

An IT-Driven Business Model Design Methodology and Its Evaluation

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Abstract— IT has changed business model and business process, and has become an essential ingredient for the competitive advantage. Under such circumstances, a conventional requirements engineering methodology is not sufficient. We propose an IT-driven business model design methodology in order to take advantage of innovative information technologies. The proposed methodology includes XBMC (eXtended BMC), an extension of BMC (Business Model Canvas) of BMG (Business Model Generation) as a framework to visualize a business architecture with a holistic view, and SMC (System Model Canvas) as a new model to visualize overall system architecture, correspondingly. In addition, we propose BSTM (Business-System Translation Meta-model) to align business architecture and system architecture based on the business meta-model and goal model. We demonstrate the effectiveness of the proposed methodology by applying it to the case of a mobile music delivery business.

Index Terms— Business Model Design, BPM (Business Process Management), Business Modeling, Business Model Canvas, System Model Canvas, Business Requirements Engineering

I. INTRODUCTION

Information Technology (IT) and Information Systems are an essential management resource. Utilization of new information system and technology such as EC (Electronic Commerce) and SNS (Social Networking Service) has created successful new businesses [3]. To create the competitive advantage of business, a comprehensive business model design methodology utilizing IT is desired. Thus, in recent years, business model design methodologies are gaining attention [6, 7, 8, 9, 15]. Under such circumstances, in order to realize business goals beyond mere business model design, it is required to analyze the impacts of IT on improvement of business value and constraints and to design business and information system concurrently.

In this study, we first clarify problems related to business model design utilizing IT. Then, to solve the problems, we

propose a business model design methodology, including visualization of business architecture and system architecture in a holistic view, and mapping business architecture and system architecture, and a design process of IT-driven business model utilizing the visualization technique and mapping technique. We apply the proposed methodology to business model design of a mobile music delivery business, and demonstrate the effectiveness of the proposed methodology by comparing with the conventional design methodologies and the related works.

II. FRAMEWORK OF BUSINESS MODEL DESIGN METHODOLOGY

We assume a framework of business model design illustrated in Fig. 1. Since concepts related to business model design are not yet well defined, we use the following definitions.

A. Business Goal

Business goal is a type of goal which meets business strategy. We assume a business goal as a strategic goal, and a soft goal.

B. Business Value

We call the value generated through business architecture to meet the business goals. We assume the business value represents a hard goal.

C. Business Architecture

Business architecture is the fundamental structure of the business to meet the business goal and the principles guiding the design and evolution. It comprises business value, business model, and business scenario.

D. Business Model

The business model is structured or system of the business. It comprises business resources to execute business processes of business value delivery, revenue structure gained from

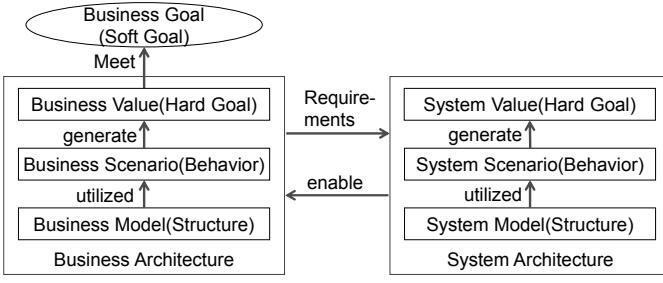


Fig. 1. Concept of Business Architecture and System Architecture

business value delivery, and cost structure necessary for business resources [20].

E. Business Scenario

Business scenario is a behavioral trace to generate business value utilizing business model.

F. System Architecture

In this study, in addition to the conventional definition of a macro structure of information systems, the system architecture includes system value. The system value in turn delivers business value via system scenario which defines behavioral trace to utilize system model to generate system value.

III. PROBLEMS IN THIS STUDY

Conventional business model design methodologies are generally to design business model first, and then analyze the requirements to realize the model. Thus, they focus on a method to visualize the business models in a holistic view, and analyze them [14].

However, rapid advancement of EC and SNS created successful new businesses. An IT-driven business model design methodology is required to realize the new business models to deliver superior business value by utilizing the innovative IT.

Our study focuses on the following three problems for creating an IT-driven business model design methodology.

- (1) Method to visualize and analyze business architecture in a holistic view
- (2) Method to visualize and analyze the system architecture in a holistic view
- (3) Mapping method between business architecture and system architecture

IV. RELATED WORKS

A. BMM (Business Motivation Model)

BMM of OMG is one of the techniques related to the business model development. It is a meta-model defined based on a concept that the fundamental components of a business plan include a purpose and means [12]. The analysis technique to utilize BMM in information system planning is proposed.

B. BMG (Business Model Generation)

BMG is one of methodologies to develop a business model. It is a method to design value generation and its delivery to a customer in a business model [14]. BMC (Business Model Canvas) shown in Fig. 2 is one of the BMG techniques. BMC is a visualized framework to gather important components for business model design, to arrange typical issues for checking, and to examine business model. BMC is comprised of nine blocks covering four areas including customer, value proposition, infrastructure, and fund. BMC enables to share the problems of the business model among stakeholders who related to business development.

Key Partners	Key Activities	Value Propositions	Customer Relations	Customer segments
	Key Resource		Channels	
Cost Structure			Revenue Stream	

Fig. 2. BMC

BMC is a concept of design from the business view, and does not provide any method to examine system architecture.

C. EA (Enterprise Architecture), TOGAF, ArchiMate

The Zachman framework shows system components and its abstract degree in a matrix [19]. EA is the business model development framework is derived from Zachman Framework [17]. TOGAF (The Open Group Architecture Framework) is one of the representative frameworks of EA [13]. EA is defined as four layers including business architecture, data architecture, application architecture, and technical architecture; However, it does not offer any method to develop business models and the business model that utilize IT.

ArchiMate is proposed as EA modeling language [11]. It provides a development method for EA from the business model defined by applying BMC; however, there is no mapping feature of EA toward a business model.

D. BABOK (Business Analysis Body of Knowledge)

BABOK is a body of knowledge for the business analysis [7]. It assumes the business model a given condition, and its object is an analysis of the business requirements condition; however, it does not offer any method to design business model.

E. REBOK (Requirements Engineering Body Of Knowledge)

REBOK is a body of knowledge on the requirement engineering to connect the business requirements to software requirements [10]. However, it does not offer any concrete method for business model development.

F. Business Value Generation by IT

In order to generate business value, a framework to analyze the EC value chain via a mobile device is offered [1]. Also, business model design method is proposed based on the business value [5]. However, it does not offer any business model development method utilizing IT.

G. Alignment between Business Architecture and IT

There are studies to align business architecture using IT [4, 16, 18]. However, it does not offer any concrete method for alignment.

V. APPROACH

BMC expresses various concerns in business architecture and system architecture. It is difficult to discuss an impact of IT on business and required system architecture to realize business value. In this study, we separate BMC into concerns of business architecture and system architecture, and propose two visual languages. By utilizing a business meta-model and business goals, an incremental mapping technique between business architecture and system architecture enables to design business models driven by IT.

VI. AN IT-DRIVEN BUSINESS MODEL DESIGN METHODOLOGY

A. Framework of the Proposed Methodology

1) *Visual Languages*: Fig. 3 illustrates the structure of our visual languages. Conventional BMC confuses both business and system concerns. In order to visualize business architecture with a holistic view, we separate concerns of business and systems from BMC, and create a new visual language, XBMC (eXtended BMC), to represent only business concerns on the framework of BMC. As an extension of BMC, XBMC accommodates goal models to represent the contribution of business models to the business goals.

By abstracting the framework of BMC, we define an abstract visual language GMC (Generic Model Canvas).

To visualize system architecture in the same framework of BMC, we derive SMC (System Model Canvas) from GMC.

2) *Definition of Conversion Layer to Map Architectures*: To meet the business goals, we define BSTM (Business System Translation Meta-model) as a conversion layer for mapping between XBMC and SMC, as illustrated in Fig. 4.

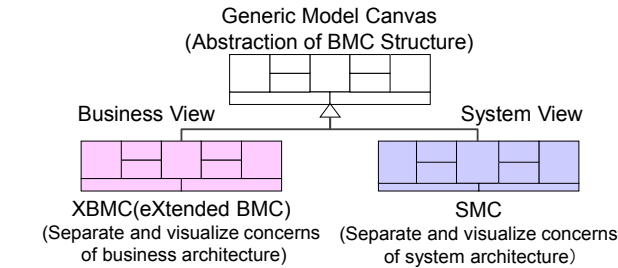


Fig. 3. Definitions of XBMC and SMC by Model Canvas Hierarchy

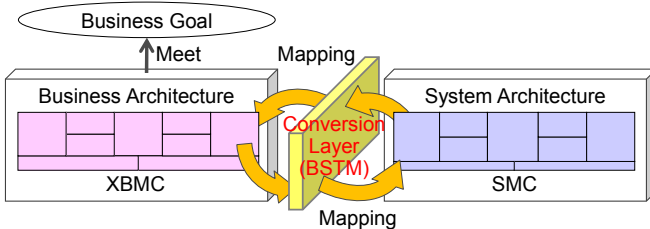


Fig. 4. Mapping Components of XBMC and SMC via BSTM

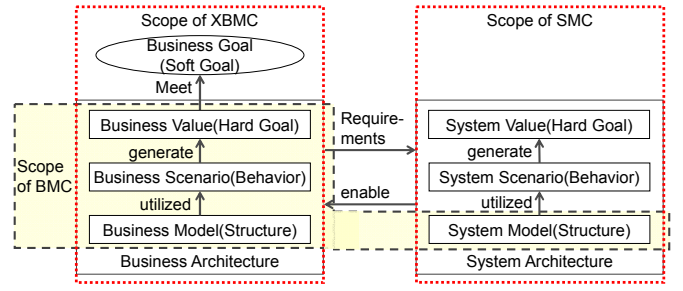


Fig. 5. Separation of Concerns and Definition of XBMC and SMC

B. XBMC

XBMC (eXtended BMC) extends the following three points to visualize and analyze business architecture.

1) *Separation of Concerns of Business Architecture*: As illustrated in Fig. 5, XBMC eliminates systemic concerns from BMC and makes SMC represent the concern with other systemic concerns. Table I shows nine components of XBMC.

2) *Relationship between Business Goal and Business Architecture by Business Goal Graph*: We introduce a business goal graph illustrated in Fig. 6. The business goal graph analyzes business goals, and relates them with XBMC components. The business goal graph enables to realize business architecture in order to meet the business goals by relating between business goals and business value.

3) *A Business Scenario Analysis Using a Business Case Map*: We introduce business case map that represents the behavior of business scenario of XBMC. The business case map is a semantic extension of Use Case Map [2]. In principle, BMC assumes the flow of business value along with business value chain from left side to the right on the canvas. However, it is unable to represent business value chain. By the business case map, it is able to represent business value chain, and to analyze business value.

XBMC enables to design business models to meet the business goals.

Table I. Definition of XBMC Components

No	Component	Category	Definition
1	Business Value	Business value	Value of business to be delivered to customer segments, a hard goal required to meet business goals (soft goals)
2	Business Customer Segments	Business model	Customer and its segment to whom business value is delivered and from whom the revenue comes.
3	Customer Relations	Business model	Business relation buildings with customer segment, methods to maintain it.
4	Business Channels	Business model	Channels to reach customer segments delivering business value
5	Revenue Structure	Business model	Stream, structure, or outcome of th revenue that comes from customer segments on return of business value
6	Business Activities	Business model	Direct activities of business to generate business value
7	Business Resources	Business model	Resources (personnel, material, know how, etc.)required to generate business value
8	Business Partner	Business model	Partner or cooperator who complements business resources and activities to generate business value
9	Cost Structure	Business model	Structure of costs required to continuously generate and offer business value

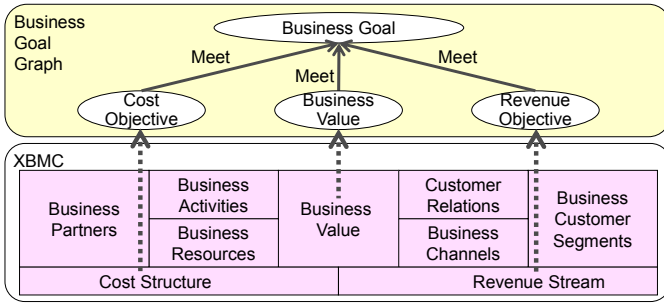


Fig. 6. Relations between XBMC and Business Goal Graph

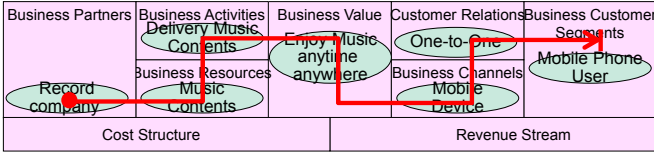


Fig. 7. Business Scenario Analysis Using Business Case Map

C. SMC

We propose SMC (System Model Canvas) as a specialization of the GMC structure. It is intended to visualize and analyze the system architecture with the following four techniques.

1) *Separation of Concerns of the System Architecture*: As illustrated in Fig. 5, we separate systemic concerns from BMC, and need to represent them as a single model of system architecture.

2) *Extension of Concerns of the System Architecture*: We integrate system value and system scenario with the system model as concerns of system architecture. Table II shows the nine components comprising MC, which express of system architecture. As a result, system architecture required to meet the business goals, and is expressed and analyzed

Table II. Definition of SMC Components

No	Component	Category	Definition
1	System Value	System value	The value of the system delivered to system users to realize business value modeled as hard goals.
2	System User	System model	User or its segment to whom the system value is delivered
3	System Utilization Scenario	System scenario, utilization, components	Scenario or method of the system with which system users utilize system value
4	System Channel	System model, utilization, components	Channels directly connected to system user to deliver system value, such as communication, device, user interface, etc.
5	System Revenue Structure	System scenario	Stream, structure, or outcome of the revenue gained by delivering system value to system users
6	System Development Generating	System scenario, utilization, components	Work or form of system development with which system value is generated
7	System Resources	System model	Resources (personnel, material, know how, etc.) related to system, which is required to generate system value
8	System Development Partner	System scenario	The partners who complement system resources or system development work to generate system value
9	System Cost Structure	System scenario	Structure of system cost required to continuously generate and deliver system value

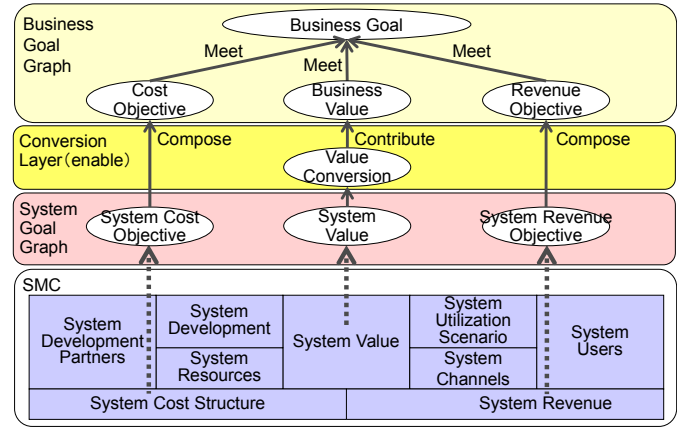


Fig. 8. Relations between SMC and Business Goal Graph

comprehensively.

SMC includes components to utilize IT that leads to business value. We call them *utilization components*. The utilization components are utilized in the system architecture to increase system value, and hence contribute to increase the business value in business architecture through the value conversion via the conversion layer as illustrated in Fig. 8.

3) *SMC Structure to Meet the Business Goal*: The relationships among SMC, system goal graph and business goal graph are illustrated in Fig. 8. The system goal graph is a graph of goals, to which SMC components are intended to meet. As illustrated in Fig. 8, SMC does not have any direct link to a business goal by the separation of concerns. The system goal graph is linked to the business goal graph by converting the values through the conversion layer. By corresponding system value, the system architecture is designed to meet business goals.

4) *System Scenario Analysis Using System Case Map*: We introduce a system case map as illustrated in Fig. 9, that represents the behavior of system scenario. The system case map is a semantic extension of Use Case Map in the context of system behavior [2].

Using the system case map enables to clarify the system value chain on SMC. By the system case map, it is able to represent stem value chain and to analyze system value.

SMC enables to design a system architecture to meet the business goals.

D. Meta-Model of BSTM

We propose BSTM that maps the utilization components in SMC to XBMC components in order to obtain business value that XBMC aims at.

1) *XBMC Meta-Model*: We defined XBMC meta-model as illustrated in Fig. 10. It comprises *Business Value Generation*

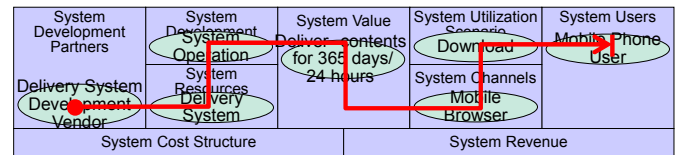


Fig. 9. System Scenario Analysis Using System Case Map

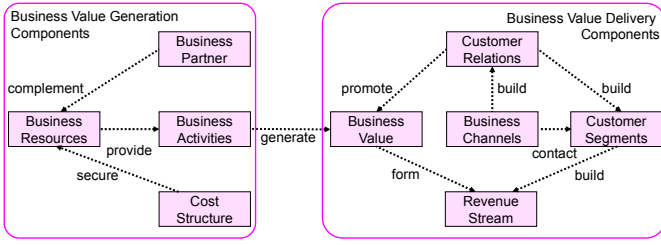


Fig. 10. XBMC Meta-Model

components and Business Value Delivery components.

Business Value Delivery component represents the relationships among components required to deliver “business value” to “customer segment.”

Business Value Generation component represents the relationships among components required to generate “business value.”

According to the XBMC meta-model, we develop requirements in the following process.

a) Develop Requirements for Business Value Delivery Components: By the governance of the XBMC meta-model, we can develop the requirements for each Business Value Delivery Component of XMBC.

- i) Customer Segments: a target for business value delivery,
- ii) Business Channels: a channel to deliver,
- iii) Business Value to Customer Segments,
- iv) Customer Relations deliver Business Value, and
- v) Revenue Stream built by delivering Business Value to Customer Segments.

b) Develop Requirements for Business Value Generation Components: By the governance of the XBMC meta-model, we can develop the requirements for each Business Value Generation Component.

- i) Business Activities to generate Business Value,
- ii) Business Resources to execute Business Activities,
- iii) Business Partners that complement Business Resources, and
- iv) Cost Structure to secure Business Resources.

2) SMC Meta-Model: We defined SMC meta-model as illustrated in Fig. 11. It comprises *System Value Generation components* and *System Value Delivery components*.

System value delivery components represent the relationships among the components required to deliver “system value” to “system user.”

By the governance of the SMC meta-model, we investigate

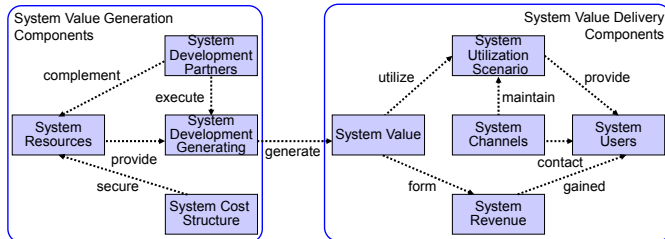


Fig. 11. Meta-Model of SMC

requirements in the following process.

a) Develop Requirements for System Value Delivery Components: Meta-model develops the requirements for each System Value Delivery Component.

- i) System Users: a target for delivery of
- ii) System Value: a value created by the system,
- iii) System Channels: a channel to deliver System Value to System Users,
- iv) System Utilization Scenario with which System Users utilize System Value, and
- v) System Revenue gained by delivering System Value to System Users.

b) Develop Requirements for System Value Generation Components: By the governance of SMC meta-model, we can develop the requirements of each System Value Generation Component.

- i) System Development to generate System Value,
- ii) System Resource executing System Development
- iii) System Development Partners that complement System Resources, and
- iv) System Cost to secure System Resources.

3) BSTM Meta-Model: We define the meta-model of BSTM as illustrated in Fig. 12. It maps utilization components of SMC to those of XBMC incrementally by combining XBMC meta-model and SMC meta-model.

BSTM meta-model defines the conversion layer that converts system goal graph illustrated in Fig. 8 to business goal graph. BSTM expresses the relationships between the meta-model of XBMC and SMC, and converts the system value to business value based on the relationships of two goal graphs. BSTM comprises four components, which form XBMC and SMC. We analyze and map requirements for each component.

E. Incremental Mapping of Utilization Elements using BSTM

The mapping process of utilization elements using BSTM is spiral in the sense that is incremental and cyclic as indicated by arrows connecting four components of BSTM illustrated in Fig. 12. It maps the utilization components in each component step by step. The single cycle of mapping each component using BSTM is managed with business goal graph.

The process to map utilization elements in BSTM cycle is as follows.

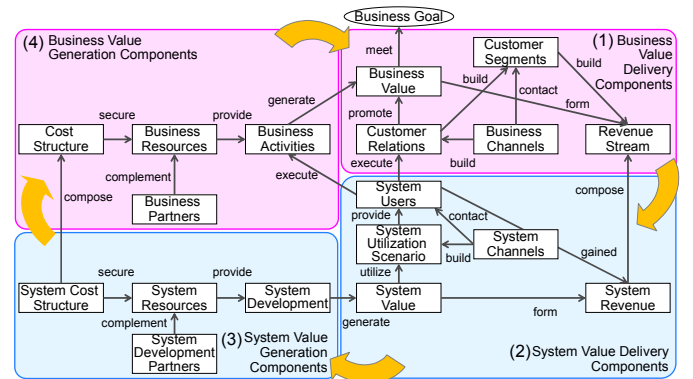


Fig. 12. BSTM

1) *Mapping Requirements from Business Value Delivery Component to System Value Delivery Component*: Analyze the alignment of the business value delivery component of XBMC to the system value delivery components SMC by BSTM.

2) *Mapping Utilization Components from System Value Delivery Components to Business Value Delivery Component*: Map utilization components of IT and their constraints in SMC to the factors in business value delivery component. Mapping to the business value delivery components in XBMC may impose changes to the requirements to obtain business value based on the utilization components and their constraints.

3) *Structural Analysis of System Value Delivery Components and System Value Generation Components*: To generate the system value, we analyze the structure of the system value delivery components and system value generation components, and evaluate if the system value is generated as expected. If not, the requirements to the system value delivery components and system value generation are reconsidered. The change of requirements to the system value delivery components and system value generation components affects to the business value generation components through BSTM, and may need to revise the requirements of business value delivery components that are impacted.

4) *Mapping Cost Constraints from System Value Generation Components to Business Value Generation Components*: We map “system cost structure” required to realize requirements of system value generation component in SMC to “cost structure” of business value generation component in XBMC. Considering “Business cost structure” that includes “system cost structure” as the constraints of business value generation, we analyze the relationships among requirements in business value generation component in XBMC, and may revise the requirement if needed.

F. Business Model Design Process

Based on the iterative mapping method above mentioned, we propose a process of IT-driven Business Model Design as illustrated in Fig. 10.

This process enables to design business architecture utilizing innovative IT and to design system architecture that is necessary in the business architecture design. As a result,

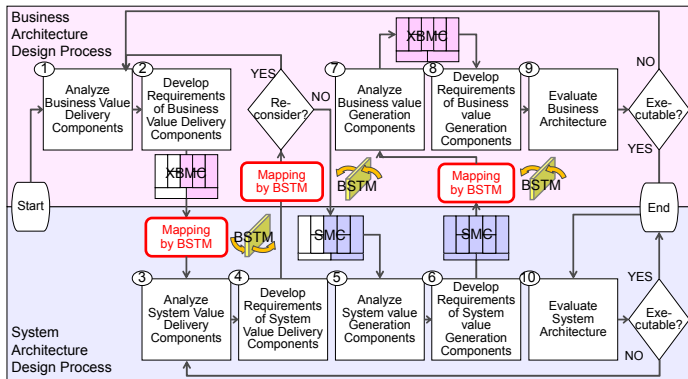


Fig. 13. IT-driven Business Model Design Process

system architecture development starts at the same time of business architecture development, and it shortens the time for business development.

The proposed business model design process is applicable to business model design for both new business development and reengineering of existing business.

1) *Tasks and Deliverables of Business Requirements Development Process*: The Business Model Design process consists of tasks shown in Table III. Executing tasks using XBMC, SMC, and BSTM enables to create XBMC and SCM step by step and to design business architecture and system architecture in order to meet the business goals.

2) *Methods to Determine the Completion of the Business Model Desing Process*: The Business Model Design process is executed repeatedly until the following three evaluation criteria are fulfilled.

- Business goal achievement by business goal graph and system goal graph*
- Realization of business architecture*
- Realization of system architecture*

VII. BUSINESS MODEL DESIGN IN THE CASE STUDY

A. Outline of the Case Study

We demonstrate the effectiveness of the proposed methodology by applying it to the development of a mobile music delivery business, in which the author was involved in the past.

The case is to evolve new business from existing business by taking advantage of the new smart phones.

The case study is outlined in the following three points.

1) *Design Models of Business Architecture using XBMC*: Conventional business model design of business architecture

Table III. Tasks and Deliverables of IT-driven Business Model Design Process

No	Task	Deliverable
1	Analyze business value generation component	BSTM (Relationships in business value delivery component)
2	Develop requirements of business value delivery components	Intermediate XBMC (Requirements of business value delivery component)
3	Analyze system value delivery component	BSTM (Relate between two components, business value delivery component and system value delivery component)
4	Develop requirements of system value delivery component	Intermediate SMC (Requirements of system value delivery component)
5	Analyze system value generation component	BSTM (Relate among three components, business value delivery component, system value delivery component, and system value generation component)
6	Develop requirements of system value generation component	SMC before evaluation (Requirements of system architecture)
7	Analyze business value generation component	BSTM (Relate among four components)
8	Develop requirements of business value generation component	XBMC before the evaluation (Requirements of business architecture)
9	Evaluate business architecture	Complete XBMC (Requirements of business architecture)
10	Evaluate system architecture	Complete XMC (Requirements of system architecture)

is to simply represent the business designer's idea and experience. In the case study, XBMC was applied to design business architecture.

2) *Design Models of System Architecture Using SMC:* Conventional model design of system architecture is separated from business model design of business architecture. However, the illustration and representation of the system model are only a part of the concerns of system architecture. In this case study, SMC is applied to investigate the requirements of system architecture.

3) *Align and Map Utilization Components between Business Architecture and System Architecture by BSTM:* Conventionally, the business architecture and system architecture are designed separately at the different process and the requirements are investigated without mapping utilization components clearly. In the case study, BSTM is applied to map utilization components between system architecture and business architecture.

B. Business Model Development in the Case Study

1) *Mobile Music Delivery Business for Mobile Phone:* XBMC illustrated in Fig. 14 and SMC illustrated in Fig.15. They respectively represent the business architecture and system architecture of the music delivery business for the mobile phone in "Mobile Music Contents Delivery Company".

They indicate the requirement of business architecture and system architecture that realized in the mobile music delivery business.

Based on the existing business, we investigate the business architecture and system architecture of the business to meet the

Business Partners	Business Activities	Business Value	Customer Relations	Customer Segments
1. Music contents supplier (Record company) 2. Mobile carrier	1. Delivery site operation 2. Music data management 3. Music procurement 4. Music Delivery 5. Payment Management 6. Music use right Management <u>Business Resources</u> 1. Music use right 2. Delivery operation staff	1. Provide songs from music CD, and enjoy it via the Cellular Phone. 2. Enable buy and download via Cellular Phone Anytime, Anywhere	1. Direct marketing/ delivery for individual customers via mobile site <u>Business Channels</u> 1. Cellular Phone	1. Users who want to enjoy music like listening CD or setting incoming melody via cellular phone (Cellular Phone Users)
<u>Cost Structure</u> 1. Music fee 2. Payment collection fee for mobile carrier 3. Sales and Administration Cost		<u>Revenue Stream</u> 1. Music contents fee (collect from cellular phone users who download the contents via carriers)		

Fig. 14. XBMC of the Case Study (Mobile Phone)

System Development Partners	System Development	System Value	System Utilization Scenario	System Users
1. Vendor who maintain and operate the platform to deliver Mobile Music Contents	1. Implementation to maintain platform 2. Operational management to maintain platform <u>System Resources</u> 1. Music data 2. Mobile Music Contents Delivery Platform 3. IT staff who has skills of platform system to deliver mobile Music Contents	1. Display and deliver music content for 365 days/24 hours 2. User does not feel stress even for mass access	1. Access to the mobile site via cellular phone, and search/select <u>System Channels</u> 1. Cellular phone with music playback function 2. Mobile web browsers 3. Mobile network	1. Experienced Cellular phone users (Cellular Phone Users)
<u>System Cost Structure</u> 1. Mobile Music Contents Delivery System implementation cost 2. Mobile Music Contents Delivery System running cost		<u>System Revenue</u> 1. Mobile Music Contents Delivery Fee		

Fig. 15. SMC of the Case Study (Mobile Phone)

new business goal.

C. Design Business Models of Mobile Music Delivery Business for a New Smart Phones

Using BSTM, we map and align utilization components of new smart phone technology between business architecture and system architecture, and investigate the requirements of business architecture and system architecture to realize music delivery business for smart phones.

1) *Requirement Elicitation of Business Value Delivery Components:* Align components of business value delivery components to meet the business goals using BSTM and elicit requirements. The business goal is set as "deliver music to mobile users anytime, anywhere, "via any device", as illustrated in Fig. 16. Note that business goal is changed from the conventional one. As indicated in red character, it includes "any device" as a part of new business goal. From the business goal, we are able to elicit the requirement of "corresponding to new devices," which is a gap between the business goal and requirements of the current business in terms of business value, relationships with customers, and business customer segment.

2) *Mapping Utilization Components from System Value Delivery Component to Business Value Delivery Component:* To obtain a business value that leads to business goals "deliver music on any devices," as a utilization component of IT with mobile music delivery business, there are smart phones of system channel and application for smart phones. Based on BSTM, we map the utilization components to "relationships to customer" in business value delivery component and smart phone applications to "customer segment", and revised the requirements of delivery via smart phone applications instead of directly deliver to the smart phone device as illustrated in Fig. 17.

3) *Structural Analysis of System Value Generation Component:* Based on BSTM, each requirement of system value generation component is analyzed to realize new "system value", "download and use application 24 hours 365 days." To generate new "system value," "system development work" is required for development of smart phone applications that is "system channel" of "system user." To develop smart phone applications, IT staffs of the case company, which is "system resources," do not have the enough skills to develop the smart phone applications.

Thus, the requirement to procure the smart phone

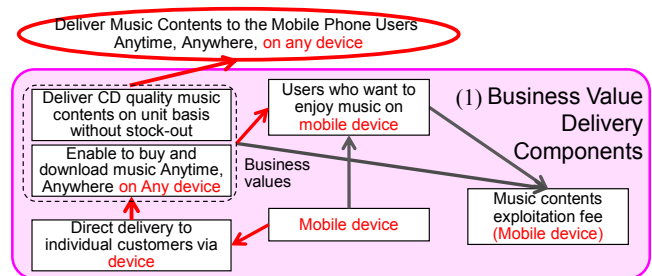


Fig. 16. Analysis of Business Value Delivery Components Using BSTM in the Case Study

development vendor is elicited as “system development partner” who complement to execute “system development work” as illustrated in Fig. 18.

As a result of requirement development, to generate and deliver new “system value,” “system cost structure,” which includes the development cost of smart phone applications, modification cost of the delivery system to correspond the smart phones as illustrated in Fig. 18.

4) *Mapping Cost Constraints from System Value Delivery Component to Business Value Delivery Component*: Based on BSTM, development costs for delivery system to correspond to smart phones and smart phone applications, which are newly generated in “system cost structure” of SMC, are mapped to “business cost structure.” Under the constraints of “business cost structure,” it is verified if the requirements of “business activities,” “business resource,” and “business partner” are elicited to generate “business value” for smart phones. In this case study, the requirements of “business activities” and “business partner” are elicited under the cost constraints of “business cost structure” as illustrated in Fig. 19.

If the condition of “business cost structure” does not meet the requirement during its realization process, the requirement of business value generation component and also the business

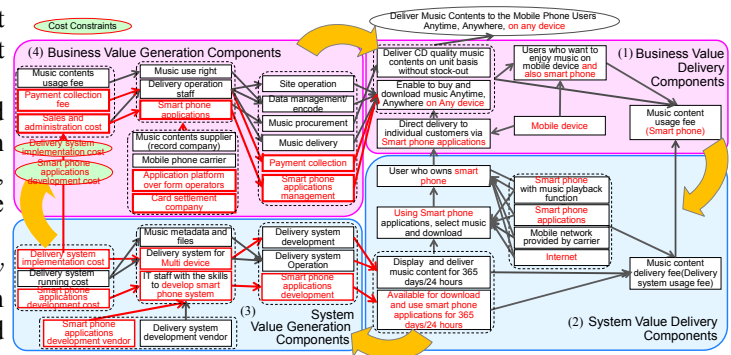


Fig. 19. Analysis of Business Value Generation Components in the Case Study

value realized by the requirement are revised.

Based on the relationships between business goal graph and XBMC, the achievement of “business goal,” “revenue goal,” and “cost goal” are evaluated. If they are met, the mapping cycle of BSTM completes. XBMC and SMC at the timing describe the requirements of business architecture and system architecture. We evaluate the feasibility based on XBMC and SMC and complete the requirements elicitation process.

5) *XBMC of Music Delivery Business for Smart Phones*: Fig. 20 illustrates XBMC to represent business architecture created by mapping through BSTM. XBMC represents the requirements of business architecture to meet business goals. The requirements in XBMC written in red, as illustrated in Fig. 20, are required to transform the conventional music delivery business model to a new music delivery business model for smart phone. A new business architecture is required to realize the requirements.

Using business case maps, XBMC represents the business value chain to manage the delivery process of smart phone applications by a partnership with companies that run smart phone application platform and to deliver music directly to smart phone users through the smart phone applications as a channel.

6) *SMC of Music Delivery Business for Smart Phones*: Fig. 21 illustrates SMC that represents the system architecture created by mapping via BSTM. SMC represents the requirements of system architecture to meet business goal.

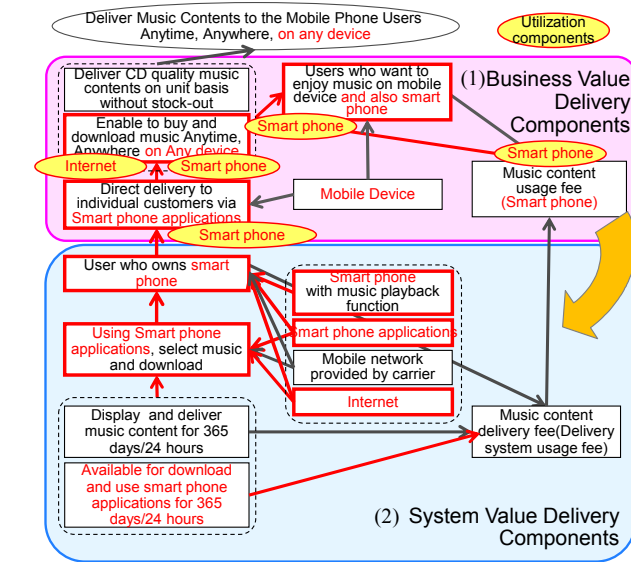


Fig. 17. Mapping IT Capability Entities Using BSTM

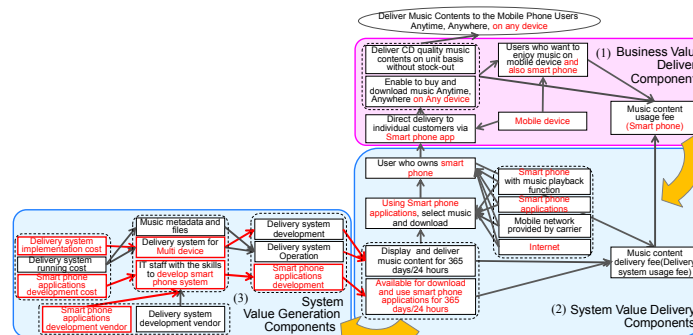


Fig. 18. Analysis of IT Value Generation Components Using BSTM in the Case Study

Business Partners	Business Activities	Business Value	Customer Relations	Customer Segments
1. Music contents supplier (record company) 2. Mobile phone carrier 3. Smart phone applications platform company (+) 4. Card settlement company (+)	1. Site operation 2. Data management /encode 3. Music procurement 4. Music delivery 5. Fee collection 6. Copy right management 7. Smart phone applications management (+) Business Resources 1. Music (use right) 2. Delivery operation staff 3. Smart phone applications (+)	1. Deliver CD quality music contents on unit basis without stock-out 2. Enable to buy and download music Anytime, Anywhere on Any device (+)	1. Direct delivery to individual customers via Smart phone applications (+) Business Channels 1. Mobile Device (+)	1. Users who want to enjoy music on mobile device and also smart phone (+)
Cost Structure		Revenue Stream		
1. Music content usage fee 2. Payment collection fee (+) 3. Sales and administration cost (+Smart phone applications development cost, Delivery system implementation cost) (+)		1. Music contents usage fee (collect from smart phone users who download music contents via phone carrier or a card company) (+)		

Fig. 20. XBMC of the Case Study (Smart Phone)

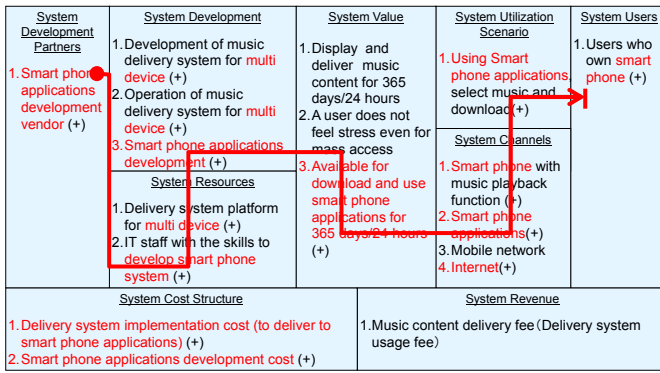


Fig. 21. SMC of the Case Study (Smart Phone)

The requirements written in red in SCM, as illustrated in Fig. 21, are the requirements to transform business model from the conventional mobile music delivery for mobile phone to a new one of music delivery business for smart phones. A new system architecture is required to realize the requirements.

Also, using system case map, SCM describes the system value chain to develop Smartphone applications as a channel of music delivery, to deliver a download service of the applications to smart phone users, and to deliver music via the applications.

VIII. EVALUATION

A. Evaluation of the Study

From the application results of the proposed methodology, we are able to determine that three problems in this study will be solved.

1) *XBMC enables to visualize the overall business architecture. Additionally, analyzing the relationships between XBMC and business goal graph enables to design business architecture meeting the business goal*

2) *Using SMC visualize the overall system architecture. Additionally, relationships between SMC and system goal graph enables to design a system architecture to meet business goals*

3) *BSTM and business model design process enables to map between business architecture and system architecture step by step. Especially, they map components utilizing IT that leads to increase business value from system architecture to business architecture*

B. Comparison with Conventional Business Model Design Methodology

Conventional business model design methodologies elicit requirements of system architecture only after the requirements of business architecture are developed. Thus, utilization components of IT of the system architecture are not mapped and the requirements of business architecture that leads to increase business value.

Moreover, a concern of business architecture is confused with concerns of system architecture, and also, the concerns of system architecture cover partially.

The proposed methodology has the following advantages in comparison with conventional methodologies.

1) *It clearly visualizes utilization components of the new IT and maps to business architecture to design the business model utilizing IT*

2) *It enables to design and present a system architecture required to realize a business*

C. Comparison with the Related Works

One of the related works, the IT-driven business value generation method [1] describes the business value chain in terms of the competency of mobile phones, but its concern of system architecture is limited in mobile phones and communication networks. Compared with this study, the related work is not enough to utilize IT to the business because its concern of system architecture to realize business is limited.

The related work [5] does not evaluate the achievement of business goal of business value chain. This study, using business goal graph and system goal graph, evaluate achievement of business goal of both business architecture and system architecture.

The related works [4, 8, 16] do not offer a concrete method to align IT of use to business architecture. This proposed methodology offers method to realize business architecture utilizing IT using phased mapping via BSTM.

D. Evaluation by Business Consultants

To evaluate the effectiveness of the proposed methodology, we interviewed four consultants, two are experienced and other two are younger members, who are in charge of business development utilizing IT. As a result, we received the following three evaluation comments, which indicate the effectiveness of the proposed methodology.

1) *It covers all the factors necessary for the investigation in business development and can be used as a checklist that prevents the omission in discussion and analysis*

2) *It can represent a system architecture with a holistic view, to start investigate the system development that is important for system value generation, factors related to system development partners, and development and procurement based on the requirements*

3) *It describes a technique to map utilization elements of system architecture to business architecture, accelerates the discussion, and generates ideas to increase business value utilizing IT*

E. Discussion

A business designer who designs the business, a system designer who designs system and the management as a decision maker of business execution are involved in IT-driven business requirements development.

1) *Business Architecture Design by Business Designers:* It enables to design the business architecture that adopts utilization components of IT, which we tend to forget, and to increase business value.

2) *System Architecture Design by System Designers:* It enables to design the system architecture that aligns to

business architecture concurrently with the design of business architecture. As a result, we are able to shorten the time to business realization by the designs of information system, organization of the information system department, and new business.

3) *Support Decision-Making of the Management of Business*: It is indispensable for decision-making to understand overall business architecture and system architecture to meet business goals. The management should understand business as a whole using XBMC and SMC to decide business execution. It enables to understand the necessity and requirements of system architecture, which were difficult to understand for the managements, before deciding business investment.

4) *Support Communication among Stakeholders in Business Development*: The XBMC and SMC help communication and negotiation among the management, business designer and system designer by visualizing overall business architecture and system architecture in order to meet business goals, and help to get agreement among them.

IX. FUTURE WORKS

The proposed methodology needs to be applied to the actual business development utilizing IT and evaluated its effectiveness quantitatively.

The proposed methodology needs to be applied to the actual business development utilizing IT and evaluated its effectiveness quantitatively.

X. CONCLUSION

The technical contribution of this study to develop competitive business model utilizing new IT is to propose an IT-driven business model design methodology including the following four technologies.

- (1) XBMC to represent business architecture
- (2) SMC to represent system architecture
- (3) BSTM to incrementally map between system architecture and business architecture
- (4) Business model design process using XBMC, SMC, and BSTM

We applied the proposed methodology to business model development for mobile music delivery business where the competitive superiority depends on the utilization of new IT, and demonstrated the effectiveness of the methodology.

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