform have matured in this phase. How much longer Platform leader can enjoy this phase highly depends on the innovativeness of the first core architecture and business model that the Platform leader provided in the past Fluid phase.

In this phase, the Platform leader feels the limitations of its own Platform business in terms of quality and functionally of completed products by observing that advanced customers start requiring new functionality and higher quality, which cannot technically be realized by current core platform module. Because of this, the Platform leader starts developing new core architecture for its next Platform business. For example, when Microsoft developed Windows95 in the early 1990s, Microsoft never had imagined the unbelievably rapid growth of the Internet coming a few years later. And around 2000, Microsoft felt the strong requirements of advanced networking and security functions that could not technically be realized in Windows95 or Windows98. Microsoft was forced to drastically update the old
core platform architecture of Windows95 to the new sophisticated architecture of Windows2000 and Windows-NT to meet these newly established market requirements.

3.1.2.5. Next Fluid phase

Since most of the complementary products which use core platform architecture cannot meet the advanced customers’ requirements due to the limitation of the core platform functionality and quality, the Platform leader starts launching the more sophisticated technology and business models to establish a new ecosystem from the beginning again. The core architecture and the interfaces are drastically renewed—for example, as Microsoft changed old API to a more complex and sophisticated API, Win32API, and most complementary products have to be redesigned to meet new platform architecture specifications again. As a result, the Platform leader has to make a large investment again for stimulating complementors to develop innovations and for other related costs. This is the start of a new Platform business cycle.

3.2. Eight levers during the Platform business cycle

In this section, I discuss which strategies the Platform leader has to focus on in each lever during the Platform business cycle. Even in the same lever, the strategies the Platform leader has to pay attention to the most, has to determine, and has to implement are different in the timing of the Platform business.

3.2.1. Lever 1 Innovative technology or business model

The most important factor for starting a successful Platform business is to have an innovative technology or an innovative business model first. To do so properly is crucial in the Fluid phase, and the Platform business never starts without this. The Platform leader has to
complete the development of the Platform core architecture, which includes an innovative technology or a business model, within the Fluid phase. The Platform leader has to focus most on this lever in the Fluid phase and the Next Fluid phase.

3.2.2. **Lever 2 Product Technology**

This lever is related to the management and control of the core architecture, interfaces, and intellectual properties to lock in complementors and stimulate the innovations of complementors more effectively and efficiently. The Fluid phase and the Former Transitional phase are very important phases for this lever. In the Fluid phase, the Platform leader has to develop a modular type of platform architecture and define the open interfaces collaboratively with a limited number of key complementors. In addition, the Platform leader has to complete filing all potential patents in the Fluid phase. On the other hand, in the Former Transitional phase, the leader should concentrate its efforts on standardization of the interfaces to be able to lock in as many complementors as possible. In addition, the leader needs to make a large investment to let more complementors know about the open interfaces through several costly marketing activities. How well does the leader handle the issue of intellectual properties in the Former Transitional phase? Does it provide intellectual properties for free or for some license fees? It depends on the type of Platform business. The important thing for the leader is to take actions ideally for the clear objectives to lock in more complementors and to make complementors develop innovations in the Former Transitional phase.

3.2.3. **Lever 3 Competences to Manage Platform**

This lever is for the leader to advocate clear visions internally and externally, to keep high technical competences, and to play the role of the most appropriate process for establishing
sustainable Platform business in the future. The leader has to sustain these competences from the Fluid phase to the Next Fluid phase consistently all the time.

The leader needs to advocate clear visions to develop an innovative technology or a business model internally in the Fluid phase. In the Former Transitional phase and the Latter Transitional phase, the leader should keep the visions externally to lock in more complementors and motivate them to develop innovations so that the prosperity of the new ecosystem can bring profits to complementors rather than to the leader.

The leader needs strong technical capabilities to invent the platform architecture and the useful interfaces in the Fluid phase. Also in each of the following phases, stronger technical capabilities are required to control the leader's own platform architecture and the interfaces, to develop tool kits to let complementors develop innovations, and to develop line-up platform architectures to broaden the new ecosystem. In addition, in the Former Transitional phase and the Latter Transitional phase, the stronger technical competences are especially mandatory to develop leader's own complementary products to stimulate complementors and to broader the ecosystem as well.

The leader has to manage the appropriate process to standardize the interfaces with a limited number of key complementors in the Former Transitional phase, and to collaborate with as many complementors as possible in the Latter Transitional phase.

3.2.4. Lever 4 Scope of the firm

This lever is used to find out the most appropriate boundary between the domain which the Platform leader should focus on and that which outside firms should focus on. This decision
highly depends on the type of Platform business the leader finally aims at and the resources
the leader has internally at the moment. Accordingly, the leader has to determine the most
appropriate boundary at latest before the Former Transitional phase begins. However, like the
case of IOS business by Cisco System, the leader in some cases (depending on the type of
Platform business) has to have capabilities to decide this boundary very flexibly regardless of
the Platform business phases, by carefully watching the circumstances such as the rapidly
changing Internet industry.

3.2.5. Lever 5 Internal Organization

Lever 5 is about the competences to manage internal and external conflicts, which happen
due to the leader developing the same type of complementary products as those of outside
firms. These conflicts are especially likely to happen in the Former Transitional phase and the
Latter Transitional phase before the Mature phase.

3.2.6. Lever 6 Commitment

This lever is used to commit to take responsibilities consistently to make the Platform
business sustainable. The commitment has to be made externally especially in the Fluid phase
when the first completed products which use the Platform are launched, in the Former
Transitional phase when the leader starts locking in complementors, and in the Latter
Transitional phase when the leader focuses on gathering as many complementors as possible
and broadening the ecosystem. Of course, to commit clearly is also important in the Next
Fluid phase when starting the new Platform business as well. The Platform leader needs to
make a commitment externally to prosper the ecosystem in the longer term, not for the leader
but for complementors, by giving up its own profits in these phases in the earlier phase.
3.2.7. **Lever 7 Credibility**

This lever is for the leader to establish credibility by several efforts not to betray complementors as a master planner through all the phases. To establish credibility in the ecosystem, the leader has to make efforts especially in the Fluid phase, in the Former Transitional phase, and the Latter Transitional phase as well as the phases the Platform leader has to focus on those in Lever 6. To manage different types of firms that are forced to aim in the same direction in the newly established ecosystem is very costly. Especially in the Fluid phase and the Former Transitional phase when nobody can predict the future success of the Platform business, the leader needs to keep investing huge amounts to give a sense of security to outside potential complementors. In the case of Sony’s i.Link business, which is high-speed serial bus technology described in Chapter 6, Sony seems not to have made these efforts enough to establish the credibility in the Former Transitional phase. Consequently, regardless of its technical sophistication, Sony could not lock in many complementors effectively, and i.Link did not become a dominant design of home network environments.

3.2.8. **Lever 8 Relationship with External Complementors**

This lever is related to a leader’s efforts to encourage outside firms to develop as many innovative products as possible on the Platform. These efforts are deeply connected to those of Lever 3 and Lever 7. As well as these levers, the leader should make efforts as effectively as possible in the Former Transitional phase and the Latter Transitional phase. Most importantly in this lever, the leader has to keep stronger technical capabilities to keep strong bargaining power against outside complementors to enhance the ecosystem effectively and efficiently.
3.3. Summary and Conclusions

In this chapter, I explored what levers the Platform leader should pay attention to the most, and when, and what strategies of each lever should be determined until when, in a Platform business cycle depicted by an S-curve. I defined the five phases in a Platform business cycle as Fluid phase, Former Transitional phase, Latter Transitional phase, Mature phase, and Next Fluid phase. In addition, this chapter suggests which detailed strategies the Platform leader should especially focus on, determine, and implement in the same lever depending on the phase of the Platform business cycle.
4. Strategy for establishing Platform architecture

Which type of architecture for the platform is the most appropriate to aim to establish a sustainable Platform business in the future, the integral type of architecture or the modular type of architecture? In which aspects is one or the other architecture superior? This is a controversial topic in the actual business site and also in the academic site. Even though I already proposed that the Platform leader should design and develop the modular type of architecture rather than integral type of architecture in order to establish sustainable in Chapter 2, I would like to discuss this issue more deeply in this chapter. I compare some ideas given by some professors first, and evaluate this topic quantitatively using an actual recent business case in Sony Corporation. In addition, I discuss this topic taking advantage of many aspects of information about the current trend of technology development environments. Then I propose a new notion about the relationship between innovations and the platform architecture. Finally, I propose which type of architecture is the best for Platform business and when to start.

4.1. Modular architecture and Integral architecture

Before comparing the two architectures, I define the modular type of architecture and the integral type of architecture.

4.1.1. Modular Architecture

As shown in Figure 4-1, the modular architecture is a system that is composed of several separate modules. The modular architecture has the following characteristics.

➢ A completed system has more than one module internally.
Each internal module can be replaced without changing the interface between modules. By replacing a module with a different module, the system can become different as a whole. This replacement is the essence of "line-up products."

The specifications of the interfaces between modules are open and are kept the same for longer terms.

The specifications of the interfaces generally are guaranteed and controlled by a firm or a community, which lead the standardization of interfaces.

 PCI-bus, ISA-bus, USB, WiFi, and Win32-API are typical examples of interfaces. However, even if a firm developed a sub module that keeps the specifications of interfaces to attach the module to a system, it doesn't mean that the proper operation of the entire system is also guaranteed.

Recently there are a lot of home electronics products that take advantage of the modular architecture, such as MP3 player, PC, digital still camera and others. Figure 4-2 shows a typical home electronics product's architecture that uses the modular architecture following the above definition.
To evaluate the modular architecture issue more deeply, I explain the typical architecture of a home electronics product such as televisions, digital still cameras, or VCRs which use the modular architecture depicted in Figure 4-2.

A typical home electronics product consists of a hardware layer, device driver layer, kernel layer, and application layer, as shown in Figure 4-2. For example, each hardware device is operated by a device driver through standard interfaces such as PCI-bus, RS-232c or others. The application software takes advantage of the services of the operation system using API, which is an open and standard interface, prepared in OS or Kernel. Some application software modules are also connected to openly prepared software modules such as network service module, GUI service module, and others via open API interfaces. In addition, the modules of application software are connected to each other by openly prepared API or communication protocol interfaces. In practice, it is unrealistic to replace the Kernel module or OS module because they are the heart of a system, but application software modules and

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**Figure 4-2 A typical system using modular architecture of home electronics appliances**

Source: Author, 2006

<table>
<thead>
<tr>
<th>Hardware Layer</th>
<th>Device Driver Layer</th>
<th>Application Software Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware1</td>
<td>Device Driver1</td>
<td>Application Software1</td>
</tr>
<tr>
<td>Hardware2</td>
<td>Device Driver2</td>
<td>Application Software2</td>
</tr>
<tr>
<td>Hardware3</td>
<td>Device Driver3</td>
<td>Application Software3</td>
</tr>
<tr>
<td>Hardware4</td>
<td>Device Driver4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device Driver Layer</th>
<th>Application Software Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open API</td>
<td>Open API</td>
</tr>
<tr>
<td>Software Service1</td>
<td>Software Service2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kernel and Modules Layer</th>
<th>Kernel or Operation Systems</th>
</tr>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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hardware modules can be replaced with different modules if the new modules follow the specifications of the particular interfaces. In a similar fashion, a home electronics product which has the modular architecture shown in Figure 4-2 can be easily upgraded to a high-end product by adding some hardware modules or some application modules without changing other parts of the system if the added modules follow the specifications of each standardized interface.

4.1.2. Integral Architecture

The integral architecture is sometimes called “interdependent architecture” or “closed architecture.” The typical integral architecture is shown in Figure 4-3.

The integral architecture has the following characteristics.

- A system has several modules in some cases, or no modules in other cases. It does not matter whether or not there are modules inside the system.
- Since the architecture is interdependent, internal parts cannot be replaced easily.
- If some internal parts are replaced, the operation of the entire system is not guaranteed at all. Evaluations of all functions and quality of the total system level are required again.
- Typically every specification in the system is proprietary and not open.

As a typical example of the integral architecture, the mainframe computer developed by IBM in the 1960s had the integral architecture. At that time, IBM proprietarily developed the main frame computers alone by vertically integrating organizations. Only the engineers of IBM were able to modify even a tiny part of the mainframe computers.
4.2. Some academic ideas about Platform architecture

In this chapter, I refer to some academic ideas about appropriate platform architecture to establish innovations proposed by MIT and Harvard professors. I take advantage of the ideas of Michael A. Cusumano, Clayton Christensen, and James Utterback to compare.

4.2.1. Gawer and Cusumano’s idea

In the book, Platform Leadership, Gawer and Cusumano make a point that the appropriate architecture that a Platform leader has to consider when establishing a successful Platform business in the future is a modular architecture rather than an integral architecture as briefly shown in Table 4-1.
Table 4-1 Cusumano’s idea for the ideal architecture for successful Platform business

<table>
<thead>
<tr>
<th>Modularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modular designs can reduce the costs of innovation for outside firms and encourage the emergence of specialized companies that may invest heavily and creatively and creatively in complements</td>
</tr>
<tr>
<td>Success firms need to build modular architecture and openly disclose external interfaces necessary to create complements</td>
</tr>
<tr>
<td>Nonmodular or &quot;integral&quot; architectures can make it more expensive and technically difficult to create complements because of the many system and interface issues that arise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>For a modular architecture to encourage third-party innovation, the interfaces should be open</td>
</tr>
<tr>
<td>Disclosing information about interfaces is a powerful way to encourage external innovation. But, disclosing too much may also</td>
</tr>
</tbody>
</table>

Gawer and Cusumano explain that the most important things for Platform leaders to consider are how to obtain as many complementors as possible, and how to stimulate those complementors to develop more innovations. To do so properly, the platform architecture has to be the modular type of architecture if possible, and the interfaces between core platform modules and outside complementary products have to be overhauled neatly and opened fully by the Platform leader. In addition, Gawer and Cusumano strongly propose that the modular type of architecture should be developed from the beginning, the Fluid phase. They also say that this type of architecture enables the Platform leader to lock in complementors in earlier phases and to establish a more sustainable Platform business.

4.2.2. Christensen’s idea

In his book, The Innovator’s Solution, Clayton M. Christensen of Harvard Business School defines the appropriate platform along the innovation cycle. In Figure 4-4, as Christensen defined, the innovation performance, driven by both an integral architecture and modular architecture, is represented. With these two lines, he describes that the integral architecture is
superior to modular architecture in term of both its quality and functionality on any time axis.

**Figure 4-4 Product architecture and integration in an innovation cycle**


In addition, he defines the characteristics of the modular architecture and the integral architecture in several aspects such as functionality, quality, and optimization, time to market, responsibility, convenience, flexibility, and cost.
Table 4-2 Characteristics of the modular architecture and integral architecture

<table>
<thead>
<tr>
<th>Features</th>
<th>Appropriate architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionality</td>
<td>Integral Architecture</td>
</tr>
<tr>
<td>Quality</td>
<td>Integral Architecture</td>
</tr>
<tr>
<td>Optimization</td>
<td>Integral Architecture</td>
</tr>
<tr>
<td>Time to market</td>
<td>Modular Architecture</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Modular Architecture</td>
</tr>
<tr>
<td>Convenience</td>
<td>Modular Architecture</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Modular Architecture</td>
</tr>
<tr>
<td>Low Cost</td>
<td>Integral Architecture</td>
</tr>
</tbody>
</table>

As shown in Table 4-2, Christensen explains that the integral architecture is more suitable for functionality, quality, optimization, and cost aspects rather than modular architecture is. On the other hand, modular architecture is superior in terms of time to market, responsibility, convenience, and flexibility aspects.

In addition, Christensen defines about the most appropriate architecture along with time axis as followings. In Figure 4-4, from the beginning of the innovation cycle to the point where the technology catches up to customers’ needs, namely in the first half of the time period when the customers’ needs are higher than the advancement of technology, integral architecture is better than modular architecture. However, he also says that in the latter half of the time period when the advancement of technology is higher than customer’s needs, modular architecture is better than integral architecture. Christensen makes a point that in the first half time frame of the innovation cycle, the firm is likely to concentrate on launching superior products to cause innovations with integral architecture. This reason comes from his premises that integral architecture is a better way to develop more sophisticated products in terms of functionality and quality modular architecture, as shown in Table 4-2. On the other hand, in the latter half of the innovation cycle, when the advancement of the technology...
becomes higher than customers’ needs, he proposes that the modular architecture is more appropriate because customers start requiring flexibility, time to market, and responsibility rather than quality and functionality as shown in Table 4-2.

The topic of this chapter is to define which type of architecture for the Platform business is the most appropriate to establish a sustainable Platform business and when to start the appropriate architecture in the Platform business cycle. As I explained previously, the idea of Christensen is not for the Platform business cycle but the innovation cycle in general. Therefore, it is not exactly appropriate for me to compare Cusumano’s idea and Christensen’s idea directly here. However, if I assume that the insight context of “innovation cycle” is the same as that of “innovation cycle in case of new Platform business,” it is possible to compare Cusumano’s idea and Christensen’s idea. In this sense, their points about appropriate architecture for the innovation for a Platform business are completely different. I discuss this more deeply in a later section.

4.2.3. Utterback’s idea

4.2.3.1. Product Family Evolution Platform Renewal and New Product Generation

In their paper, *Metrics for Managing Research and Development in the Context of the Product Family*, James Utterback and others write that “Excellence in platform design is fundamental to the quality and success of a product family.” They point out the advantage of the modular architecture for continuously launching line-up products to make innovations. They mention that the innovators need to earn profits in order to aim toward the next incremental innovations by launching line-up products continuously. Utterback indicates this notion in the Figure 4-5 in his paper. This figure shows that an innovator launches line-up products one after another effectively by changing sub systems of an entire system on
common platform architecture, and evolving the core platform architecture itself while selling former line-up products. It is obvious that the innovator takes advantage of the essence of the modular type of architecture.

Figure 4-5 Product Family Evolution Platform Renewal and New Product Generation

4.2.3.2. The metric to evaluate Platform Effectiveness and Platform Efficiency

In the paper, Utterback also proposes a metric to evaluate the efficiency and the effectiveness of derivative products that are based on common core platform architecture. The Platform Efficiency and the Platform Effectiveness are simply defined as the following.
Platform Efficiency = \[ \frac{R&D \text{ costs for derivative product}}{R&D \text{ costs for Platform version}} \]

**Formula 4-1 Platform Efficiency**


Platform Efficiency is the indicator for the degree of efficiency to take advantage of the common platform architecture in terms of R&D costs. The smaller the value is, the more efficiently the innovator uses common platform architecture in line-up products.

\[ \text{Platform Effectiveness} = \frac{\text{Sales attribute to a platform or derivative product within a product family}}{\text{Costs attribute to a platform or derivative product within a product family}} \]

**Formula 4-2 Platform Effectiveness**


Product Effectiveness indicates how effectively use of the common platform architecture contributed to sales of each derivative product. The greater the value is, the more the ROI, return on investment, is.

According to the Utterback’s paper, the metric can imply a lot of things other than the above notions. But in this paper, I take advantage of this metric as the indicator for how effective and efficiently the core platform module works in the Platform business cycle.

### 4.3. Evaluation of modular architecture

In this section, to evaluate which type of architecture is the most appropriate for a Platform business, I use Product Effectiveness and Efficiency metrics described in the previous section.
to quantitatively analyze an actual product development case which uses core platform architecture for several line-up products.

4.3.1. Applying Meta-Metrics of Utterback’s idea for actual technology development

I use a case of an actual recent product developed by Sony Corporation to apply the metrics defined by Utterback. Even though this case is not a Platform business but just a product business, this product family abundantly takes advantage of the common core platform architecture for several line-up products. In this sense, this case seems appropriate to analyze the efficiency and effectiveness of core platform architecture. Here, for reasons of confidentiality, I can disclose very limited information, but enough to discuss this topic.

The actual case has the following characteristics.

- **Product overview**
  - These are electronics products for networking function.
  - The annual revenue with this product category is about 100 million USD.
  - Six products were launched and sold from 2003 to 2005. Most of the products are still being sold as of 2006.
  - The product's longevity is about 2 years.

- **Core platform architecture overview**
  - The core platform architecture has been used for all six family products.
  - The core platform architecture has been adapted in a modular architecture way.
  - The five family products use the core platform architecture by changing some modules around the core platform module.
  - The core platform module roughly includes the following.
    - Hardware modules (But Sony does not develop any LSI by itself.)
• Middleware modules including OS (OS is provided by third parties.)
• Application software modules.

➤ Family products

◇ The properties of each derivative product are shown in Table 4-3.
◇ The development period, costs, and sales revenues are shown in Table 4-4.
◇ A summary of initial product and family products that use same core platform architecture is shown in Figure 4-6.

Table 4-3 Family products and the properties of each derivative product
Source: Sony Corporation and author, 2006

<table>
<thead>
<tr>
<th>Initial Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product-2</td>
<td>A cheaper and simpler model compared to Initial Product</td>
</tr>
<tr>
<td>Product-3</td>
<td>A peripheral product with which Initial product or Product-2 can be used</td>
</tr>
<tr>
<td>Product-4</td>
<td>A product which some special functions are added to Initial product</td>
</tr>
<tr>
<td>Product-5</td>
<td>A product which very wide range customers can use</td>
</tr>
<tr>
<td>Product-6</td>
<td>A very high-end product compared to other family products</td>
</tr>
</tbody>
</table>

Table 4-4 Development period, costs, and sales revenues of each family product
Source: Sony Corporation and author, 2006

<table>
<thead>
<tr>
<th></th>
<th>Initial Product</th>
<th>Product-2</th>
<th>Product-3</th>
<th>Product-4</th>
<th>Product-5</th>
<th>Product-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span of development</td>
<td>05/02-06/03</td>
<td>07/03-01/04</td>
<td>05/02-06/03</td>
<td>03/04-09/04</td>
<td>03/04-10/04</td>
<td>03/05-06/05</td>
</tr>
<tr>
<td>Total Revenue (million $)</td>
<td>55.1</td>
<td>11.2</td>
<td>6.0</td>
<td>7.9</td>
<td>3.8</td>
<td>3.9</td>
</tr>
<tr>
<td>R&amp;D for total product (million $)</td>
<td>10.7</td>
<td>2.1</td>
<td>1.1</td>
<td>0.9</td>
<td>6.6</td>
<td>0.6</td>
</tr>
<tr>
<td>R&amp;D for its platform (million $)</td>
<td>5.9</td>
<td>0.5</td>
<td>0.4</td>
<td>0.2</td>
<td>1.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Using the quantitative information given in Table 4-4, the Product Efficiency and the Product Effectiveness are calculated as shown in Table 4-5 and Table 4-6 respectively. Here I used Formula 4-1 and Formula 4-2.

**Table 4-5 Result of Product Efficiency of Sony case**

<table>
<thead>
<tr>
<th>Product Efficiency</th>
<th>Initial Product</th>
<th>Product-2</th>
<th>Product-3</th>
<th>Product-4</th>
<th>Product-5</th>
<th>Product-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>0.36</td>
<td>0.19</td>
<td>0.15</td>
<td>1.13</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4-6 Result of Product Effectiveness of Sony case**

<table>
<thead>
<tr>
<th>Product Effectiveness</th>
<th>Initial Product</th>
<th>Product-2</th>
<th>Product-3</th>
<th>Product-4</th>
<th>Product-5</th>
<th>Product-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.42</td>
<td>21.35</td>
<td>16.00</td>
<td>43.72</td>
<td>3.13</td>
<td>32.67</td>
<td></td>
</tr>
</tbody>
</table>

The results given in these tables are depicted in Figure 4-7 and Figure 4-8.
In terms of Product Efficiency, almost all family products except Product 5 keep very low values which mean Sony has taken advantage of the core platform architecture very efficiently. As for Product-5, since this is a very high-end model to which were added many functions compared to others case, Sony spent a lot of R&D costs regardless of using the same core platform architecture on Product-5. Therefore, the result in Table 4-5 is not worth much at this moment. However, analyzing the Product Efficiency of the other products, I can say that Sony spent little on R&D on derivative products compared to spending on initial
products as a whole. As a result of the Platform Efficiency analysis, Sony seems to have taken advantage of its core platform modules and other family products efficiently.

In terms of Product Effectiveness, the values of the Product Effectiveness are relatively high except for Product 5 which means that the ROI of family products are high compared to that of the initial product. Even though the sales revenue of the initial product is overwhelmingly high compared to that of others, the Product Effectiveness of the initial product is not so high compared to that of others. This fact definitely indicates that Sony was able to take advantage of its core platform architecture very effectively for other products. As for Product 5, due to its being a very high-end model, the increase of sales volume is very slow and Sony has just started a sales promotion for Product 5 recently. For this reason, it is not worth using the value of Product 5 at this moment. On the other hand, the Product Effectiveness value of Product-4 is very high, which means that Sony took advantage of its core platform architecture effectively. As for Product-6, although it was launched very recently, the value of Product Effectiveness is very high. From these analyses, I can conclude that Sony has been able to take advantage of modular architecture very effectively and efficiently in the family products business.

If this project had used not modular architecture but integral architecture, what would have happened? Table 4-4 shows that Sony spent 13 months to develop the initial products including the core platform architecture. Considering this time period, if Sony had not used the core platform architecture module for the other five family products, it would never have been able to launch six products within 3 years and 6 months. This achievement was exactly the benefit from using modular architecture. Sony successfully achieved time to market.
As for the quality of products, Sony needed over 10,000 evaluation items in QA (quality assurance) phases, over 4 months for QA activities, and over 10 dedicated QA testers, to examine the quality of the initial product. However, the following five family products needed less than half of the QA items, QA months, and QA testers to examine each product. This fact implies the how hard it is to examine a product which has unexamined platform architecture compared to successor models which use already examined platform modules.

In terms of functionality, thanks to modular architecture, the project team was able to add, modify, and replace sub system modules easily for successor products.

In terms of cost, the project team gradually increased the bargaining power against the parts vendors because the amount of usage of the same parts accumulated over the years. The project team finally became able to purchase most of the parts affordably compared to the price of parts used in the initial product. As for the fixed costs, such as engineers, QA testers, and managers, the projects for successor products needed less than half of those who were necessary in the project for the initial product.

In terms of optimization of the products, because of modular architecture, by modifying and adjusting the actual platform architecture, which was developed in the past, the development team could achieve the optimization of the entire system. The development team has shown that the most important aspect for optimization is the accumulation of technical knowledge at a site using a physically existing prototype. That’s why the team spent much less time than expected to optimize later successor products such as Product 6.

In the book, *The Innovator’s Solution*, Christensen describes that integral architecture is superior to modular architecture when a firm develops “a product.” He does not mention the
case of “family products” as I discussed in this chapter. However, even if a firm aims to develop “one product” which is a huge and complex product, as I discussed in this section, I believe that modular architecture is much superior to integral architecture in all aspects from these analyses of an actual case. This example project in Sony needed over 100 engineers, 20 managers, 15 QA testers, and 1 million steps of application software code for the initial product. If the team had not adopted modular architecture, it could never have guaranteed its required development months, the required quality, and the required functionality. I discuss this more deeply in the next section.

With an innovative product or line-up products that have modular architecture, the Platform leader or innovator can successfully raise the possibility to be able to move on to the Former Transitional phase from the Fluid phase.

4.3.2. Timing to cause innovations

I proposed that the modular architecture is superior to the integral architecture in many aspects. But does the potential Platform leader really need to develop its core platform by modular architecture from the beginning? Or, as Christensen says, in some cases, is it better for the Platform leader to develop the Platform business with the integral architecture first and afterwards change to the modular architecture when the leader realizes that the Platform business will succeed?

I think the timing is a very important factor for making innovations happen. The potential Platform leader has to keep in mind that it must not miss grasping the most appropriate “timing” to make innovations happen. To not to miss the timing to realize innovations, in the Fluid phase and the Former Transitional phase, the would-be Platform leader and key
complementors have to launch family products, which use the core platform, continuously to the market, even if customers seem not to need those products at that stage. They should try to launch family products continuously so as not to miss the key timing to make innovations happen. In this sense, the potential Platform leader should develop its core platform with the modular architecture and as many family products as possible with key complementors in the Fluid phase. Doing so might raise the possibility greatly to cause innovations rather than launching very a little kind of products. There are no Platform leaders that succeed at causing innovations with only one product or so. Most of them succeed at establishing new ecosystems by launching many products continuously from the Fluid phase. Consequently, the Platform business successfully moved to next phase. Again, the important sequence that the potential Platform leader has to keep in mind is the following.

- The Platform leader and a key complementor launch the first product that uses the core platform. At this moment no one can predict whether or not this first model will be the first one of a future successful Platform business.
- The potential Platform leader watches the reaction of potential customers very carefully.
- The potential Platform leader and key complementors immediately try to launch many products that have new additional functions desired by potential customers.

By doing these things, the potential Platform leader increases its likelihood of causing first innovations. Without modular platform architecture, the potential Platform leader can never realize the above sequence quickly. Having adopted the modular architecture, the potential Platform leader should be prepared to launch any type of related products any time so as not to miss the timing of causing innovations.

In conclusion, the potential Platform leader should have the modular architecture from the beginning, which Gawer and Cusumano also recommend.
4.3.3. Thoughts from recent technology development environments

Here, I discuss which type of architecture is better for the platform architecture based on recent development environments in the IT and high-tech industry. The trend of recent high-tech development environments is to develop new technology with the modular architecture.

4.3.3.1. Recent software development environments

The representations of recent software development environment are open-source, Java, Agile environments, and others which are all based on the modular architecture. All these software development environments strongly deny the way of integral architecture approach essentially because the modular architecture has the following advantages compared to the integral architecture.

➢ To reduce the development period drastically by using modules developed by others.
➢ To keep high quality by using modules already guaranteed by others.
➢ To keep high performance by using already optimized module architectures.

This tendency was naturally caused by the drastic increase of demand for high quality and complicated functionality for recent IT and high-tech products.

4.3.3.2. The evolution of software programming language

Additionally, the history of the evolution of software programming languages also indicates the trend that shifted naturally from “a language to develop a small system by the integral architecture entirely” to “a language to develop a huge system by the modular architecture.”

For example, the main programming language used in the world shifted from C to C++ to
Java, taking many years. Looking at Java and new programming languages, it is easy to notice that “global variables” disappeared and that modularity is strongly supported.

From this fact, the software development environments clearly became appropriate for modular architecture and open interface architecture.

4.3.3.3. Project management methods

In addition, looking at the methods of project management recently utilized all over the world such as CMM (Capability Mutuality Model) and SQA (Software Quality Assurance), the base notion of them is to use patterns someone else developed in the past and modules someone else guaranteed in the past to build an own system. These most commonly used project management methods also prefer modular architecture to integral architecture.

4.3.3.4. Common platform used in a company

Recently IT and high-tech companies aggressively have established “common platform environments based on modular architecture” which can be used by any divisions and any products in the company to improve cost reduction and speed time to market, and sustain higher quality and performances in the corporate level. For example, “Uniphier” which is the “common platform environment” established by Matsushita Electronic Industry Corporation, the largest home electronics company in the world, defines many technical standards that can be used in the company. Uniphier gives commonly used hardware modules, middleware modules, and software modules, and defines the notion of interfaces, architectures, and usages based on modular architecture. Matsushita officially announced that Uniphier could possibly raise its development efficiency five times compared to its current efficiency within several years. Matsushita is ready to make innovations with modular architectures prepared in
Uniphier. Not only Matsushita but also other major high-tech companies have started installing similar type of in-company development platforms. This is the trend of the entire IT industry.

A very talented software engineer, who has developed software applications at Sony for many years, said that “When I develop even a very tiny software module, I always think to adopt the modular architecture. Integral architecture is not so realistic. The fundamental of all is the modular architecture.”

From these many facts, to choose the modular architecture is a fundamental and mandatory approach when developing something and trying to make innovations. In conclusion, when the potential Platform leader aims to establish sustainable Platform business for next generation home-network environments, the leader has to develop the core platform architecture with modular architecture and open interfaces.

4.4. Modular Architecture and Innovation

4.4.1. Modular architecture and Innovation

Here, I go back to Christensen’s idea about innovations and appropriate architecture, and propose a new idea about the relationship between innovations and the appropriate architecture. Figure 4-9 is the same as Figure 4-4 which Christensen depicted in The Innovator’s Solution. In this figure, he shows that the performance realized by an integral architecture is superior to that realized by a modular architecture. (Here, I again assume that the innovation line in Figure 4-9 also represents the innovation line in a Platform business cycle.)
First, the modular architecture can achieve higher performance compared to the integral architecture. As described previously, the would-be Platform leader with key complementors should launch as many products which use the core platform as possible in the Fluid phase, which is the time period when the customers’ needs are superior to the advancement of technology in Christensen’s figure. By doing so with not a single product but a family of products, the potential Platform leader seeks the opportunity and timing to attract more complementors and cause actual innovations. The more complementors get in the new ecosystem, the more the advanced technologies come to the ecosystem. Consequently the innovations can accelerate faster than expected. This notion is depicted in Figure 4-10.

Figure 4-9 Product architecture and integration in an innovation cycle
Afterwards, in the newly started innovative ecosystem, the Platform business starts stimulating customers to come up with new sophisticated usages and needs at an accelerating speed. Accordingly, in a successful Platform business, the more time elapses, the more sophisticated customers’ needs appear. The successful Platform business by i-mode of NTT-DoComo, the largest Japanese mobile phone service company, is a good example to represent this phenomenon. When i-mode was released, everybody imagined that this i-mode service would just be for the conventional function to browse WWW servers from mobile phones. However, the more complementors introduced various innovations using i-mode and Java Applet, the more various sophisticated usages customers naturally required. Consequently, a completely innovative ecosystem, which nobody could imagine when i-mode was released, was established, and the monopolized Platform business by NTT-DoComo started in the mobile phone industry. In this manner, the phenomenon, in which a new innovative ecosystem is generated by gradually increasing and expanding customers’ needs through giving complementors open interfaces and modular architectures, is depicted in
Figure 4-11. The innovations driven by the modular architecture successfully raised the dotted line of customers’ needs in Figure 4-11.

Figure 4-11 Innovative products increase and expand customers’ needs in the Platform business

Source: Author, 2006

Looking at the successful Platform business phenomena which NTT-DoCoMo and Palm realized, the relationship between innovation line driven by the modular architecture and customers’ needs line cannot be the relationship of those that Christensen defines in Figure 4-9. Rather, Figure 4-11 indicates the actual phenomena that seem to happen in some successful Platform businesses.
4.5. **Summary and Conclusions**

In this chapter, I discussed which type of architecture is the most appropriate to establish sustainable Platform business in the future and when to start developing the appropriate architecture in the Platform business cycle. I took advantage of some academic ideas, an actual technology development case, and analyses of current technology development environments, and other ideas. In addition, I proposed a new notion about the relationship between the modular architecture and customers’ needs in a successful Platform business.

In conclusion, when a potential Platform leader aims to establish a successful Platform business, especially in the competitive and rapidly growing high-tech industry, the leader has to keep the following recommendations.

- **Recommended architecture**
  - To adopt the modular architecture, which is superior to the integral architecture in many aspects such as cost, functionality, quality, performance, speed of time to market, flexibility, responsibility, and others
  - To adopt the modular architecture from the Fluid phase.

- **Recommended interfaces**
  - To design interfaces properly so that they continually can be used by numerous complementors for longer term
  - To open the interfaces in an appropriate manner to avoid allowing competitors to duplicate the technology by reverse engineering activities
    - free of charge such as PCI bus and IEEE1394
    - licensing such as Windows SDK
● "RAND," "reasonable and non-discriminatory" conditions such as Sony Felica

◊ Technically, to keep initiatives for maintaining and upgrading specifications of the interfaces during all the Platform business phases

Importantly, the potential Platform leader should not miss the best timing to cause innovations by continuously launching products that use core platform module. By doing so, the new ecosystem which was made by the Platform leader and complementors will successfully generate more customers’ needs which will evolve the ecosystem further.
5. Case analysis using EPLM: Noncontact IC card Platform business

In this chapter, to evaluate whether or not Enhanced Platform Leadership Model, EPLM, is an appropriate framework for the Platform leader to establish sustainable Platform business in the future, I take advantage of an actually ongoing Platform business which is the non-contact IC (Integrated Circuit) card, “Felica,” driven by Sony Corporation.

5.1. What is Felica

Sony’s R&D center in Tokyo started development of “Felica,” which is a non-contact IC card technology, in 1988.

Sony tried to solve the following problems of the existing “contact type magnetic card,” which has been widely used as a banking card, credit card, and other ID cards.

- Inconvenient usage
- Vulnerability on security
- Physical wear-out
- Small size for data storage
Sony developed Felica both on technology aspects and business aspects as a next-generation standard of IC card to be not only the substitute of magnetic cards but also to be electric money, which will be used in the coming new network age.

From the beginning, Sony aimed to establish a new sustainable Felica ecosystem as a Platform leader by taking advantage of several of its own assets, such as high technologies, several electronics products, brand power, experiences in network business, and financial functions such as Sony bank. Sony aimed to establish the brand new application for E-money, E-commuter pass, E-commerce, E-ticket, E-trade and others by using several technical advantages of Felica.

As of 2006, although two other non-contact IC card technologies were developed and standardized by Philips and Motorola, only Felica has become a de facto standard that has
been widely spread mainly in the Asian market. Sony already launched a total of 100 million pieces of Felica cards and devices as of February 2006.

In order to achieve the success of IC card kind of business, unlike an ordinary home electronics product business, it is necessary to gather complementors and establish social infrastructures with complementors rather than just producing core IC card devices. On this point, Sony succeeded at not only developing sophisticated technology but also locking in various kinds of complementors from banks to train companies. After finishing the development of Felica technology in the latter of the 1990’s, Sony successfully introduced Felica as key parts of “Edy,” Japanese first electric money (E-money), and “SUICA” which is Japanese first electric commuter pass of JR East, the largest Japanese train company, in 2001. Afterwards, Sony successfully locked in many key complementors to expand the Felica ecosystem. One of the most successful results is that all major Japanese mobile phone service companies, such as NTT-DoComo, AU, and Vodafone, decided to adopt Felica technology for E-money in 2004 and 2005. As of now, all Japanese mobile phones are equipped with Felica. As all major mobile phone companies entered the ecosystem, the Felica business has rapidly expanded at a gathering speed by adding restaurants, hotels, shops, amusement centers, and transportation, which need E-money or E-commuter passes. Since E-money or E-commuter passes can be used at over 30,000 sites in Japan, Felica has completely become the dominant design for non-contact IC card for the newly established ecosystem, especially in the Asian area.

About 15 years after the first development, the Felica business finally was able to move to the Latter Transitional phase in the Platform business cycle. Sony began to enjoy the position of Platform leader as a manufacturer of Felica modules at a higher profit margin and as a
company which offers complementary products and services as well. This is the success story of a Platform business not only in the B2B market but also in the consumer market.

In this chapter, I explore the activities Sony did as a potential Platform leader, and evaluate the effectiveness of new framework EPLM by using this actual case.

5.2. Felica technology

5.2.1. General technical advantages

As described previously, the non-contact IC card technology Felica solves the following crucial problems of conventional contact type magnetic cards.

➢ Inconvenient usage

When a user uses the magnetic card in a bank or a restaurant, the user has to get it out of his wallet. Felica enables users to use the card at the site while keeping the card inside his wallet.

➢ Vulnerability on security

As there have been a lot of crimes which duplicate other people's magnetic cards illegally, the security of the magnetic card is very vulnerable. The hackers can never duplicate the Felica card, which was granted as the safest technology in consumer products by ISO. (It obtained EAL4 of ISO15408, which is the highest level on security issues.)

➢ Physical wear-out

Since there is no physical contact by using Felica, there is no problem of physical wear-out.

➢ Small size for data storage

Felica can hold local data inside up to 32 Kbytes, which is dozens of times that of conventional magnetic cards. This capability enabled Felica to be utilized as E-money, which requires a lot of data capacity.
As shown in Table 5-1, there are three types of Non-contact IC cards recognized by ISO. Table 5-1 briefly shows specifications of three non-contact cards, which are Type-A, Mifare, by Philips, Type-B by Motorola, and Type-C, Felica, by Sony. Since Felica is superior to others on the communication speed, which is the most necessary capability as a non-contact IC card, it is the most appropriate because people can access the card Reader/Writer while walking. For example, at a station, people do not want to slow down when walking past the entrance gate to take trains. Since people are very sensitive about maintaining their speed comfortably, Felica has great advantages compared to other types. That is why major train firms have adopted Felica rather than others.

<table>
<thead>
<tr>
<th>Specification and Type</th>
<th>Organizer</th>
<th>Card size</th>
<th>bit coding</th>
<th>modulation</th>
<th>carrier</th>
<th>speed</th>
<th>communication type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-A ISO/IEC14443</td>
<td>Philips</td>
<td>Credit Card (ISO/IEC7810)</td>
<td>Miller and Manchester</td>
<td>ASK100%</td>
<td>13.56MHz</td>
<td>106kbps</td>
<td>symmetric</td>
</tr>
<tr>
<td>Type-B ISO/IEC14443</td>
<td>Motorola</td>
<td>Credit Card (ISO/IEC7810)</td>
<td>NRZ</td>
<td>ASK100%</td>
<td>13.56MHz</td>
<td>106kbps</td>
<td>symmetric</td>
</tr>
<tr>
<td>Type-C : Felica ISO/IEC18092 212khrs Passive Mode</td>
<td>Sony</td>
<td>Credit Card (ISO/IEC7810)</td>
<td>Manchester</td>
<td>ASK100%</td>
<td>13.56MHz</td>
<td>212kbps</td>
<td>asymmetric</td>
</tr>
</tbody>
</table>

Table 5-1 Non-contact IC card technology
Source: Sony Corporation, 2006
Figure 5-3 shows the relationship between the Felica IC card and the Reader/Writer side, which is the base transceiver station accessed by Felica.

The Reader/Writer for Felica has the following technical features.

- High speed communication between Felica and Reader/Writer up to 212 Kbps
- Possible distance to communicate between Felica and Reader/Writer up to 10 cm
- Passive power type. Felica card does not need to have any batteries inside since the Reader/Writer supplies power via wireless communication when accessing.

5.3. **What does Sony provide in the Felica business?**

Here I discuss what Sony group provides to the newly established Felica ecosystem. First the Sony group companies which join the Felica ecosystem are shown in the following table.
Table 5-2 Sony group companies which are related to Felica business

Source: author, 2006

<table>
<thead>
<tr>
<th>Firms</th>
<th>Roles in Felica Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sony Corporation</td>
<td>R&amp;D for technology and business strategy, development of products</td>
</tr>
<tr>
<td>Bit Wallet Inc</td>
<td>The service provider of E-money which is based on Felica</td>
</tr>
<tr>
<td>Sony Finance International, Inc</td>
<td>The credit card issuer of &quot;eLIO&quot; by utilizing Felica</td>
</tr>
<tr>
<td>Felica Networks, Inc</td>
<td>Felica business sector for Japanese market</td>
</tr>
<tr>
<td>Sony Broadband Solutions, Inc</td>
<td>A system integration company to establish B2B system to utilize Felica</td>
</tr>
</tbody>
</table>

As shown in Figure 5-4, Sony group provides many things to the Felica ecosystem.

![Sony group provides many things to the Felica ecosystem](image)

**Figure 5-4 What Sony provides to the Felica ecosystem**

Source: Sony Corporation and author, 2006

- Modules for Felica card module (card, token, sub module)
- Dual interface IP chip module for Felica
- Mobile Felica module for mobile phones
- Reader/Writer module, USB Reader module for base transceiver stations
- Felica Servers Kit (Felica Secure Server SDK, Secure Application Module)
- Development Support (SDK for Felica)
- Business Support (Consulting, System Integration)
Sony has tried hard as Sony Group to nurture complementors, to establish the ecosystem, and to keep the ecosystem sustainable by giving hardware modules, software modules, and many kinds of services. After moving to the Latter Transitional phase, Sony became able to earn profitability by not only simply selling devices but also providing services. The motto Sony has internally to make the Felica ecosystem sustainable is the following: **Sony supports you...**

- from the first development to the business operation
- by several ways
- from Real to Cyber

### 5.4. Various Felica Applications

As Sony intended in 1988, Felica technology contributed a lot to establish a new ecosystem by making it possible to generate completely new applications and usages. Even though the technology itself Sony provides is very tiny physically, the new world generated by Felica is huge. Table 5-3 shows key complementors that exist in the Felica ecosystem as of March 2006. The most impressive achievement of Felica is that it realized “E-money” and “E-wallet” which nobody could achieve in the past, by providing technologies for high security, high speed communication, high volume of data holding, high quality, and high convenience.
I briefly discuss several types of actual successful Felica usages in the ecosystem.

5.4.1.1. E-commuter pass

The Felica card is widely used as the de facto E-commuter pass in Japan, Singapore, Hong Kong, China, Thailand, and India. In Japan, Felica is adopted by JR West and East, which are the largest train companies in Japan, as their Suica and Icoca commuter passes. This means that almost all Japanese who live in the Tokyo and Osaka areas have Felica in their wallets. E-commuter pass accounts for 20 million cards in Japan. In addition to the usage as the E-commuter pass, Suica can be used as E-money and E-wallet in kiosk shops in almost all JR stations. Figure 5-5 shows the image of Suica. The passengers can walk through an entrance...
gate in stations by simply letting the wallet approach to the Reader/Write. The Suica card and the Reader/Writer immediately calculate the ride fee and subtract the fee electrically from the amount of E-money charged in Suica. The passengers do not need to stop at the entrance gate because of very rapid transaction capability. This new smooth usage, which successfully reduced the terrible traffic jam of people at stations, stimulated many other transportation companies, such as trains, buses, taxis, monorails, and others, to adopt Felica as their commuter passes.

![Felica Commuter Pass](image1)

![Train ticket gate](image2)

**Figure 5-5 E-commuter pass Suica used by JR East**

5.4.1.2. Edy (E-wallet / E-money)

The first E-wallet and E-money, Edy, by Felica were introduced by BitWallet of Sony Group. Edy, shown in Figure 5-6, is the world’s first E-money utilized widely. If users have the Edy card in their wallets, they do not need any cash at restaurants and other sites. The service of Edy is currently utilized mainly in Japan with over 4,000 automatic vending machines and 30,000 sites of restaurants, hotels, gyms, and shops as of January 2006. This successful number is the result of efforts of Sony Group, which focused not on selling just Felica IC card selfishly but also on nurturing the ecosystem and infrastructure at the same time. If Sony did not do so, the new infrastructures would not have grown at all. Without widely spread infrastructures, Felica would have been impossible. Currently, there is no other E-money that can be used widely in Japan.
5.4.1.3. Credit Card

Of course, banks and credit card issuers, which have suffered from many IC card crimes, naturally started utilizing Felica technology for their bank cards and credit cards. Sony Finance has issued “eLIO,” and Tokyo Mitsubishi bank has issued “Super IC card” for their credit cards. There are many other credit cards that use Felica technology. In addition, large credit card issuers such as Visa and MasterCard have expanded the infrastructures that are exactly the Felica ecosystem.

5.4.1.4. Mobile Phone

The adoption of Felica by all Japanese mobile phone service providers such as NTT-Docomo, AU, and Vodafone has accelerated the expansion of the Felica ecosystem. In 2004, NTT-Docomo, the largest mobile phone service provider started “OSAIFU-KEITAI,” which is the E-wallet by mobile phone, and in 2005, AU and Vodafone also started the same services utilizing Felica. Currently Felica is included in all mobile phones in Japan as a result. As of January 2006, the Felica utilized in mobile phones accounted for over 10 million pieces, and it is predicted that tens of millions of new mobile phones using Felica will come to the market in 2007. Figure 5-7 shows usage of Mobile Felica when purchasing something.
The adoption of Felica by mobile phone service providers is very valuable in that once the Felica infrastructures are set up, Felica is guaranteed to be utilized for a very long term as a de facto standard. Sony can enjoy the synergetic effect for longer periods. This situation is exactly what Sony aimed at for over 15 years of very long deficits.

5.4.1.5. Corporate ID card

Felica is widely used as a corporate ID card instead of conventional magnetic cards because of its high security and convenience. As only one card can play multiple roles such as an ID card to enter the office and to record working hours, as an E-wallet in company facilities, Sony group, Tokyo Mitsubishi Bank, Tohoku-epco, Oji Paper, several universities, and other lot of communities utilize Felica card as their in-company ID cards. The number of firms and communities that use Felica as ID card are over 100, as of January 2006.

I presented various kinds of Felica applications and infrastructures as examples. The most important thing for Felica ecosystem is that the largest key players of each industry such as banks, transportation, credit card issuers, mobile phones, restaurant chains, and convenience stores have decided to adopt Felica as their IC cards. Therefore, it is easy to predict more expansion of the Felica ecosystem in the future due to the synergetic network effect.
5.4.2. Global Market

As of January 2006, the Felica card module has accounted for 100 million pieces in Asian market accumulatively as shown in Figure 5-8. Also as shown in Figure 5-8, Felica released 71 million pieces in Japan, 16 million in Hong Kong, 10 million in Singapore, 10 million in China, Thailand, and India respectively.

![Figure 5-8 Summary of Felica business over the world (March of 2006)](image)

Source: Sony Corporation and author, 2006

5.4.2.1. Hong Kong Octopus Card

Before the adoption in Japan, Octopus Card Company in Hong Kong started utilizing Felica as their Octopus Cards in 1997. Like Suica of JR East in Japan, the Octopus Card can be used as an E-commuter pass for trains and subway MTR, buses, and ferries, and E-money for kiosks, public phones, convenience stores, public parking lots, and vending machines. As of 2006, over 300 Hong Kong service-providing firms are affiliated with Felica business, and 16 million Octopus Cards, which exceeded the number of the population of Hong Kong, were used every day in Hong Kong. Felica successfully became the heart of Hong Kong infrastructures.
5.4.2.2. Singapore E-money

Since 2002, the public transportation of Singapore, LTA, has started utilizing Felica for E-commuter passes, E-money for vending machines, room keys for hotels, and ID cards. The Felica card accounts for 10 million pieces as of 2006, and there are over 4 million transactions everyday in Singapore.

In Europe and North America, not Felica but Type-A and Type-B have tiny markets. However, it is predicable that Felica, which has great advantages with its technologies and actual business achievement in the Asian area, will soon be adopted in new infrastructures there.

5.5. Profit model in successful Platform business

Although, for reasons of confidentiality, only limited information is disclosed, the following table shows the its role and business that each Sony group company takes charge in for the Felica Platform business.
Table 5-4 Business type and model of Felica Ecosystem in Sony Group
Source: Author, 2006

<table>
<thead>
<tr>
<th>Firms</th>
<th>Type of Roles</th>
<th>Main Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sony Corporation</td>
<td>Platform leader</td>
<td>Selling Platform modules (Felica card, modules, Reader/Writer modules)</td>
</tr>
<tr>
<td>Felica Networks, Inc</td>
<td>Complementor</td>
<td>Transactions of Felica</td>
</tr>
<tr>
<td>Bit Wallet Inc</td>
<td>Complementor</td>
<td>System integration and Maintenances of Felica B2B system</td>
</tr>
<tr>
<td>Sony Broadband Solutions, Inc</td>
<td>Complementor</td>
<td>N/A</td>
</tr>
<tr>
<td>Sony Finance International, Inc</td>
<td>Complementor</td>
<td>N/A</td>
</tr>
</tbody>
</table>

As shown in Table 5-4, Sony Group plays the roles of both Platform leader and complementors. Among several types of business Sony does in the Felica ecosystem, Sony mainly earns most of its profits by selling the platform modules, such as Felica card, card modules, and Reader/Writer modules. The profit ratio Sony has successfully earned from the Felica Platform business is dozens of times that of other Sony hardware product businesses. Sony successfully established a new business model by selling tangible platform modules as Intel has done with Pentium CPU.

Although the current profit model highly relies on selling hardware platform modules, since the Felica infrastructure has expanded at an accelerating speed, Sony Group is ready to earn a higher profit ratio through several ways, not only through selling current Platform modules, but also through transactions, licensing, and system integrations in the near future.

5.6. Evaluation by EPLM

Sony’s Felica business looks like a successful Platform business as a Platform leader. In this section, I evaluate Sony’s Felica business with each lever of EPLM, which is proposed in this paper. Using this actual business case, I conclude whether or not EPLM offers the appropriate key success factors for the Platform leader to take.
5.6.1. **Lever 1 Innovative Technology or Business Model**

In the Felica case, obviously the technology is very innovative because many problems of magnetic cards were solved. Additionally, compared to other non-contact technologies, Type-A and Type-B, Felica is superior on high-security and high-speed communication that is very important factors to realize for electric money applications. Furthermore, Felica was technically defined and developed from the beginning to be able to adapt various kinds of applications such as E-commerce, E-wallet, and E-commuter pass which would be parts of the new ecosystem in the future. The Felica technology, which assumed these applications, includes the following.

- **High flexibility to adapt various applications**
  - The firewall among several applications made possible by setting up each key for each application
  - Cooperation with different applications provided by different service providers
  - The file-system inside to distinguish between “areas” and “services”
  - The file-system in which keys and access rights can be set for each file
  - The CPU inside with which three types of data and methods can be set

- **Transmission method appropriate to non-contact IC card shown in Figure 5-10**
  - Complex but high performance encryption and decryption possible
  - High speed communication not to irritate users but to make them comfortable
The above technical advantages, in addition to Felica’s superior technologies compared to those of competitors, show that Felica is very innovative from the point of view of user usages.

In terms of its business model, the Felica business can be regarded as innovative. Sony did not develop Felica only from the point of view of technology enhancement. In 1988 when the Internet did not yet exist, Sony predicted that 20 years later a new world would exist in which E-money would be the new key business in the coming network age. At that time, Sony drew a picture of “Felica world” and technically developed the necessary and appropriate functions for Felica. The most widely used E-money in the world is Edy, operated by BitWallet, one of the subsidiaries of Sony. This means that Sony tried not only to develop just a new technology but also to establish a new business altogether. Sony aimed to be ready to obtain sustainable profits at the same time as Felica technology started as an innovative business model. Sony fully satisfied this lever by making both innovative technology and business idea.
5.6.2. **Lever 2 Product Technology**

In terms of architecture, the architecture of both the IC card side and the Reader/Writer side use the modular architecture for complementors to develop necessary modules on it. Because of its modular architecture, Felica can be adapted to several types of Felica products such as very thin IC card, tokens, watches, and cellular phones depending on the business of the complementors. In terms of openness of interfaces, Sony provides necessary information to complementors through ISO/IEC18092. The interfaces for wireless communication, which are the most important interfaces for complementors, are open under “RAND,” “reasonable and non-discriminatory,” conditions in ISO. Complementors can utilize the interfaces reasonably. In terms of intellectual properties, Sony filed several crucial patents. However, Sony discloses some of this information to complementors under NDA, “non disclosure agreement,” conditions. Since there is a lot of technology information regarding “security” in Sony’s intellectual properties, Sony discloses only reasonable information to complementors. In addition, Sony firmly protects the core technology, which is important not for complementors but for competitors. Because of the modular architecture, open interfaces, and open intellectual properties under some conditions, the strategy of Sony seems appropriate in this lever.

5.6.3. **Lever 3 Competences to Manage Platform**

In terms of advocating clear visions, even if it took over 10 years to become profitable, Sony headquarters kept a clear vision to continue the development and establish the new ecosystem internally. In addition, to the outside world, Sony exhibited Felica technology in several exhibitions to attract complementors in a step-by-step fashion.
In terms of keeping high technology, as described previously in Lever 1, Sony kept high technical capabilities all the time. In addition, Sony developed SDK and tool kits to support complementors to develop innovations. It is obvious that Sony achieved its current position with its own high technical capabilities.

In terms of appropriate process, as described previously, Sony tried hard to cooperate with key complementors such as JR East, NTT-DoCoMo, and Tokyo Mitsubishi Bank rather than with an unspecified majority. Once key applications were established, Sony tried to expand to access to many complementors, as Cusumano and Gawer recommend. As a whole, Sony seemed to have taken appropriate steps to establish its new ecosystem.

5.6.4. Lever 4 Scope of the Firm

Scope of the firm is not obvious from the beginning because Sony aimed to provide core Platform modules to complementors as well as complementary services and products such as E-money, Edy, PC with Felica, credit card, eLIO, and other services. As of now, Sony has both core platform modules and complementary products and services. These strategies seem inappropriate from the Lever 3 definition of EPLM. Were these strategies Sony took in fact inappropriate in this case? Felica’s Platform business is much different from that of PC and Palm products, because the complementary products which have Felica don’t make sense without usable infrastructures. Without the ATMs which adopted Felica, nothing could be done even if the users had a Felica IC card. Fundamentally, Sony’s Felica Platform business can be nurtured only when complementary products and complementary infrastructures are ready cooperatively. In these specific conditions, which are completely different from those of PC and Palm, the strategies Sony took seem reasonable. To establish a huge new
ecosystem, Sony had to nurture not only hardware but also software, services, and system integration functions all together.

5.6.5. **Lever 5 Internal Organization**

Sony seems not to need to manage internal conflicts because there are no conflicts between complementary products Sony provides and those complementors provide so far. In the case of the Felica business, complementary applications are E-commuter pass, E-wallet/E-money, mobile phone, credit card, and others. The Felica business is not a hardware-selling business but an infrastructure business. Therefore, the more complementary products and services, the more infrastructures in the industry are ready. As a result, even if Sony launches same complementary products or services which outside firms provide, such a situation is welcome rather than problematic. For this reason, Sony did not need to manage conflicts internally and externally in its Felica business.

5.6.6. **Lever 6 Commitment**

As described in Lever 3, it took over 10 years for Sony to gain a profit in the Felica business. It is easy to imagine that Sony stayed with developing the new technology, business model, complementors for over 10 years. It is not obvious how effectively Sony continued committing to establish Felica outside for the years; however, Sony definitely showed its commitment externally through obtaining ISO, establishing BitWallet for Edy, Felica Networks, eLIO, and others.

5.6.7. **Lever 7 Credibility**

It is not clear that how effectively Sony made efforts to establish its credibility; however, the brand power Sony has obviously worked in this case to establish credibility for
complementors. Indirectly, it is certain that Sony Group generally has tried hard to enhance the brand image through compliance activities and employee trainings. These down-to-earth in-company activities gradually have accumulated the credibility in the ecosystem. In addition, Sony did not invade the complementors’ territories. Therefore, Sony was able to establish Win-Win relationships with complementors. As Cusumano and Gawer describe, Sony focused on expanding Felica ecosystem persistently, and consistently.

5.6.8. Lever 8 Relationship with External Complementors

Sony successfully established the relationship with complementors and customers in its ecosystem as shown in Figure 5-11.

![Figure 5-11 The players and roles in Felica’s ecosystem (As of March 2006)](source: Author. 2006)
The property of this ecosystem is much different from that of the PC ecosystem Intel made. The PC ecosystem is very simple in that customers buy products that complementors developed. In the Felica ecosystem, the structure is very complicated. Sony is the Platform leader and also a complementor, and complementors such as NTT-DoCoMo are complementors and also customers of Sony. This ecosystem is a unique world where complementors cultivate other complementors, and customers nurture more customers with a synergetic effect. For example, NTT-DoCoMo is a customer for Sony and a complementor because it utilizes Felica in its products. Furthermore, NTT-DoCoMo tries to nurture its complementary services or infrastructures such as restaurant chains for Felica to win competitor mobile phone carriers. In other words, a complementor is cultivating secondary complementors that Sony does not know. In this sense, Sony successfully established a naturally growing ecosystem in which key complementors automatically gather complementors. It was very valuable to be able to lock in prime key players in each industry such as NTT-DoCoMo, Tokyo Mitsubishi Bank, Fujitsu and other major players with which Sony has Win-Win relationships.

5.7. Summary and Conclusions

In this chapter, I analyzed a case of a successful Platform leader business by using of EPLM. In this analysis, I realized that Sony’s Felica business mostly satisfied the key success factors of EPLM. With this result, I can conclude that the more the Platform leader values the eight levers of EPLM, the higher the success rate of the Platform business will be. The Felica business is related not only to consumer business but also to B2B business. Since this business greatly relies on social infrastructures such as E-money, credit card, and E-commuter pass, the sustainability of this ecosystem in the future would be unpredictably stable once the infrastructures are set up as a dominant design.
Sony’s purpose was to establish a new ecosystem and to expand it. However, since the new ecosystem seems to be placed in a proper orbit, the objective of Sony in the future is how to maximize the profitability for longer term in this ecosystem as Intel and Microsoft have done successfully.

In this chapter, to evaluate whether or not EPLM is the appropriate framework for the Platform leader to establish sustainable Platform business in the future, I take advantage of an actually ongoing Platform business, “i.Link,” driven by Sony.

6.1. What are IEEE1394 and i.Link?

Sony launched DCR-VX1000, which is the world’s first DV camera for the consumer industry in 1995. It is an innovative product which opened the digital video world, replacing analog 8 mm video cameras.

Figure 6-1 DCR-VX1000, which adopted the world’s first i.Link

DCR-VX1000, shown in Figure 6-1, is equipped with “DV interface (I/F)” which was also a new technology developed by Sony. The DV I/F enabled the user to transmit digital video data recorded in the camera to other devices without any deterioration of video quality, unlike conventional analog transmission. This was the beginning of i.Link, a standard of IEEE1394, by Sony. The high speed serial interface, i.Link, was only adopted by Sony DV camera as of 1995. In addition, there was no similar high technology or standard which could transmit high-quality digital video other than i.Link until the emergence of USB2.0 several years later. As of 1995, Sony dreamed of establishing a “future digital home-network world” based on i.Link technology, and concentrated on developing i.Link. Afterwards, in Sony, not only consumer products such as VCR, HDD recorder, VAIO, PlayStation, and other PC peripheral
devices but also industrial products such as camera coders, video editors, and all video-related products have been equipped with i.Link. Since 1995, the Sony products equipped with i.Link have amounted to tens of millions products. Figure 6-2 shows the Sony products with the i.Link interfaces which the author personally owns. They are a desktop PC, a DV camera, a note PC, and a HDD recorder.

![Sample products which have i.Link](image)

This is the achievement Sony has strongly placed its hopes in i.Link, hoping to establish "digital home-network environments" for 10 years.

However, as of 2006, Sony seems not have succeeded at achieving the "digital home-network world" using i.Link as was expected in 1995. Additionally, looking at the home electronics industry, it turns out that i.Link has not become a dominant design as an interface to transmit video, audio, and data. Instead, USB1.1/2.0, which came to the world much later, has become a dominant design of digital data transmission for digital home-network environments.
6.2. IEEE1394, FireWire and i.Link

Although i.Link was named by Sony and the first product which used it was also launched by Sony, not all the technology of i.Link was developed by Sony. i.Link is based on a standard technology of IEEE1394 which was originally invented by Apple Computer as “FireWire” in 1986. Originally Apple invented this high-speed serial bus technology for internal and external peripheral buses of Macintosh. Later, Sony joined Apple to add new specifications to handle video data to basic specifications of Apple in the early 1990s. The IEEE1394, which includes a video transmission function defined by Sony, became official standard in 1995. Although i.Link was named by Sony and FireWire was named by Apple, these two also mean the adoption of IEEE1394 technology. IEEE1394, including both PC peripherals bus function and video transmitting function, has been very sophisticated technologically not only in the 1990s but also even now. Currently, the nonprofit organization IEEE1394 Trade Association, or IEEE1394 TA, is taking responsibility to license i.Link and FireWire to third parties, giving interoperability test environments, and disclosing IEEE1394 specifications to complementors to develop products that use IEEE1394.

![i.Link and FireWire Trademark](http://www.1394ta.org/About/products/compliant_products.html)

**Figure 6-3 Trade mark of i.Link and FireWire**

Source: [http://www.1394ta.org/About/products/compliant_products.html](http://www.1394ta.org/About/products/compliant_products.html)

Although both i.Link and FireWire are trademarks of IEEE1394, the IEEE1394 I/F adopted by third parties for home appliances seem to be named i.Link while IEEE1394 I/F adopted for PC peripherals seem to be named FireWire customarily. End users sometimes get
confused about the difference between i.Link and FireWire, which are actually the same technically. Once a third parity passes the interoperability test provided by the TA, it can get approval to put the trademark shown in Figure 6-3 on its products.

Considering this background, Sony’s contributions to IEEE1394 seem not so great compared to those of Apple. However, the association of Sony with IEEE1394 was very helpful for Apple, because Macintosh’s business had been in a downturn due to the emergence of Wintel PC. During the downturn of Apple computers, that Sony brought additional specification, which was about video transmission to IEEE1394, was really valuable for Apple to revitalize the IEEE1394 world because Sony was one of the most innovative and influential home electronics companies in the world. At that time, since Sony was seeking sophisticated high performance serial bus technology to establish its “digital home-network world” in the future, the IEEE1394 of Apple was really good to utilize in Sony products.

What did Sony achieve in the IEEE1394 ecosystem? Sony enhanced several new technologies regarding video transmission such as protocols, commands, copy rights protection, and others continuously, and gave them to the TA to establish its “new digital home-network environments.” Once the new technologies became a part of a standard, every third party could utilize those disclosed technologies for free. Therefore, Sony can not earn profits from the disclosed technologies on the TA. By providing free sophisticated technologies to third parties through the TA, Sony fundamentally aimed to establish a new Platform business for new home-network environment business whose base was i.Link. Here, I discuss the effectiveness of Sony’s strategies as a potential Platform leader.
6.3. i.Link technology

I introduce i.Link and IEEE1394 technology briefly here. Since the technology was adopted as a proposal of IEEE in 1985, major modifications such as IEEE1394a up to 400Mbps, IEEE1394b up to 800Mbps, and minor additions and modifications have been applied. The technical specifications are shown in Table 6-1.

Table 6-1 The summary of i.Link specifications
Source: IEEE1394TA and author, 2006

<table>
<thead>
<tr>
<th>Type</th>
<th>High Speed Digital Serial Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>IEEE1394 (proposed by Apple Computer)</td>
</tr>
<tr>
<td>Transmission Rate</td>
<td>IEEE1394a: 100Mbps/200Mbps/400Mbps</td>
</tr>
<tr>
<td>Transmission Method</td>
<td>serial</td>
</tr>
<tr>
<td>Transmission Mode</td>
<td>Isochronous Transmission</td>
</tr>
<tr>
<td></td>
<td>Asynchronous Transmission</td>
</tr>
<tr>
<td>Communication</td>
<td>bi-directional</td>
</tr>
<tr>
<td></td>
<td>daisy chain structure</td>
</tr>
<tr>
<td>Structure</td>
<td>up to 64 devices in one loop</td>
</tr>
<tr>
<td>Cable and Connector</td>
<td>4-pin type</td>
</tr>
<tr>
<td></td>
<td>6-pin type (power supply possible)</td>
</tr>
<tr>
<td>Other features</td>
<td>Self Identity</td>
</tr>
<tr>
<td></td>
<td>Automatic configuration</td>
</tr>
</tbody>
</table>

In addition, IEEE1394 has the following characteristics.

➢ High speed digital serial communication

➢ Since the spec was defined for the internal bus of personal computers, the data transmission rate (up to 400Mbps on IEEE1394a) is overwhelmingly high for an external peripheral bus. IEEE1394b can support up to 800 Mbps. That's why this technology can send huge size digital video data.

➢ There is almost no deterioration of data on the bus because of digital video data transmission.
Bi-directional data transmission

Only one cable is necessary to transmit all video, audio, and other data.

Various data transmission methods supported

- Isochronous transmission
  
  In this mode, digital video and audio are guaranteed to be sent without any jitters unlike other technologies such as Ethernet. This feature is the most important one to send video data keeping the high quality.

- Asynchronous transmission
  
  While sending huge video and audio data, other data such as command data and control information among appliances can be transmitted at the same time through one physical connection.

Easy connection in daisy chain manner

- Easy connection and Hot Plug and Play
  
  As shown in Figure 6-5, with i.Link, all devices can be connected easily in the daisy chain manner. Even if two devices are not connected directly, any data can be sent between the two, as Device-A in Figure 6-5 can send any data to Device-E. In addition, the daisy chain realizes hot Plug and Play function.
Digital content copyright protection

Since this technology can send any type of digital data without deterioration, digital content copyright protection is mandatory. i.Link can protect against illegal copies of digital content. The technology has been licensed by DTLA, whose primary company has been Sony.

Briefly, i.Link solved the following key conventional problems which are mandatory to solve to transmit high quality video and audio as key technologies for comfortable next generation home-network environments.

- There are complicated connections among devices with many cables
- Video and audio quality deteriorate on the bus when transmitting
- Huge data such as high quality video cannot be sent among devices

IEEE1394 and i.Link which solved the above key problems, which were crucial to create comfortable home-network environments, were innovations. Actually, no technology which is superior to i.Link in terms of high speed serial bus has emerged as of even now.
6.4. **Have i.Link and IEEE1394 become successful Platforms?**

Since the first standardization of IEEE1394 in 1995, both consumer and industrial products which adopted i.Link and FireWire have been launched gradually, and Sony has bundled this technology into almost all own product categories. As of February 2006, firms which got licenses to use either i.Link or FireWire from the TA and categories are the following.

- **Consumer Products: 11 categories/40 companies**
  - MP3 Players, Digital Video Cameras, Digital Televisions/HDTVs, Set Top Boxes/Satellite Receivers, Digital VHS VCRs, DVD Players/Recorders, CD Players/Recorders
- **Computer Products: 14 categories/over 200 companies**
- **Industrial Products: 3 categories/20 companies**
  - Vision Systems, Test & Measurement Devices, Control & Instrumentation

Since the above data include both i.Link and FireWire, I cannot count the number of adoptions of i.Link specifically. It is likely that most of the consumer products might have adopted i.Link while most of the computer products might have adopted FireWire. As for the industrial products, the adoption of i.Link and FireWire might have been mixed. In other words, I can roughly say that the 11 categories and 40 companies shown in Table 6-2 seem to have been influenced by Sony, which has been the Platform leader of i.Link.
Table 6-2 Consumer product firms which adopted IEEE1394 (As of February 2006)

<table>
<thead>
<tr>
<th>Creative Labs</th>
<th>Mitsubishi</th>
<th>Scientific Atlanta</th>
<th>Akai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canon</td>
<td>Philips</td>
<td>ViewSonic Corp</td>
<td>Daewoo</td>
</tr>
<tr>
<td>JVC</td>
<td>Pioneer</td>
<td>Denon</td>
<td>Hewlett Packard</td>
</tr>
<tr>
<td>Panasonic</td>
<td>Sanyo</td>
<td>Integra</td>
<td>LiteOn</td>
</tr>
<tr>
<td>Samsung</td>
<td>Toshiba</td>
<td>Integra Research</td>
<td>Sherwood Newcastle</td>
</tr>
<tr>
<td>Sharp</td>
<td>Axonix</td>
<td>Marantz</td>
<td>Audioquest</td>
</tr>
<tr>
<td>Sony</td>
<td>Dish Network</td>
<td>Onkyo</td>
<td>Belkin</td>
</tr>
<tr>
<td>Fujitsu</td>
<td>Key Digital Systems</td>
<td>Yamaha</td>
<td>Monster Cable</td>
</tr>
<tr>
<td>Hitachi</td>
<td>Motorola</td>
<td>RCA</td>
<td>Pure AV</td>
</tr>
<tr>
<td>LG</td>
<td>Pace Micro Technology</td>
<td>Apex Digital</td>
<td>Radio Shack</td>
</tr>
</tbody>
</table>

From Table 6-2, I can say that most of the large and famous home electronics companies in the world have launched products which used i.Link. As a result, I can appraise the spread of i.Link and IEEE1394 in the consumer electronics industry. And a good thing is that firms which adopt i.Link and IEEE1394 have still increased even 10 years after the first launch.

However, I have to raise some questions about whether or not Sony ideally achieved its first objectives which were to establish not “the spread of i.Link” but “new home-network environments” using i.Link, and whether or not Sony successfully established “sustainable Platform business” which should bring huge profits to Sony. Additionally, even if the use of i.Link seems to have been widespread in the consumer electronics industry, it is obvious that i.Link and IEEE1394 have not become a dominant design due to the wide spread of similar technology, USB1.1/USB2.0. I have to say that current situations are not the situations that Sony wanted to have when it developed this technology spending a lot of money. On this point, I have to say that this is a sort of unsuccessful case from the point of view of Platform leader business. I analyze more deeply these recent critiques by using EPLM.
6.5. Evaluation by EPLM

In this section, I evaluate the effectiveness of EPLM as key success factors of Platform business by using the Sony i.Link case which seems an unsuccessful case as a Platform business.

6.5.1. Lever 1 Innovative Technology or Business Model

i.Link technology itself is very innovative because it solved a lot of the key problems of analog technologies. As I described previously, no other similarly sophisticated technology has emerged even as of now. It successfully brought the world of high-quality digital video to the consumer industry. In addition, as Sony dreamed at that time, the consumer electronics industry felt that a new home-network environment age would really be realized by Sony. Until 1995, every product and even PCs were just “stand-alone” products whose usages were not considered when connecting them in a network. That’s why industries were surprised by the emergence of i.Link technology in 1995. Even though USB1.0, which was also a serial bus to transmit digital data, was launched in PC industry by Intel in 1996, the specifications and performance of i.Link were sophisticated beyond comparison to those of USB. i.Link’s transmission rate (USB: up to 12 Mbps, i.Link: up to 400Mbps) and other capabilities were much superior to those of USB. And the USB2.0 standardized in 2000 was still inferior to i.Link. For these reasons, as a high performance serial bus technology, i.Link has been overwhelming for over 10 years.

The technology is very innovative, but was Sony able to establish a sustainable Platform business with i.Link as a Platform leader? Has i.Link become a dominant design as a platform for home-network environments? It’s true that i.Link has increased complementors for 10 years and the usage has widely spread. However, Sony has not established the
sustainable new ecosystem with i.Link, because Sony has not enjoyed the profitability with its core platform technology as Sony Felica, Intel, and Microsoft did, and Sony has not successfully established “new home-network environments” with i.Link. As Cusumano and Gawer say, the successful Platform leader must clearly mention its vision of the future ecosystem. Did Sony make a clear vision not about just i.Link but about “new homework environments”? Surely, Sony aimed to bring about a new digital home-network world though its marketing activities, like the “Digital Dream Kids” catch phrase around 1995. And Sony tried hard to build a “new network world” rather than stand-alone products by launching VAIO (PC) business to let VAIO to be a center of the “new home-network world.” However, Sony’s vision about the “new network age” seemed vague. It was not a clear and concrete vision but just a dream. Sony was not able to make a very clear plan about which type of home-network environments Sony wanted to build. In this sense, the technology seems to have been far ahead compared to making a concrete business model for “new home-network environments.” Although i.Link enabled a device to connect with other devices, “new home-network usages” have not come to the world in these 10 years. This fact surely supports my thoughts. New home-network environments where any video and audio content can be easily enjoyed anywhere at home anytime, which was that Sony wanted to establish when it invested to develop i.Link in the middle of 1990s, has not been realized yet. Accordingly, Sony i.Link technology ended up being a just a new technology rather than a Platform technology to make a new ecosystem. What is worse is that this undesired situation allowed USB, which is much inferior to i.Link technically, to become a dominant design of digital serial interfaces to connect many appliances. In addition, USB2.0, which is up to 800 Mbps, has made the position as dominant design even stronger.

In this lever, Sony seems to have used i.Link not to become a Platform leader for a new ecosystem, but just as a function to add extra value for each Sony product. Sony had a very
innovative technology but did not have innovative business ideas to build a sustainable Platform business.

6.5.2. Lever 2 Product Technology

In terms of the openness of its interfaces, Sony disclosed all necessary information such as protocols and commands to transmit video and audio data to complementors through the TA for free. Any third parties can develop products which have i.Link. Since i.Link itself is an “interface” technology, to disclose all information of the protocols and commands is very important to increase complementors. On this point, Sony behaved appropriately as a potential Platform leader as defined in EPLM. In addition, every time Sony updated a function of i.Link such as copyright protection technology, it immediately disclosed the newly developed information through the TA. As a result, as described previously, many complementors have adopted i.Link since 1995. Technically, since Sony carefully developed the upper version of i.Link to keep the upper compatibility, the products launched in 1995 and those in 2006 can be connected successfully.

In terms of intellectual properties, IEEE1394TA fairly and reasonably manages the patents filed by several key players such as Sony and Apple. Sony has not taken advantage of its own patents unfairly and exclusively. Any third parties can use key players’ patents for free or for reasonable license fees. As a result, in this lever, Sony appropriately managed its architecture and intellectual properties to encourage complementors to develop their own products.

6.5.3. Lever 3 Competences to Manage Platform

In terms of visions, since 1995, Sony has advocated new visions to make new home-network environments internally and externally by launching the world’s first DV camera and many other types of products, and entering the PC industry with VAIO. However, Sony seems not
to have been able to make a clear vision which concretely shows which new home-network
Sony wanted to build with complementors. As a result, i.Link technology ended up being just
a technology for connecting devices.

In terms of high technical capabilities in this lever, Sony has kept enough high capabilities to
propose, develop, implement, and launch several necessary technologies.

In terms of process in this lever, Sony managed this issue properly as Cusumano and Gawer
recommend. Sony chose to enhance its technology with a limited number of key players,
“rabbits,” collaboratively first rather than with unspecified majority. For example, Sony
collaborated to enhance the spec of transmission of video and audio with Matsushita, the spec
of storage function with Quantum, and the spec for copyright protection with Intel, which are
the most advanced key players in each industry. Once details of the spec were fixed with key
players, Sony disclosed all information through IEEE1394TA.

In this lever, Sony appropriately managed as a potential Platform leader on important aspects.

6.5.4. Lever 4 Scope of the Firm

The strategy Sony took was not very clear from the beginning on this lever. Sony seems to
have attempted both to be the Platform leader of i.Link and to be a complementor. Since
i.Link is an “interface” technology which does not exist physically, unlike “Windows OS
package” and “Pentium LSI,” its behavior as a Platform leader which has invisible interfaces
must be different from other Platform leaders who have physically visible core platform
modules. Sony did not choose to be a Platform leader by making a physically existing device
and selling the device to complementors, as Intel successfully did in its Pentium business.
Rather, Sony used i.Link to improve features and functions of Sony’s many products to
differentiate them from competitors’ products. On this point, the business scope of Sony was
not only vague but also improper as a Platform leader who had to make efforts to increase
complementors first rather than make its own complementary products. Sony played a role as
just a manufacturer that makes own products rather than as a Platform leader.

In this lever, I can conclude that Sony did not manage its strategies appropriately as a
Platform leader.

6.5.5. Lever 5 Internal Organization

Since Sony internally stimulated many divisions to develop complementary products, there
was no need to manage conflicts between internal divisions which develop i.Link technology
and divisions which develop complementary products. Internally, Sony seems to have
discussed a lot how to implement i.Link to more Sony products actively rather than which
kind of new home-network world Sony should build when all devices are connected by i.Link,
as a Platform leader.

6.5.6. Lever 6 Commitment

Sony has made many efforts to enhance the spec of i.Link continuously, and Sony has
launched a lot of products which have i.Link to evolve the “i.Link community.” In addition,
Sony tried hard to guarantee upper compatibility technically so that newly designed products
can connect to products designed 10 years before. This activity looks easy but actually this is
very costly. On these points, Sony obviously showed a strong long-term commitment to be
engaged in the i.Link community as an i.Link promoter. That’s why many companies have
still adopted i.Link in their products.
6.5.7. Lever 7 Credibility

It is not clear that how effectively Sony made efforts to establish its credibility. However, the brand power Sony has obviously worked in this case to establish the credibility of its complementors. Indirectly, it is certain that Sony Group generally tries hard to enhance the brand image through compliance activities and employee trainings internally. These down-to-earth in-company activities have gradually accumulated the credibility in i.Link community. The achievement of the revival of IEEE1394, which was originally designed for Macintosh which rapidly lost the market share in the PC industry, shows the credibility of Sony. Wintel adopted ATA, PCI, and USB as internal and peripheral interfaces. If Sony had decided not to use IEEE1394 as interfaces for home appliances, IEEE1394 would have definitely not been able to make so many complementors, as shown in Table 6-2. IEEE1394 would have ended up being a very minor interface technology for only low market share Macintosh. On this point, I can conclude that the credibility Sony established contributed a lot to expand i.Link complementors.

6.5.8. Lever 8 Relationship with External Complementors

Has Sony stimulated complementors to develop innovations from the point of view of this lever? It was true that Sony tried to lock in complementors by introducing the world first DV camera, and by leading actively the IEEE1394TA with Apple. In addition, Sony disclosed necessary technical information and patents through the TA. Seemingly, Sony surely managed this lever as Cusumano and Gower suggest. However, from the following evidence, I conclude that Sony was not able to establish new sustainable ecosystem where Sony could enjoy stable profitability as Microsoft, Intel, and Sony Felica did successfully.

- USB2.0 has become a dominant design for home-network environments.
- Sony has not enjoyed remarkably huge profitability from its i.Link Platform business

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Sony did not realize a “new home-network environment” which it has dreamed of vaguely for 10 years, by taking advantage of less than half of the sophisticated i.Link functions. i.Link ended up being just a function to connect devices.

Sony seems to have tried to obtain not “complementors” but “companions” in the i.Link ecosystem even though Sony aimed to be a Platform leader. As one of many reasons for this, I want make a point that Sony didn’t make i.Link technology as physically visible modules which could be a core platform module like Pentium LSI and Windows package. It would be very difficult to establish a Platform business without a physically existing platform module. As a result, Sony could not create a new ecosystem where many innovative complementors bring profits to Sony which should have physically existing core platform module. Sony has always tried to make its own innovations using i.Link rather than stimulating complementors to cause innovations. As a conclusion in this lever, again, Sony could not lock in complementors, but it made companions.

6.6. Summary and Conclusions

6.6.1. Evaluation by EPLM

Taking advantage of EPLM for the Sony i.Link case, I discussed the Sony’s unsuccessful case as a Platform business. (However, I want to point out that Sony’s strategies, not as a Platform leader but as a manufacturer, have been very successful.) The result of analyses by EPLM is the following.

- The levers which Sony appropriately managed as a Platform leader: **Lever 2, 6, 7.**
- The levers that Sony inappropriately managed as a Platform leader: **Lever 1, 3.**
- The Levers that were out of the scope of the case of i.Link business: **Lever 4, 5, 8.**
Compared to Sony's Felica business analyzed in Chapter 5, the number of levers which Sony managed properly is definitely few in the i.Link Platform business. In addition, it is strange that three levers are out of scope in this case, unlike other successful cases. Ironically, this might imply that Sony did not try to establish a Platform business by using i.Link in the first place. From these analyses, I can conclude that EPLM is effective as crucial criteria to establish a sustainable Platform business, and that to value all levers carefully enables a potential Platform leader to succeed with higher probability.

6.6.2. Considerations about Products or Services, Standard, and Platform

Finally, based on the analyses in this chapter, it appears that it is very difficult to establish a Platform business with invisible protocol and interface technologies. Even though USB has become a dominant design instead of i.Link for home-network environments, it would be very difficult for Intel to earn high profitability from only its USB Platform business. However, USB has been very effective for Intel as a complementary technology to make the Pentium Platform business sustainable. If a potential Platform leader wanted to generate a sustainable Platform business, it would be better to avoid choosing invisible protocol or interface technologies as a core platform seed. There have been many attempts to be a Platform leader for next-generation home-network environments such as Jini, USB, i.Link, Ethernet, Wi-Fi, Bluetooth, HAVi, Internet Home Alliance, and ECHONET. Some of them have succeeded as just technology, but none of them has enjoyed the sustainable Platform business for a longer term, because these are protocol or interfaces technologies, which don't physically exist in most cases.
From the above considerations, I come to define the appropriate relationship with Products or Services, Standard, and Platform, and which case a potential Platform leader should attempt to aim as a sustainable Platform business. The definitions are the following.

➢ **Products or Services**
  - End users or customers pay for them and can benefit by using them.
  - Products or Services do not need to include Standards or Platforms.

➢ **Standard**
  - Manufacturers or service providers can benefit by using it to develop their products or provide their services.
  - A Standard is generally open a protocol, an interface, or other type of common specification. In most cases, it is not a physically existing technology.
  - In some cases, a Standard is for utilizing a Platform, but in other cases Standard is not for utilizing a Platform.

➢ **Platform**
  - Complementary firms can benefit by using this to develop their products or provide their services.
  - A Platform can be used only when the standardized protocols or interfaces for the Platform are reasonably open.
  - Platform and Standard seem similar because both are necessary parts of products or services, but a Platform is not a Standard in that a Platform itself is not open but proprietary technology, and a Platform is usually provided by a firm, unlike a Standard, which is openly shared by many firms.

In Figure 6-6, I define products or services with the following three product cases, which each depict example businesses.
Very simply, all products or services in the world can be one of three types depicted in Figure 6-6. I define and summarize the characteristics of each Product Case in the conclusions of this chapter.

- **Most importantly**, products or services are very attractive or innovative for customers.
- **Product Case 1**
  - The product or service provider can enjoy a monopoly. However, to keep the sustainability for longer term seems very difficult due to inappropriate architecture.
- **Product Case 2**
  - Looking at the case analysis in this chapter, I conclude that it is difficult for the firm, which offers not a Platform but just a Standard, to enjoy sustainable business for longer term because the open Standard can be used by many firms.
  - No firm, whether or not it provides Products or Services, or Standards, can enjoy a monopoly because a Standard can be used by every firm.
Product Case 3

Looking at several successful Platform businesses, I conclude that the firm, which offers a Platform, can enjoy more profitability and sustainability than firms that provide Products or Services, or a Standard. In some cases, a Platform holder can enjoy overwhelming profitability that complementors can never earn.

To do so, a Platform generally should be physically existing and proprietary technology to distinguish from a Standard, which can be used fully by other firms.

Sony’s i.Link business was not able to achieve the Product Case 3 type of business, while Sony’s Felica business successfully has become a Platform holder as in Product Case 3.
7. A proposal for a Platform business for next-generation home-network Environments

In this chapter, I propose a business model for companies desiring to be a Platform leader for next-generation home-network environments, a goal which many potential Platform leaders tried unsuccessfully to do. In addition, using EPLM whose effectiveness was discussed in Chapter 5 and Chapter 6, I propose strategies for making the proposed business model sustainable as a Platform business. Here, I propose a new Platform business, which takes advantage of NFC (Near Field Communication) as a form of "intuitive usability," for which Sony, Philips, and Nokia just established a forum together for a next-generation genuine home-network environment. Especially, I focus on how Sony can be a successful Platform leader for the proposed new Platform business.

7.1. Future home-network environments that Sony targets

7.1.1. Past trials to be a platform leader for home-network environments

Because of the rapid spread of open source free OS like Linux, very affordable but high performance LSI, and free software libraries which can realize numerous functions such as MPEG decoders, the consumer electronics industry has become much more competitive than expected. The product life has become very shorter, and the profit of each product has become very thin. Even major consumer electronics companies have suffered from these competitive situations. Under such severe conditions, all major players have tried to shift their main business from a hardware selling business to a more profitable and sustainable business, which Microsoft, Intel, and IBM have done successfully.

Among many new businesses, "the realization of ubiquitous world by next-generation home-network environments" is one of the potential businesses which have a higher
possibility to make profits for main players in the future. Many firms have tried to be central
players of this new business to escape from the very competitive circumstances. The success
of Intel and Microsoft has stimulated high-tech companies to provide a dominant design for
home-network environments to build sustainable Platform businesses. Jini by Sun, HAVi by
Sony, Echonet, and others are all new technology or business models proposed to be a
dominant design for the new generation home-network business. Once a technology or
business model becomes a dominant design of home-network environments, where numerous
complementors and products such TV, phone, audio, printer, PC, VCR and many other types
of products can be locked in, the center player can enjoy a sustainable situation compared to
the current “low profit and short cycle hardware selling” business. However, looking at
current home-network, it’s easy to say there is no overwhelming dominant design connecting
existing home appliances. No trials have been successful so far.

7.1.2. What are the problems so far in genuine home-network environments?

Why have no trials to be a dominant design for home-network succeeded? I think there are
two types of problems: technical and managerial. Among many technical problems, the most
crucial is that even though potential protocols and technologies to connect devices were
implemented in many products, to set up configuration to connect appliances was bothersome
and complicated for users. For example, although WiFi became a dominant design of wireless
network access in the world, the configuration is still so complicated that users who are not
familiar with PCs cannot set it up and use it easily. There are no technologies to essentially
solve these issues, which are “easy use” and “intuitive use,” for ubiquitous home-network
environments. On the other hand, in terms of management problems, as I explored the
unsuccessful case of a home-network business in Chapter 6, all past potential Platform
leaders seem to have focused on selling their own products or technologies rather than on
establishing complementary assets externally. The past players did not appropriately manage the key success factors for a Platform leader, namely, EPLM.

In this chapter, by focusing on next-generation genuine home-network environments, I propose a Platform business model that solves the technical problem described above, and also propose strategies to solve past management problems mentioned above by using EPLM.

7.1.3. Future applications in genuine home network environment

As pointed out previously, to realize very easy usability is the most important task to achieve to be a dominant design for genuine home-network environments. Some several past trials surely enhanced the connectivity among different firms’ products, but didn’t achieve very easy connectivity.

What’s the very easy usage for all users? The answer is that it can be only realized by the usability based on human intuitiveness. Who wants to use a printer with a very complicated configuration? Who likes to set up a wireless network each time the user moves to other area? Who wants to watch a DVD after difficult configuration changes? Sony has just started to establish a dominant design for next-generation home network environments by realizing very easy usability and intuitive operation with the NFC Forum.
What is “human intuitive operation”? For example, what is the most intuitive and easy operation when printing out a document? First, a user touches the PC screen, which displays the document the user wants to print out. Then, the user touches a printer. This sequence is the easiest because it is same as human intuitive operation which points out the source and destination simply. As another example, when a user wants to move pictures stored in a digital still camera to a PC, the user touches the digital camera first, and then touches the PC. That’s it. There is no easier or more intuitive way than this.

The Near Field Communication (NFC) Forum, founded by Sony, Philips and Nokia has recently just started implementing a home-network environment realized by these “intuitive usability” operations. And importantly, this intuitive usability can be realized by Felica, which is a non-contact technology. The new business model I propose takes advantage of Felica technology, which has successfully become a dominant design of B2B world as introduced in Chapter 5.
Next, I propose some killer home-network applications, which nobody could realize by using intuitive operation from the user point of view. In addition, I explore the synergetic effect of connection of each product by using intuitive operations.

### 7.1.3.1. Intuitive data transmission between devices

- **Data transmission between storage devices and monitors**

I assume that the necessary technologies for intuitive operations are implemented in three related devices: (1) storage devices, (2) monitoring devices, and (3) a controller the user holds in his hand. For example, a user can easily display a document displayed on his PC in a bigger projector very intuitively following the sequence illustrated in Figure 7-2.

- A user lets the controller in his hand touch the PC monitor, which displays a document.
- The user approaches the projector and lets the controller touch the projector.

![Figure 7-2 An application of intuitive usability](image)

Source: Author, 2006

The user does not need to know about very complicated configuration. What the user needs is that intuitive operation among devices.
➢ Data transmission between storage devices

A user can realize the data copy between storage devices with the same operation as above. Actually, if this function can be realized, most of our day-to-day operations can become very easy.

➢ An application outside the home

The technology for intuitive operation is very effective also outside the home. The “electric poster” is one valuable application, as shown in Figure 7-3. I assume that the technology for intuitive operation is implemented in the electric poster and a mobile phone or a handheld PC. A user lets a mobile phone or handheld PC touch the electric poster on the street or in a train. The user can obtain much information about the poster in his mobile phone or handheld PC without taking a note at site. Then, the user also can look at more detailed information by letting the mobile phone or handheld PC touch a PC or TV monitor at home.

Figure 7-3 Electric poster
Source: Author, 2006

URL Information
http://www.relazzen.co.jp/

Internet Connection

Web browser activation
Additionally, users can easily obtain a timetable of trains or buses at a site by letting the mobile phone touch an information board on the train or the bus. There are numerous useful examples when intuitive operation is actually realized.

7.1.4. Session hand-over between devices

The intuitive usability can enable not only the actual data transmission between devices described previously but also “session hand-over,” which is the transmission of not data but sessions, protocols or status between devices.

➢ Session Hand-Over Application 1 (Changing the monitor)

1. A father is watching a DVD movie on a living room TV monitor. Then, his child shows up and asks the father if he can play a TV game on the monitor.

2. The father lets the “intuitive operation” controller touch the TV monitor.

3. The father walks to another room where there is another TV monitor.

4. The father lets the “intuitive operation” controller touch another TV.

5. The father can enjoy the DVD movie in other room, starting from the scene the father stopped on living room monitor, automatically.
Here, the intuitive operation successfully transmitted a “session” or “status” which is “watching a movie,” from one place to another place automatically.

➢ **Session Hand-Over Application 2 (Hand-over of a communication)**

1. I am talking to my parents over my mobile phone at home.
2. My parents request to look at their grandchild over the phone.
3. I let the mobile phone touch a TV monitor, which has AV communication capabilities.
4. The only audio communication session of the mobile phone is handed over to audio and video communication over the TV monitor in the living room. My parents can look at their grandchild by video.
This is an example of hand-over of a session that is a “communication.” The user does not need to remake a call by another device in order to show the grandchild to the parents. The ubiquitous home-network environments that use Felica kind of non-contact IC technology make possible both actual data transmission and session and protocol hand-over.

7.1.4.1. Free device configuration

Intuitive usability technology will also make possible the free device configuration. For example, it is bothersome to set up wireless LAN to use when the user changes location such as home, school, airport, and restaurant. The intuitive usability technology easily can help solve this problem. I assume that the technical information, such as SSID, key length, and pass phrase to adapt the location-unique configuration of WiFi, is put on the wall. The user simply lets the “intuitive usability controller” touch the wall first and then touch the laptop PC. Or the user lets the laptop PC touch the wall directly. With these simple operations, the laptop PC immediately and automatically can set up a unique configuration to activate the wireless LAN. This “free device configuration application,” which looks very simple but has not been realized yet, will be a breakthrough as the first step to realize next-generation home-network environments in the near future.

7.1.4.2. E-Wallet, Ticketing, Transaction, Content Download

As I introduced in Chapter 5, E-wallet, ticketing transaction, and content download are also potential applications that intuitive usability can realize.

Past attempts to be a dominant design and a core platform module for next-generation home-network environments failed due to lack of intuitive usability technology. However, the current success of Felica raises the possibility to realize the new world. As I introduced
several new applications in this section, the intuitive usability technology has an unbelievably huge power to change the home-network world.

7.1.5. Key technology for genuine home-network environment

Here, I discuss necessary technologies to realize intuitive operation.

7.1.5.1. Non-contact Interface

The non-contact IC card technology is the most important key technology to realize “intuitive usability operation” which is “making a device closer to another device.” To realize ideal intuitive usability requires that detection and communication be possible within strictly only 10 cm distance. As discussed in Chapter 5, the most advanced non-contact IC card technology is Felica of Sony, which has been standardized as ISO/IEC 18092.

![Figure 7-5 Technical Features of NFC](source: Sony Corporation, 2006)

7.1.5.2. High-speed communication

Next, intuitive operation requires very high speed communication among devices. Without high-speed communication, it would be difficult to realize “comfortable usability” which is very important for human intuitive operations. As shown in Table 7-1, among three
standardized non-contact IC card technologies, the speed of Felica is the fastest with 212 Kbps. This speed makes it possible to transmit information between devices comfortably, and makes many new applications possible. On this point, Felica is the most appropriate key technology among other similar technologies.

Table 7-1 Data rates of three non-contact IC card technologies

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<tr>
<th></th>
<th>ISO/IEC 14443 Type-A</th>
<th>ISO/IEC 14443 Type-B</th>
<th>Felica</th>
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</thead>
<tbody>
<tr>
<td>Data rate</td>
<td>106kbps-</td>
<td>106kbps-</td>
<td>212kbps-</td>
</tr>
</tbody>
</table>

7.1.5.3. High security

In addition to intuitive usability, new applications such as E-Wallet, ticketing transaction, and content download require high security technology, because a lot of important private information needs to be sent among devices. Felica has the following technical advantages on this.

➢ The firewall among several applications, which can setup each key for each applications
➢ The file-system in which keys and access rights can be set for each file

Felica successfully obtained EAL4 of ISO15408 which is the highest level on security issues and the first acknowledgment as a non-contact IC card.

7.1.5.4. Capability for multiple applications

The intuitive usability among many devices requires capabilities to allow multiple applications to be operated. Felica has the following advantages compared to other non-contact IC card technologies.

➢ Cooperation with different applications provided by different service provides
The file-system inside to distinguish between “areas” and “services”

The CPU inside with which three types of data and methods can be set

7.1.5.5. Protocols between devices

For successful next-generation home-network environments, to realize smooth communications among different firms’ different types of products is the most important. To achieve this, we have to solve political issues, but here I focus on technology issues. Two types of protocols are necessary.

➤ Basic protocol between devices for intuitive usability in a home-network

This protocol has to be implemented in all products, which belong to the new home-network.

➤ Advanced protocol between devices for many applications

The protocols are application unique.

To start this Platform business, the basic protocol between devices has to be implemented in all products as shown in Figure 7-6. The basic protocol, which is drawn as a red module in Figure 7-6, needs to be newly defined in all layers from the physical layer to the application layer in the OSI reference model. The red module for the basic protocols for intuitive usability is the “core Platform module” in the next-generation home-network Platform business. In addition, the advanced protocol should be defined and implemented uniquely in each product by each player after successful implementation of the basic protocol. In this paper, I don’t explore the advanced protocols.
7.2. Near Field Communication (NFC) Forum

7.2.1. What is the NFC Forum?

Figure 7-7 NFC Forum Logo
Source: http://www.nfc-forum.org/home

The NFC forum was established in 2004 as a non-profit organization by Sony, Philips, and Nokia. The objective of the NFC Forum is to establish a new ecosystem for next-generation home network environments with the newly obtained standard ISO/IEC IS 18092 (NFC) as a short-range wireless connectivity technology, which realizes intuitive usability. The actual purpose of this forum is to enable Sony and Philips to use their individual non-contact
technologies, Felica and Mifare respectively, on new home-network business. Since the NFC forum has just started its activities, almost no technologies except the physical layers have been determined yet. There are many unclear issues, which will have to be decided in the future.

The NFC Forum consists of the following four categories, which have each benefits and dues.

- **Sponsor Member**: 11 companies
  MasterCard, Panasonic, Sony, Microsoft, Philips, Texas Instruments, NEC, Renesas, VISA, Nokia, Samsung
- **Principal Member**: 13 companies
  American Express, Inside, RF Micro Devices, Anadigm Inc, LG, SK Telecom, France Telecom, Logitech, SKIODATA, GEMPLUS, Motorola, Vodaphone, Innovision
- **Associate Member**: 36 companies
- **Non-profit Member**: 8 companies

Briefly, the Sponsor Members have initiatives for all NFC activities while the other three member groups carefully watch what goes on in the forum. And each working group assigned in NFC Forum periodically gets together and discusses assigned issues such as NFC technologies, applications, security, and tests.

### 7.2.2. Sony and NFC

How did Sony, which wants to be a Platform leader for next-generation home-network environments, join the NFC Forum? As described in Chapter 5, Sony succeeded in establishing a new Felica ecosystem for E-commuter pass and E-money. Sony wants to take advantage of the technology of Felica and the achievement of Felica business to make a new
Platform business for home-networks, in which Sony’s i.Link business could not achieve as a Platform leader as described in Chapter 6. The first step for Sony’s objective was to obtain ISO/IEC IS 18092 (NFC) and to start the NFC Forum.

Figure 7-8 shows the coverage of NFC technologies standardized in ISO.

- The NFCIP-1 is the technology that was standardized as ISO/IEC IS 18092 (NFC) in 2003.
- The NFCIP-2 is the technology that NFC forum wants to decide and standardize in the future.
- The area of Felica is already standardized as ISO/IEC 18092.

The NFCIP-1 in Figure 7-8 enables interoperability between Felica and Mifare (Type-A), which had no interoperability between them until NFC was established.

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**Figure 7-8 Architecture of NFC module**
Source: Sony Corporation, 2006
In Chapter 5, I discussed in detail the advantage of Felica in terms of both technical aspects and business aspects compared to Mifare (Type-A) of Philips. Under such circumstances, why did Sony try to have interoperability with the inferior technology? I think Sony, which actually wants to be a dominant Platform leader, might consider the following issues. Sony might have wanted to avoid obvious conflicts between the Felica format and the Mifare format of Philips with which Sony had collaborated well in many technologies such as CD format in the past. Most importantly, Sony might have wanted to avoid a “format war” by which Sony had a lot of past failures, such as Betamax. In addition, Sony might have wanted to introduce Felica technology to North America and EU where Mifare has more businesses than Felica so far. These are my guesses, but on this point, it is obvious that Sony has been very seriously aiming to be a Platform leader for NFC ecosystem by using Felica.

The reason why Sony and Philips established NFC forum with Nokia, which is a leading worldwide manufacturer of mobile phones but has no technologies in terms of NFC, is that Sony and Philips seem to consider the mobile phones the most important key device to realize intuitive usability operation among many home appliances. As described earlier in this section, the intuitive usability controller is very important to consider first to realize many applications. Sony and Philips might have considered Nokia to be the first key complementary player of the NFC ecosystem.

7.2.3. Sony aims to be a Platform Leader in NFC

Although the NFC Forum was established with two companies equally, Sony has the obvious advantages of its Felica technologies and the success of many Felica businesses. Therefore, Sony must appropriately and sincerely perform as a potential Platform leader.
In terms of technology, although only the physical layer is determined as NFC as of now, Felica already has upper layer technologies such as File System and security module as shown in Figure 7-8. Under such conditions, it is likely that the current Felica specification would be used for undetermined upper layers as the standard for NFC in the near future. On this point, Sony is in an advantageous position among the three firms.

As described previously, although there were many similar forums and communities to establish “next-generation home-network environments” in the past, no one was able to be the dominant design for new home-network environments. Considering the past several failures of several players, Sony has to carefully consider the key strategies to establish a sustainable Platform business by taking advantage of NFC, which has just been launched. Sony must deliberately and thoroughly make effective strategies to be the Platform leader and not cause the same failures that Sony and other players had in the past. Using EPLM, I explore these strategies Sony should take under such circumstances.

7.3. Current status of home-network business with NFC

7.3.1. Current status of NFC business

As introduced in Chapter 5, Sony already launched over 100 million Felica devices throughout the world successfully with many sustainable businesses. However, as for the NFC Forum, there are no complementary products launched so far, since many technologies are not fixed yet. Affiliated players have just started seeking business opportunities by showing sample NFC technology and sample applications through exhibitions and other marketing activities. Very importantly, any NFC products have to be launched by some firms after the determination of all technologies as a standard in the NFC Forum so as not to repeat the failures of past home-network standard businesses. Under such current unstable situations,
Sony, as the potential Platform leader, has to strongly and appropriately take a leadership role.

7.3.2. Where is NFC in the Platform business cycle?

What is the position of the NFC Forum in the Platform business cycle proposed in Chapter 3? The NFC Forum is still defining and seeking specifications, protocols, and applications. There are no complementary products yet. From these facts, NFC Platform business is in the Fluid phase as shown in Figure 7-9.

![Figure 7-9 Current phase of NFC in the Platform business cycle](image)

**Figure 7-9 Current phase of NFC in the Platform business cycle**

From the description of which levers the Platform leader has to focus on defined in Chapter 3, the potential Platform leader of an NFC business has to value Levers 1, 2, 3, 4, 6, and 7 more than others. In the next section, I discuss which strategies Sony has to consider especially in those six levers of EPLM as a Platform leader for a successful next-generation home-network environment business.

7.4. Appropriate strategies to be a successful Platform Leader for next-generation home-network environments

7.4.1. Lever 1 Innovative Technology or Business Model

Although the NFC business is in the Fluid phase, its core technology, Felica, is already proven as a very innovative technology, which has successfully established a new Felica ecosystem in the actual B2B world. Especially, Felica technology fully satisfies the key technology for intuitive usability.

In terms of a business idea, NFC has already come up with several new applications mentioned previously because of intuitive operations, easy usability, and free configuration, which solve many past key problems which made past Platform leaders unsuccessful. Although only the spec of the physical layer has been determined in the NFC Forum so far, the forum has already over 70 members in it. The sophistication of its business idea and applications already has attracted many key players.

As discussed in Chapter 6, Sony's i.Link business failed as a Platform leader because Sony had not physically existing core platform modules but physically invisible interfaces. On this point, Sony seems not to be repeating the same failure because Sony now has a physically
existing core Platform module, Felica. However, Sony has to keep in mind that what will bring profitability to Sony is not sophisticated “interfaces” or “protocols” but “physically visible core engines.” Of course, to establish a successful new home-network environment business, Sony has to continue making technical efforts to define and develop several necessary technologies such as protocols between devices shown in Figure 7-6. In addition, in order to move to the Former Transitional phase successfully in the Platform business cycle, Sony has to start developing SDK and tool kits to stimulate future complementors to develop innovations.

As a whole, I can conclude that Sony already has enough innovative technology and an effective business model to establish a new home-network environment Platform business.

7.4.2. Lever 2 Product Technology

Even though Sony already has innovative core technology, Felica, Sony has to define the core platform module for NFC first. Thereafter, Sony has to be able to maintain its new architecture module and the interfaces in the NFC Forum. The core platform module Sony has to own beyond the Felica technology is illustrated in Figure 7-10. The red module, which includes Felica technology internally, is one Sony needs to have as the core Platform module which will be the heart of new Platform business for home-network environments.
The issues Sony especially has to take care of are the following.

- **Design and develop the core Platform module**

  Considering key future applications, Sony has to develop the core Platform architecture illustrated in Figure 7-10. The module includes everything from the physical layer to the application layer. The module might consist of hardware modules and software modules.

- **Use modular architecture**

  As shown in Figure 7-10, Sony has to develop the core Platform module by the modular architecture. Various firms’ home appliances would be complementors in this business. In the coming Latter Transitional phase and Mature phase, Sony has to be ready to modify and upgrade some sub-modules inside of the core Platform architecture. On this point, again,
Sony should develop the core module by the modular architecture from the beginning. However, Sony should avoid designing a very complicated core module by implementing all possible functions from the beginning.

- Open interfaces

The interfaces between the core Platform module Sony develops and the external modules complementors develop have to be fully open. The interfaces in this case are illustrated as “External Interfaces” in Figure 7-10. To enable complementors to fully use the core Platform module, it should be open and made easy to use by preparing API or function properly. And Sony has to keep in mind that the interfaces should be kept the same regardless of the core platform version to keep the upper compatibility. On the other hand, Sony should not open the “Internal Interfaces” illustrated in Figure 7-10 to keep the core platform itself proprietary and to keep the competitive advantage against competitors.

- Control intellectual properties

As discussed in Chapter 2, the strategies of intellectual properties sometimes make the position of the Platform leader stronger, and sometimes unfortunately cause complementors not to be locked in the ecosystem. Since NFC business is in the Fluid phase, the most important strategies Sony has to use at this moment is to file as many patents as possible to be able to manage the patents effectively in the future depending on the situation.

7.4.3. Lever 3 Competences to Manage Platform

As described in Lever 1 and Lever 2, to adapt Felica technology to the core Platform module shown in Figure 7-10, Sony has to enhance the current technologies and start attracting complementors. In order to do so, Sony has to do the following.
Advocate clear visions internally and externally

Under the recent very competitive and severe circumstances of the home electronics industry, the possibility to obtain profits from NFC business might be lower in the Fluid phase. Sony has to keep clear visions to establish the new Platform business internally and externally even if the huge profits might come to Sony several years later. As Felica succeeded 10 years after the first development, Sony should keep high motivation and advocate visions internally and externally regardless of low short-term profitability.

Keep internal development team that has high technical capabilities

Sony has great advantages in terms of higher technologies for this Platform business. To develop the core Platform module shown in Figure 7-10, Sony has to keep technical capabilities of hardware, software, middleware, communication technology, security, RF, networking, and others. Sony seems to be in a very good position to be the Platform leader in terms of technology. However, Sony should keep the high technical capabilities regardless of low short-term profitability phase.

Manage appropriate process to establish the Platform business externally

Has Sony managed the appropriate process as a Platform leader in this business as Intel and Microsoft did in the Fluid phase? As described previously, Intel tried to design and fix the interfaces with a very limited number of complementors. Once the interfaces were completely fixed, Intel tried to collaborate with as many complementors as possible. Cusumano and Gawer point out the importance of this process. Looking at the NFC Forum, although the core architecture and the interfaces are not completely defined or fixed, the forum already has over 70 members, and the number of members has increased. In the huge forum, Sony has tried to define key technologies and applications with many firms.
at the official information Nokia and Philips announced about the objectives of the NFC business, these objectives are different from that of Sony. It is true that each firm has a policy and an objective individually. For example, Nokia has focused on using NFC mainly in mobile phones while Sony and Philips have focused on implementing NFC in many home appliances. The problem I would like to raise here is that it seems too early to gather many complementors in the forum in the Fluid phase when the core platform module, interfaces, and key applications are not yet determined. It is possible that design and development of core technology will not be determined smoothly due to many firms’ insisting on their own objectives. I recommend that Sony focus on discussing and developing necessary technologies, applications, business models, and direction of the ecosystem mainly with the Sponsor Members, which are 11 key companies. Sony should keep in mind that this process, which seems not to be appropriate at this moment, made many past players unsuccessful.

7.4.4. Lever 4 Scope of the Firm

Sony should remember the reasons of i.Link’s failure as a Platform leader described in Chapter 6. Sony tried to implement i.Link in many own Sony products rather than make a Platform business with a core Platform module. Sony chose a complementary product business rather than a Platform business in the i.Link business. As a result, Sony could not stimulate complementors to develop innovations for the ecosystem, and finally USB came to the world very rapidly instead of i.Link. i.Link ended up being just a way to transmit video between devices.

It is quite natural that Sony wants to implement the NFC module in Sony products rather than to do the “small core platform module” business. However, at this moment, Sony should concentrate on how effectively Sony can let complementors adopt NFC rather than
implementing it in its own products, because it is impossible to establish a next-generation home-network with only Sony products. I recommend that Sony starts launching its own complementary products after Sony succeeds in locking in key complementors in the Former Transitional phase or Latter Transitional phase. Following this process, which Intel and Microsoft did successfully, will raise the possibility of establishment of a sustainable Platform business. Again, Sony should implement the following process. (1) It should focus on prospering the Platform itself with complementors. (2) Once key complementors are locked in and actual innovative products come to the ecosystem, Sony should launch its own complementary products if it wants to do so.

Sony should not try to raise the attractiveness of each product but try to lock in complementors first, as the Delta model strongly suggests. “System lock in” will be much more profitable than “Best Products” shown in Figure 7-11.

![Figure 7-11 Delta Model for NFC Platform business](image)

**Figure 7-11 Delta Model for NFC Platform business**

7.4.5. **Lever 5 Internal Organization**

Since NFC business is in the Fluid phase, to focus on this lever is not so important. As I discussed, Sony is likely to use Platform core modules for many Sony products to raise the attractiveness of each product rather than focusing on the Platform business. The “division company structure”, which started in 1995 in Sony and ended in 2005, seems to have made the tendency of independence of each business division. This structure seems to have weakened the spread of the visions that Sony headquarters made. It is possible that the conflict between divisions of developing complementors and the division of developing the Platform business of NFC happens easily in the earlier phase. However, the corporate headquarter should manage the conflicts effectively if Sony really wants to enjoy the Platform business in the future. To establish a Platform business has a higher priority than the business of each division.

7.4.6. **Lever 6 Commitment**

Since Sony established the NFC Forum, Sony has to take responsibility to make the forum successful without being captivated by earning its own short-term profits. Sony needs to stay committed to making efforts for a successful NFC Platform business. Since Sony is a company which launched brand-new products which had not existed in the past, such as Walkman, Betamax, AIBO, and PlayStation, there have been actually a lot of failures behind the bright success stories. Especially, in the recent severe home electronics industry situations, Sony has withdrawn from unsuccessful business relatively easily. The withdrawal from AIBO, Cocoon, and Qualia business are prime examples. Such withdrawals are crucial to keep the company alive. However, too early or too easy withdrawals are likely to reduce the value of the commitment as a Platform leader. Sony needs to make a commitment to NFC business to
wait for a longer time to be a successful and profitable Platform leader. That short-term patience makes long-term profitability is the essence of the Platform business.

7.4.7. Lever 7 Credibility

The NFC Forum was established in 2004 by Sony, Philips, and Nokia, who have different objectives. Nokia has wanted to enhance its mobile phone business, while Philips has wanted to sell its own non-contact IC card, Mifare. In addition, the NFC Forum already has over 70 firms, which have completely different purposes on NFC business. Under such circumstances, it is very important for Sony to consistently focus on members’ objectives rather than its own objective as a Platform leader in order to make the ecosystem sustainable in the future. Sony has to focus on establishing its credibility first by doing the following.

➢ Show the policy that Sony would focus on developing core Platform module rather than developing complementary products.

➢ Make Win-Win relationships with complementors rather than make own short-term profit.

➢ Provide a sense of security to complementors, once the ecosystem is successfully established.

Simply, since the probability of Sony’s making innovations by itself alone seems much lower than the probability of many complementors’ making innovations, Sony should wait for innovations around the core Platform module which Sony provides. This is the key method for the Platform leader to succeed. Sony should take responsibilities as a new industry negotiator.
Since larger firms are less likely to be successful Platform leaders compared to relatively smaller size firms are, the larger the firm that wants to be a Platform leader, the more efforts the potential leader has to make to establish credibility.

7.4.8. Lever 8 Relationship with External Complementors

Since the NFC Forum is in the Fluid phase, to focus on this lever is not so important compared to others levers as described previously. However, once the Platform business successfully moves to the Former Transitional phase, this lever will be the most important. Sony has to keep the highest technical capabilities and marketing capabilities in the ecosystem to navigate the ecosystem in the appropriate direction and keep bargaining capabilities against complementors. Higher technical capabilities prevent similar competitors from duplicating the leader’s innovative technology and business model. Especially, in the NFC business case, Sony has to pay attention to the behavior of Philips, which is a co-founder of NFC and is a very similar type of company.

7.5. Summary and Conclusions

In this chapter, I proposed a business model to be a Platform leader for next-generation home network environments which many past potential Platform leaders tried unsuccessfully to do, and proposed strategies for how to make the proposed business ideas sustainable as a Platform business using EPLM. Sony, which has Felica technology, has just established the NFC Forum with Philips and Nokia, and has just announced its intention to be the Platform leader for the next-generation home-network environment Platform business. I proposed the key success factors that Sony has to pay attention to in order to be a successful Platform leader in NFC Platform business.
I believe that if Sony learns efficiently from the successful case described in Chapter 5 and the unsuccessful case in Chapter 6 as a Platform leader, the possibility of success in generating a new home-network environment ecosystem as a Platform leader will definitely increase. In addition, Sony should also keep in mind the EPLM.
8. Overall Summary and Conclusions

8.1. Overall Summary

In this paper, I proposed key success factors the Enhanced Platform Leadership Model (EPLM) for a potential Platform leader to establish successful and sustainable Platform business. Especially I focused on the industry of next-generation home-network environments for which many players tried unsuccessfully to establish a dominant design. In addition, I proposed a high potential business model taking advantage of NFC technology for next-generation home-network environments.

![Diagram of Enhanced Platform Leadership Model: EPLM](image)

Figure 8-1 Enhanced Platform Leadership Model: EPLM
Source: Author, 2006

The EPLM is the enhanced model of the key success factors which Cusumano and Gawer defined in the book, *Platform Leadership*, considering several successful and unsuccessful
attempts of companies to be Platform leaders, especially in the home-network business. In EPLM, I defined five categories and eight levers as key success factors to be a successful Platform leader. In this paper, I evaluated the effectiveness of EPLM, taking advantage of several actual cases.

In Chapter 2, I defined as EPLM the following categories and levers which a potential Platform leader has to pay attention in order to build a sustainable Platform business.

Five Categories:

1. Innovative Technology or Business Model
2. Competences for Platform Management
3. Competences for Internal Management
4. Commitment to be Platform Leader
5. Competences for External Management

Eight Levers:

1. Lever-1: Innovative Technology or Business Model
2. Lever-2: Product Technology
3. Lever-3: Competences to Manage Platform
4. Lever-4: Scope of the Firm
5. Lever-5: Internal Organization
6. Lever-6: Commitment
7. Lever-7: Credibility
8. Lever-8: Relationship with External complementors
In Chapter 3, I explored which levers the potential Platform leader has to focus on depending on its place in the Platform business cycle, which I divided into five phases.

In Chapter 4, I discussed the most appropriate architecture, evaluating some academic ideas, actual business cases, and recent trends of technology development environments. As a result, I proposed that the most appropriate architecture for a core Platform module was modular architecture. I also proposed a new idea about the relationship with modular architecture and innovations by arguing Christensen’s innovation model.

In Chapter 5, I discussed Sony’s Felica business as a successful Platform business in order to evaluate the effectiveness of EPLM. I concluded that EPLM contains the appropriate key success factors which a potential Platform leader should use to establish a sustainable Platform business.

In Chapter 6, I discussed Sony’s high-speed serial bus business, i.Link, as an unsuccessful Platform business in order to evaluate the effectiveness of EPLM further. I realized that interfaces and protocols, which don’t exist physically, are not appropriate as the seed of a Platform business.

In Chapter 7, I proposed a business model of next-generation home-network environments which many past potential Platform leaders tried unsuccessfully to achieve, and used EPLM to propose strategies about how to make the proposed business model sustainable as a Platform business. I proposed that intuitive usability operation is the key technology for next home-network environments, and also explored the business models and key success factors for NFC business as a high potential Platform business.
8.2. Conclusions and recommendations

Under the severe circumstances due to the collapse of the IT bubble and the rapid commoditization of digital products, the consumer electronics industry has suffered from not earning even short-term profits. While home electronics companies have suffered from thin margin business, namely "hardware selling business," the firms, which enjoy ten times of the profit ratio of conventional firms', have been the Platform leaders such as Intel, Microsoft, and NTT-Doicom. Additionally, their profitability is considered sustainable for a longer term. However, the successful Platform leaders didn't obtain their current profitable position in a day. Rather, some stayed in the shade for a longer term.

As I discussed in several chapters, the most important notion the potential Platform leader has to keep in mind is that the potential Platform leader has to manage processes appropriately by continuously investing for the prosperity of the entire ecosystem rather than pursuing its own profits. This seeming contradiction raises the sustainability and profitability of the Platform business.

Currently, there are many companies which have very innovative technology seeds, but some of them have to give up pursuing the future success in taking advantage of those seeds due to the strict eyes of stakeholders who need short-term profitability. However, I conclude that if the potential Platform leader really wants to be a sustainable Platform leader in the future, it should not react nervously to day-to-day results. EPLM obviously offers a contradiction to firms that need short-term profitability. However, I believe that to do business properly with appropriate strategies to achieve future success and not to improvise the current business because of being scared of short-term results raise the possibility of the success of a Platform business. That is the fundamental idea of EPLM.
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**Interview and discussions**

Discussion with Prof. Michael A. Cusumano on November 23, 2005

Interviews with Mr. Matsuo, a business planner of an R&D center of Sony Corporation on January 16, February 12, and March 30, 2006

Discussion with Prof. Michael A. Cusumano on January 19, 2006
Interviews with Mr. Tominaga, an engineer of Business and Professional division of Sony Corporation on January 20, 2006

Interviews with Mr. Nakamura, a manager of Business and Professional division of Sony Corporation on January 22 and 23, 2006

Interviews with Mr. Taniwaki, an engineer of Business and Professional division of Sony Corporation on January 22, 2006

Interviews with Mr. Tada, a researcher of network R&D center of Matsushita Electric Industrial Co., Ltd., on February 6 and February 13, 2006

Interview with Mr. Kato, an engineer of TV business division of Sony Corporation on February 16, 2006

Discussion with Prof. Michael A. Cusumano on March 30, 2006