

IT Business Model Engineering: A new perspective on the technology development

TOSHIHIKO YAMAKAMI†

The complexity of technologies and business value chains are further accelerated by the advances of computer communication technologies enabling more advanced business model development. The author presents the business model requirement for computer communication technology development. The issues of the business model development surrounding today's computer communication technologies are outlined. The author proposes a socio-technical methodology to cope with this challenge involving business players mental model on the uncertain future. The author briefly outlines four domains of IT business model engineering, starting from value chain modeling to IPR business models, business model evolution and platform selection business models. The issues in IT business model engineering are highlighted from the international standardization case study and platform selection criteria case study. To cope with the long-term dynamisms in computer communication platform standardization, evolution stage analysis and two dimensional diagram comparison methods are used to identify the factors of business models during the cognitive process of the technology development.

1. Introduction

The advances of computer technology involves rendering it as an inseparable part of business as well as our every day life. While the advanced computer communications are radically improved, we simultaneously witness that the more business model discussions are deeply involved in the technology development. This aspect of business may not explain the motives of the technologies, however, they can often explain the social factor that propels the technology into the larger world. In this paper, the author presents the two use cases for the business model discussions in the today's technology development frontiers. Then, the author discusses the directions of the technology development in relation to the business model development. After highlighting the important of business model development, as the next step, the author outlines the IT business model engineering as a research field. Finally, the author presents the first step for the establishment of IT business model topology studies and non-equilibrium business model dynamics.

2. Challenges and Related Works

2.1 Definition

In a basic sense, a business model is the method of doing business by which a company can sustain itself. It means the model in which the relations among business players generate revenue. In other words, the business model is a relation picture that describes the position of the business players in a value chain. IT business model engineering is the design method of the business models.

2.2 Challenges

The globalization of today's world force more researchers to devote increasing amount of time for the international standardization. It is common that the researchers involved in the international standardization encounter more and more procedural works for intellectual property right(IPR) declaration and license agreements. It is a minor scene of the standardization activities, however, it is to be noted that the today's IPR management needs significantly more complicated compared to those a decade ago. Not just for paper works like IPR declarations or signing license agreements, the knowledge about IPR treatment has no sign of decreasing. It involves patent pool, mandatory patent advisory committees, and various restrictions on IPR licensing in an agreed group. It is an indicator that the technology devel-

† ACCESS, 2-8-16 Sarugaku-cho, Chiyoda-ku, Tokyo, JAPAN, e-mail:yam@access.co.jp

opment is deeply involved in the technology development. In addition, in business scenes, it is rarely seen that the technology superiority means market selection. The complicated today's computer and communication environments, no single technology can dominate the world. And the world is tightly interconnected using the global standards of communication technologies. It inevitably leads to the situation in which researchers need to spend more time for business model considerations than the technology development. From these common examples, it is clear that the high level research in which technology for business model development is required for this part of industries. In the previous studies, the business model development was treated as the matter of business cases. The business cases are parts of empirical and inductive. They formed part of business management or management science. The computer science needs more complicated integration of the technology. It needs a good methodology to build a business model to glue the components. The methodologies to coin business models and compare them are needed in this field. First, the outline, goal, and roadmap of the IT business model engineering should be explored. Second, the dynamics of the business model should be identified. The dynamics needs the topology of the business models and driving factors for business model evolutions.

2.3 Purpose of the Study

The aim of this research is to identify the business model factors affecting IT technologies, like international standardization of communication technologies and platform selections of communication technologies in the light of the socio-technical methodologies.

2.4 Related Works

Business models were perhaps the most discussed and least understood aspect of the Internet. The business modeling was extensively researched as a part of the software engineering. It is partly because the business modeling for business structures and business flows were required to build an information system. The business modeling was used to help to establish the requirements for the system development⁴⁾. Some times these modeling are used for document modeling, process modeling or knowledge captures. As the electronic

technology is deeply involved in the real world, business model engineering is needed to justify the IT use in the real world. One of the such examples includes digital right discussions¹⁾. As the Internet business emerged from the technology-augmented real world using Internet, various business models are proposed³⁾. They are mainly used for the business incubation with the Internet Initial Public Offering(IPO) boom worldwide. Emerging e-business gave a new opportunity to describe the whole e-business domain using the business modeling approach⁶⁾. Business patterns were studied using business flow diagrams⁵⁾. The transition framework of the business operation was studied in light of the strategic grid⁷⁾.

3. IT Business Model Engineering

3.1 A Basic Start Point

The simplest business modeling comes from the analysis from the e-business formation. The business modeling in e-business in the early stages come from the following two steps.

- Electronic methods will give a completely new method of business
- Electronic methods should learn from the existing business models and make use of the strength of them

The first approach came from the fact that the daydream that the new frontier created from the emerged communication technologies brings the everybody's heaven to the world. The second approach came from the retrospective view on the extreme optimism in the first approach and tried to lure the existing power players into the Internet business field. The examples include⁶⁾:

- The Inquiry Model
- The Layered Model
- The Discount Model
- The E-broker Model

As stated above, the technology development requires in-depth consideration of business model studies. The factors to require these studies are depicted in **Fig. 1**.

These requirements differentiate the business model engineering for the technology development with the past business model development for building companies or for building software systems. To cope with these requirements, two factors are the IT business model engineering

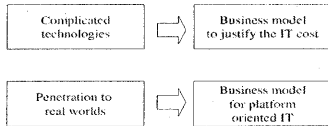


Fig. 1 Two Driving forces for Business Models

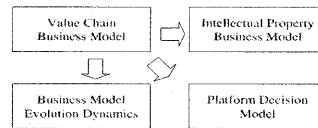


Fig. 3 Four Perspectives in IT Business Model Theory

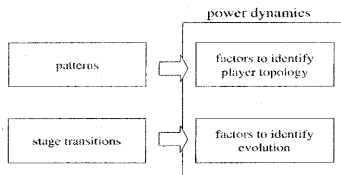


Fig. 2 Patterns and Transitions: Two Factors in IT Business Model Engineering

as depicted **Fig. 2**. In the today's technology world, frankly speaking, there is no static business model. However, to identify the dynamism, it is important to identify the static patterns. Without them, it is hard to identify the dynamism in the technology evolution. The power dynamism to drive the evolution needs careful consideration in order to think about the sustained business model development.

3.2 4 Perspectives of IT Business Model Engineering

The purpose of this study is not to invent a new business unit, but to form a new framework to enable the new IT technologies into the international standardization and platform selection process. The four major domains to pursue the goal are outlined in **Fig. 3**. The upper left corner business value chain is the most standard form of the business model engineering in the ordinary sense. The business model engineering discussed in this paper evolves towards the three different directions.

4. Case Studies for IT Business Model Engineering

4.1 Competition, Player Relation and Business model for IPR

The most active business model development and the evolution of the strategy through the regulatory changes, player changes and market structure changes can be observed in the international standardization of the computer communications. The author proposes the four-stage model for this⁸⁾. The stages and their characteristics are summarized in **Fig. 4**. The globalization of computer communication leads to the increase of internationalization and accompanied challenges against IPR policy management. Since the application layer computer communication standardization started in the late 1970s, the computer communication standardization copes with this challenge. The rapid advances in technology and deregulation of the telecommunications propelled the fast establishment of the business-model oriented decision on the technology selection. The procedures and licensing policies were developed and improved during these four-stage evolution. In addition, it reflects the changes of the players, player power balance, and trusts among players and potential players.

The model illustrates that the following three changes:

- Regulation and Market changes brought the new players
- Emerged new players brought changes of power balance and mutual trust mechanism
- New social factors like power balance and mutual trust brought changes of rules, pro-

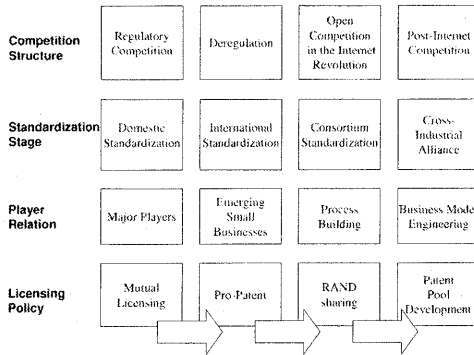


Fig. 4 A four-stage model of the International Standardization of Computer Communications

cedures, and policies of IPR

This is a piece of observation, however, it should be noted that the underlying social structures and mental cognition are the important factors during this series of evolution.

4.2 A Business Pattern Model

There are many business models that have been developed during the long history of business. They include:

- Brokerage
- Advertising
- Infomediary
- Merchant
- Manufacturer
- Affiliate
- Community
- Subscription
- Utility

To focus the business model chain, the business to consumer model is considered in this section. The business chain positioning examples are shown in **Fig. 5** with the additional remarks on the evolution strategies. This topology model is simplified to abstract the details of the player interactions. The black mark indicates the position in the business model. It is assumed that the left side white circle denotes the business player and the right side white circle denotes the consumer players and that the business players provide services to the consumers. ASP denotes application service provider, a kind of aggregated to platform business which usually charges the use of the

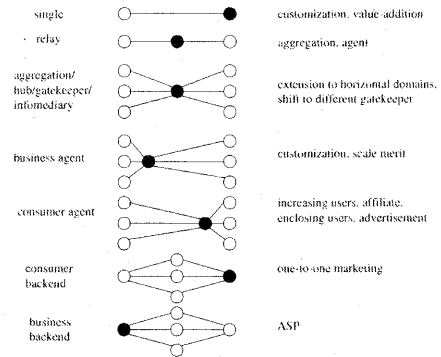


Fig. 5 A Taxonomy of Business Model Topology Diagram

platform to the business customers.

4.3 Business Model Positioning and Competence

It is beyond this paper's scope to discuss the in-depth study of a certain business model, or generally summarize the details of the business model. However, the author focuses on the evolution paradigm. To study the evolution paradigm, the author takes the first step to make two dimensional comparisons of the value proposition and competence.

The comparison is made in the perspective of the technology development, the following two factors are used.

- Business Openness factor
- Standard-driven factor

First, the positioning in business models is depicted in **Fig. 6**. It identifies the positions of the different business model positioning. They include aggregation, integration, consultation, business backend, broker, infomediary and user front end. The integration and consultation are usually a single relation to the customer, however, it is shown to highlight the business openness and standard driven factors in the business positioning.

Next, the competence in the two dimensional comparison are depicted in **Fig. 7**. The competence includes first come, financial, niche, mediation, technology differentiation, material superiority, and regulatory closed. The details of the competence strategies are as follows:

- first come: simply arriving first in the business domains

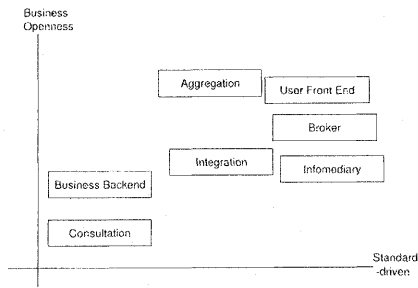


Fig. 6 Two Dimensional Comparison Positioning for Positioning in Business Models

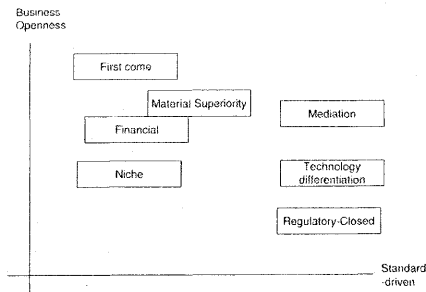


Fig. 7 Two Dimensional Comparison for Competence

- financial: coining business models in the money flow engineering, like lease, insurance, investment, financial advice, and so on.
- niche: doing business in the niche area in which only a small number of players can survive
- technology differentiation: driving business with the technical competence
- material superiority: doing the same business models with outstanding investment and resources to drive away early comers and competitors
- regulatory closed: protecting the business by official licenses

This empirical study presents the first outline of the business model engineering in the business modeling. Generally speaking, the business trend requires more openness and more standard alignment for interoperability and

third party collaboration. However, how the players perceive the openness and alignment in their mental model should be examined further. In addition, the shift of the business model and forces to propel the shift are for further studies.

4.4 Platform Selection Process

Platform is defined as the common infrastructure to provide the bases for third party services. Platform selection is important because it involves the leverage from network effect. Network effect is defined as the phenomenon whereby a service becomes more valuable as more people use it, thereby encouraging ever-increasing numbers of adopters. The network effect grows with analysis of a network's size and projected growth. The decision theory for service platform is an interesting research topic. When the platform is selected, it is common that it is infeasible to discuss the every future possibilities of the platform outcomes. Therefore, it is quite social cognition issue to select a platform. When it works as a lock-in effect, it will dominate the platform business without any special technical superiority. The platform decision theory is immature, however, the author proposes the two dimensional comparison for platform decision factors. The factors are depicted in the two dimensional comparisons in **Fig. 8**. The measures to drive the platform selection include reliability, stability, applicability flexibility, alignment to standard, reuse, commitment for extension, predictability, visibility, interoperability and openness. In a very general sense, the emphasis is moving from the left bottom corner to the right top corner.

The business domain specific factors on platform selection are out of scope of this study. How the openness, visibility or other cognitive factors are calculated by business players are for further studies.

5. Discussions

The whole IT industry heavily depends on the advances on computer communications. The computer communication technologies bring the following two advantages:

- Cheap and abundant communications
- Digital and reusable information

The communication cost drop always gives benefits to business, because business heavily depends on the project management, execution

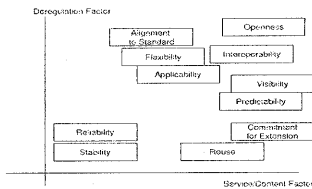


Fig. 8 Two Dimensional Comparison for Platform Decision Factors

management and education, each of which enjoys the additional cost reduction or additional benefits from computer communications. Digital reuse is the source of new business models, because it enables broker, infomediary, and also helps incubate new business models like reverse auction. Today's computer communications increasingly demands the business model consideration. This comes from the following two factors:

- network effect heavily depends on the third-party content and services which is derived from network's platform capabilities
- the complicated accumulation of the technology components require the more visible solutions for business players

These factors depend on the business players' mental model. The further socio-technical studies are needed to identify the factors to determine the mental positions of the business players and to propel the business model evolution. The mental model should be analyzed with the following factors:

- trust building process among players
- platform selection
- cognition of openness, business visibility, and fairness
- cognition of dominant business competence
- negotiations on business model development

6. Conclusions

The advances of computer technology involves rendering it as an inseparable part of business as well as our every day life. While the advanced computer communications are radically improved, we simultaneously witness that

the more business model discussions are deeply involved in the technology development. The author proposes the business model engineering in the view of the today's technology development requirements. The author briefly outlines four domains of IT business model engineering, starting from value chain modeling to IPR business models, business model evolution and platform selection business models. The issues in IT business model engineering are highlighted from the international standardization case study and platform selection criteria case study.

The author emphasizes the importance of the business model consideration in the computer communication technology development. Evolution stage analysis and two dimensional diagram comparison methods are used to identify the factors of business models during the cognitive process of the technology development in static patterns and in dynamic patterns. The general theory of the business model evolution needs in-depth investigation of the business model transitions.

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