

Designing a Framework for Sustainable Content Communication Considering UX on the Content Lifecycle for Non-professional Personnel

Kyoko Watanabe*

Keio University Graduate School of System Design and Management

Seiko Shirasaka

Keio University Graduate School of System Design and Management

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ABSTRACT

This study proposes a framework for sustainable content communication that can be utilized by in-house personnel without expertise in content communication to maintain good user experience. Content communication plays a key role for an organization to survive in a competitive market. Several concepts including enterprise content management (ECM) have emerged and have been applied in organizations to deliver the right contents to the right people at the right time so as to maximize user experience (UX). However, the actual implementation of these concepts requires large-scale infrastructure including IT tools and personnel with technical communication expertise that are available only in large organizations. SMEs account for over 95 percent and 99.7 percent of the firms in OECD economies and Japan, respectively. Surveys show that these SMEs are facing problems with effectively communicating with their stakeholders because of their inability in effectively delivering communication contents. This study focuses on solving this communication problem using a framework based on systems engineering by which non-technical personnel can manage sustainable content communication. The framework was tested and evaluated by eight small businesses.

Keywords: Content communication framework; Sustainable content communication; User experience; Information lifecycle.

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1. INTRODUCTION

1.1 Background

Content communication is crucial for organizations to survive in competitive markets. Nowadays, content communication is becoming increasingly important in a digital-driven economy. To conduct content communication with stakeholders, the content must be well managed throughout its lifecycle, which requires a strategy for the content to be effectively communicated.

Content communication is conducted based on content strategy and management. The terms “content communication”, “content management”, and “content strategy” have been discussed by researchers and practitioners for many years.

The exponential evolution in digital technologies has transformed the world into a digital-driven economy. This remarkable change is making content communication in enterprises more complex and harder to handle. The amount of information flowing into and out of each enterprise and the number of channels/vehicles carrying the information contents are continuously and rapidly growing. To realize good content communication in this emerging situation, there have been a lot of discussions in the field of technical communications. From such discussions, new concepts of content management and new frameworks for developing content strategies have been introduced. One of them is the concept of Enterprise Content Management (ECM), which involves generating and delivering the right contents to the right people at the right time so as to maximize user experience.

However, ECM’s implementation requires large-scale infrastructures, including IT tools and personnel like information managers, otherwise the work has to be outsourced to external technical communication professionals. In other words, it requires the organization to achieve a certain size/scale in order to implement and utilize the concept (O’Callaghan *et al.*, 2005).

However, the number of large-scale companies in the world is quite limited. Majority of real-world organizations are small in size. According to OECD, small-and medium-sized enterprises (SMEs) account for over 95% of the firms in OECD economies (OECD, 2000). Majority of SMEs are “micro-entities” (hiring one to nine employees) and a significant number of them are family-owned enterprises.

In Japan, for instance, SMEs account for 99.7 percent of the entire economy, with 86 percent of them small-sized companies hiring less than 20 employees (source: Small and Medium Enterprise Agency, 2012). Surveys also show that these organizations are experiencing problems with communicating with their stakeholders because of their inability in effectively delivering communication contents. It is considered that in-house operators have had a hard time in maintaining good user experience in content communication.

According to surveys on web content operations, around 50% of the companies revealed that they are dissatisfied with the effectiveness of their website operations (source: Mitsubishi UFJ Research and Consulting, 2007). The smaller is the size of an enterprise, the more serious is the problem (Web Marketing Laboratory, 2007).

Website operations involve strategy design, content creation, and content renewal. In many large companies, the work of website operations is usually undertaken by in-house professional personnel or outsourced to external web design/consulting firms. According to a survey (Web Marketing Laboratory, 2007), a significant number of SMEs are undertaking website operations in-house, and in many cases the firm has no expertise in technical communications. For instance, among SMEs, 90% of the jobs in strategy design, 80% in content creation, and 60% in content renewal are undertaken by non-professionals.

Given the fact that majority of real-world enterprises are small in size, sustainable and effective content communication with customers and other stakeholders is a difficult task for many organizations, especially in a digital world.

1.2 Purpose of the Study

Given the situation described above, we focused our study on solving the content communication problems that commonly happen in SMEs. Considering the difficulties faced by SMEs in communicating the right contents at the right time, they are isolated from effective management of content communication that incurs high costs of expertise and investments in the systems. The purpose of this study is to solve this problem by designing a framework for content management that serves as an interface for SMEs to gain access to effective content management (see Figure 1).

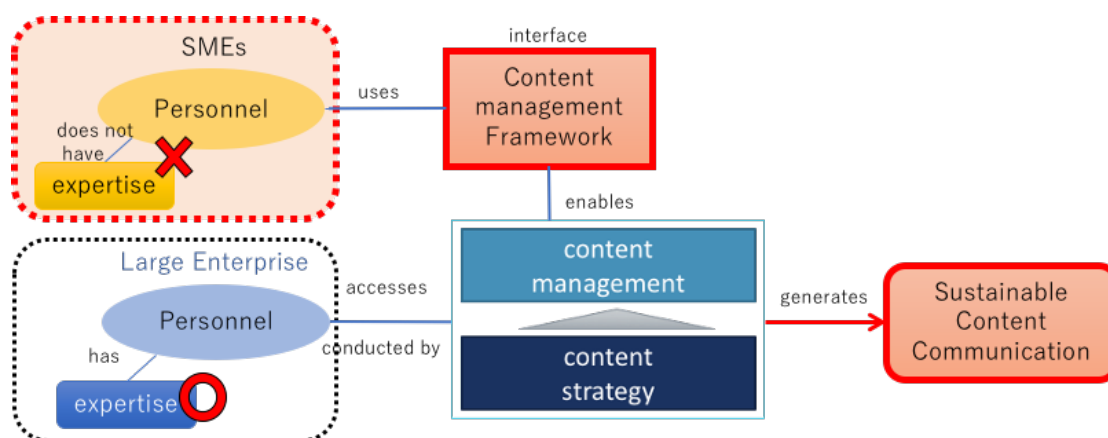


Figure 1. Designing a framework to solve content communication problems in SMEs

1.3 Terms and Definitions

The terms “content” and “content lifecycle” were often used in different contexts in past studies. This paper defines these terms as follows:

Content:

According to Oxford Learner’s Dictionary, “content” is “*anything that is inside something.*” In the context of content management and content strategy, Clark (2016) reviewed the definitions of “content.” One definition of “content” is given by Bailie and Urbina (2013) as “*the stuff inside the container.*” In that context, containers are deliverables including websites, mobile applications, brochures, guidebooks, or some other communication outlets. Halvorson and Ranch (2012) suggested that “*content is what the user came to read, learn, see, or experience. From a business perspective, content is critical information that website, application, internet, or any other delivery vehicle created to contain or communicate.*”

As defined above, this study uses the term “content” as something contained in delivery vehicles or information outlets, which are then delivered in a communication between an enterprise and its stakeholders.

Content Lifecycle:

Every human-made system has a lifecycle. A lifecycle can be defined as a series of stages through which something (e.g., a system or manufactured product) passes (INCOSE, 2015), which is a description in the Systems Engineering Handbook serving as a guide for system lifecycle processes and activities.

In this study, we aim to achieve sustainable user experience (UX) in content communication. Considering content as a system, it has its lifecycle. Therefore, it is critical to know how a piece of content changes in value throughout its lifecycle.

Past literature provides definitions for different lifecycle stages of information and contents. In particular, Hodge (2000) described them as follows: (1) creation; (2) acquisition; (3) cataloging/identification; (4) storage; (5) preservation, and; (6) access.

The lifecycle of contents has been widely studied and identified by practitioners, especially in the context of “website.” Vidgen (2001) suggested that different stages of a web content lifecycle are: (1) create; (2) review; (3) store; (4) publish/exchange; (5) archive, and; (6) destroy. Similarly, Schwickert (2004) suggested that the different stages are: (1) create; (2) control; (3) release; (4) publish; (5) archive, and; (6) deletion. Souer (2008) developed a framework for the operation and maintenance of a web content management system. In that framework, he identified the “inspection process” in the operational management of web contents, which determines whether the contents are up-to-date or not and whether outdated contents should be preserved or removed.

Given the above discussion, we define seven stages of a content lifecycle: (1) create; (2) review; (3) store; (4) publish/exchange; (5) inspect; (6) archive, and; (7) destroy.



Figure 2. Content Lifecycle

2. REVIEW OF PREVIOUS STUDIES

Content strategy and management have been widely researched by researchers and practitioners. Recent studies showed that there is a trend for the research to be more extended in scope and have higher levels of complexity and expertise.

2.1 Content Management

Good content communication requires the content strategy and management to be based on strategy. In the world of digital economy, most organizations are generating an increasing amount of information. As the speed and amount of information generation keep increasing, the information generated is left unstructured and unused. To handle this situation, the concept of content management at the enterprise level should be studied and introduced in companies (O’Callaghan *et al.*, 2005). Enterprise Content Management (ECM) is a systematic way of administering the transactions with

all of the material published by an organization, including traditional publishing activities, emails, financial records, and human resource documents (Clark, 2012; Batova *et al.*, 2016). However, the focus of ECM is on the transactions rather than on the content itself (Gollner, 2015).

To make the best use of ECM, O'Callaghan *et al.* (2005) developed a process framework for ECM strategy development. The development of an ECM strategy in an organization is not a "green-field" exercise. It has been tested in large organizations and found to be influenced by the existing IT tools, methods, and infrastructure.

Another concept of content management, or component content management, has also emerged. It is an interdisciplinary area of practice that focuses on creating and managing information as small components rather than documents (Andersen *et al.*, 2015). It focuses on creating and managing well-structured content components to enable reuse and multichannel publishing (Gollner, 2015). The system for component content management, like any other content management system, performs functions of tracking contents in the forms of posts, pages or documents. However, it manages contents at a more granular level (i.e., component level) such as words, paragraphs, topics, and concepts (Batova *et al.*, 2016).

2.2 Content Strategy

Clark (2016) conducted a literature review on content strategy and tried to define the direction of this field. According to his survey, there are three areas of consensus as follows. Content strategy is: (1) inclusive of the lifecycle of contents (addressing the processes of creating, revising, approving, publishing, and revising material); (2) integrated with technical and business requirements, and; (3) largely focused on materials used by customers and therefore, is focused on marketing and support documents. Clark also mentioned that content strategy primarily focuses on traditional genres of contents and overlooks emerging genres. The emerging extension from its traditional scope is what needed for communicators to better connect their work with the business goals of the enterprises. Content strategy is required to enhance the integration of professional and technical communication with the marketing, training, and business processes of the organization.

Batova *et al.* (2016) also studied the definitions of the term "content strategy." They proposed in an editorial of *IEEE TRANSACTION ON PROFESSIONAL COMMUNICATION* that a common focus of most definitions is an organizational vision for information and an action plan for achieving it. They considered the introduction of component content management, a new interdisciplinary practice of content management in enterprises as a cause of the expansion in scope.

3. FRAMEWORK DESIGN

3.1 Scope of the framework

The scope of content communication and its management are quite extensive. It involves all the 5W's and 1H - why, how, what, when, which, and to whom to deliver. Given that, we set the scope of the framework as follows. The framework shall not

cover the “why” (business mission and vision) and the “how” (communication channel) parts.

The framework is designed to support in-house personnel in SMEs by providing access to content management activities. Assuming that the personnel is not involved in developing the business mission and vision, we thus excluded that part from our scope. Also, in this study, we assumed that the channel via which the enterprise is going to deliver the contents is given. That is to say, the channel, whether it is printed documents, websites, or some kinds of SNS, is already determined before using the framework.

3.2 Design Approach

In this study, we used a system engineering methodology to design a framework and employed the Enabler Framework Structure to visualize the architecture of the framework.

3.2.1 Systems Engineering Methodology

Systems Engineering is a cross-functional approach for successfully realizing large, complex systems. An international organization for systems engineering, International Council of Systems Engineering (INCOSE), defines in its book, *INCOSE Systems Engineering Handbook*, that systems engineering is an aggregate of best practices of a large, complex system design as well as a system that leads a project to success while considering the quality, cost, and delivery. It is composed of methodologies for thinking about complex issues and developing solutions and techniques for executing those methodologies. It has been systematized by ISO and others as a methodology to maximize the application of diversity in various areas (INCOSE, 2010; Tomita, 2019). Based on these characteristics, we employ this methodology to design the framework for sustainable content communication that can be used by non-professionals.

Systems Engineering is standardized as ISO 15288 that identifies four process groups to support Systems Engineering: technical processes, technical management processes, agreement processes, and organizational project-enabling processes. In total, 30 processes have been defined. These processes are concurrently conducted throughout a project lifecycle (INCOSE, 2010).

We employed parts of the technical processes in this study and conducted the following activities.

(1) Identifying the SoI (System of Interest)

SoI is the object to be designed as a system. In this study, it is “a framework for sustainable content communication.”

(2) Requirement Analysis

It includes lifecycle analysis, context analysis, and functional analysis.

(3) System Architecting

It includes abstracting functions and allocation of them to physical entities.

3.2.2 Enabler Framework Structure

Here we introduce the structure that we utilized to describe the designed framework, which is called the “Enabler Framework.” It is composed of multiple viewpoints aggregated to describe the whole. One example is an aggregation of three viewpoints, including the operational, functional, and physical viewpoints (IEEE, 2005). It is a general-purpose framework that focuses on the relations among those viewpoints (Shirasaka, 2010). In such a framework, a set of viewpoints are arranged in “enabling” and “utilizing” relations. The viewpoint: (a) enables (realizes) the superordinate viewpoints, and (b) utilizes the one in the lower level (see Figure 3). For example, when one looks at the commonly identified operational, functional, and physical viewpoints, operational factors are realized by functional factors, while functional factors are realized by physical factors (Tomita, 2019). The lower one enables the upper one; in other words, the three are in an enabler-utilizer relationship.

In this study, we extract viewpoints that are aggregation of the whole and then describe the designed framework in the enabler framework structure as shown in Figure 3.

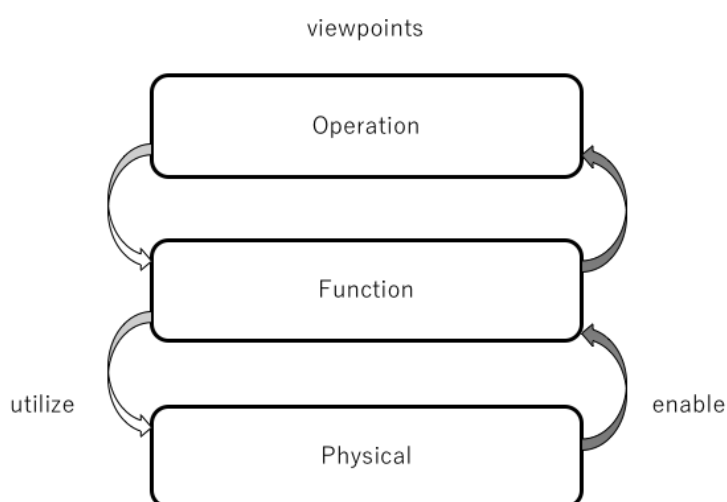


Figure 3 Example of enabler framework

3.3 Design Process

Systems Engineering is also standardized as IEEE 1220 “Systems engineering — Application and management of the systems engineering process” specifically on its design and development stages. According to IEEE 1220, we designed the framework by conducting the following processes.

- (1) Requirement Analysis.
- (2) Functional Analysis.
- (3) Synthesis.

3.3.1 Requirement Analysis

We analyzed the lifecycle of content communication and analyzed the context in each stage as shown in Figure 4.

ISO15288 identifies a generic lifecycle. It is composed of the concept stage, development stage, production stage, utilization stage, support stage, and retirement

stage. ISO 15288 proposes that the life cycle should be tailored accordingly and suggests that “lifecycles vary according to the nature, purpose, use and prevailing circumstances of the system,”.

In this study, we tailored the lifecycle by identifying the stages as concept, design, development, implementation, operation, maintenance, and retirement as shown in Figure 4.

concept stage	design stage	development stage	implementation stage	operation stage	retirement stage
				maintenance stage	

Figure 4. Content Communication Lifecycle

As stated in 3.1 above, we excluded the concept stage from context analysis activities. In accordance with IEEE 1220, we analyzed the context of each stage as follows.

3.3.2 Functional Analysis

Out of the context analysis of each stage, we extracted functions to realize the system. The extracted functions are as follows.

- (1) Eliciting stakeholders’ requirements.
- (2) Turning (1) to system requirements that would maximize user experience.
- (3) Identifying architecture of the content communication by defining what to deliver and allocated in which structure.
- (4) Launching the designed content communication.
- (5) Maintaining good user experience by sustainable content communication operation.

3.3.3 Synthesis

Synthesis translates the functional architecture into a design architecture that provides an arrangement of system elements (IEEE, 2005). In this study, we identified physical elements to allocate the extracted functions. In other words, we identified “how’s” that would realize the functions (see Figure 5).

4. DESIGN RESULT

4.1 Framework

The designed architecture of the content communication framework is shown in Figure 5. As shown in Figure 5, we described the framework consisting of views and viewpoints. We identified a set of viewpoints as strategic, architecting, implementing, and operational. Corresponding views are the requirement definition, the architecture to realize UX, the UX realized on a communication channel, and the Sustainable UX. In the figure, we also identified how’s/tools for each function defined in 3.3.2 above. Function (1) is realized by using a tool “2x2 wants matrix”, function (2) is realized by “UX framework,” function (3) is realized by allocation, function (4) is realized by publishing the communication channel, and function (5) is realized by “content lifecycle”.

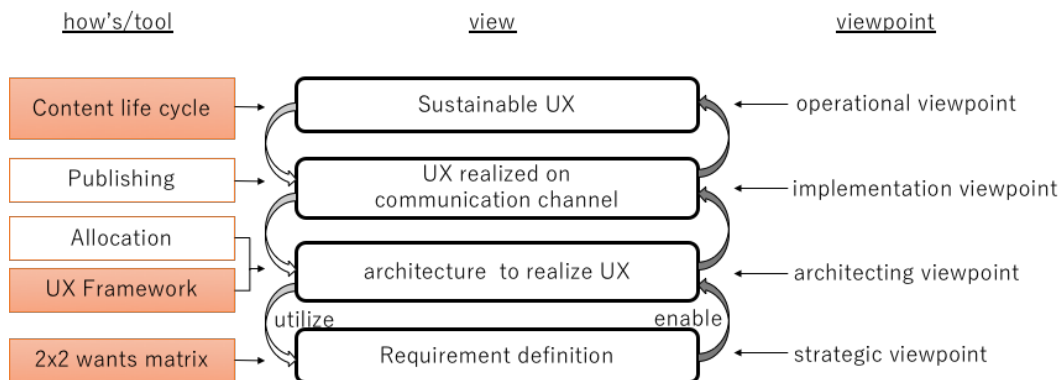


Figure 5. Framework for sustainable content communication and tools

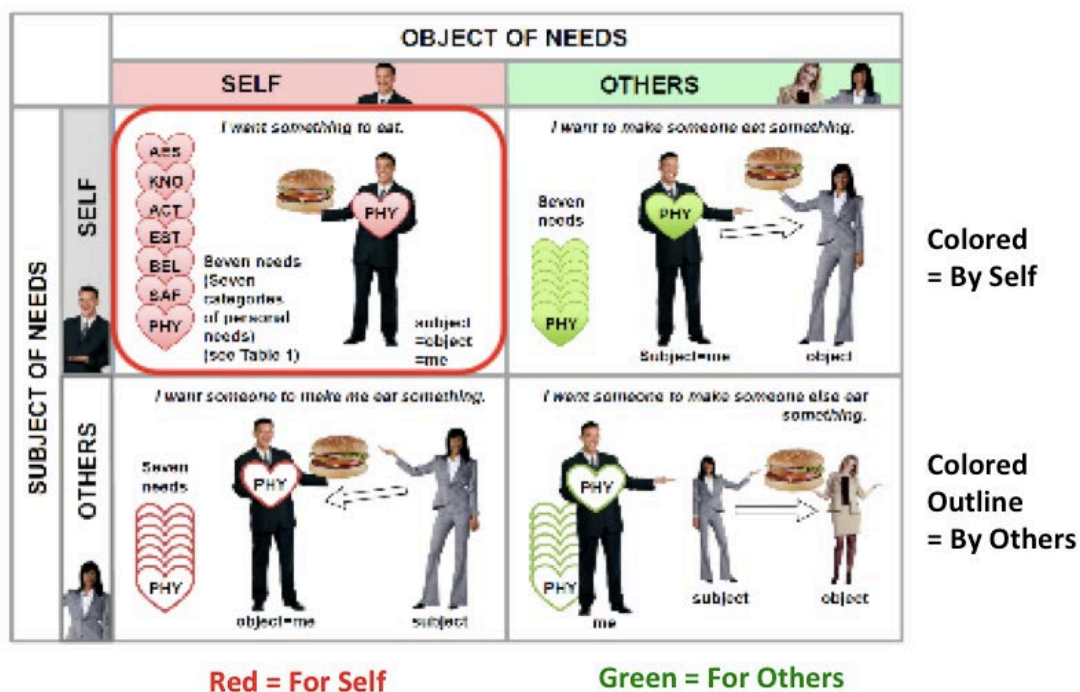


Figure 6. WCA 2X2 matrix (Makino, 2011)

4.2 Tools

As shown in Figure 5, the framework also suggests tools to realize the functions stated in 3.3.2 above. Here we elaborate on each tool.

4.2.1 2x2 wants matrix

2X2 wants matrix is utilized for the defined function “(1) Eliciting stakeholders’ requirements.” (Figure 6). It is an existing matrix used in a method called Wants Chain Analysis (WCA) that analyzes and identifies stakeholders’ wants and needs. WCA is used to describe the wants and needs of each stakeholder and to analyze how those wants are linked to each other (Makino, 2011).

The matrix allows listing stakeholders' wants and needs in four categories considering who are the object and subject of the needs.

- (1) Subject of needs: Self; Object of needs: Self (example: I want to eat something).
- (2) Subject of needs: Others; Object of needs: Self (example: I want someone to make me eat something).
- (3) Subject of needs: Self; Object of needs: Others (example: I want someone to eat something).
- (4) Subject of needs: Others; Object of needs: Others (example: I want someone to make someone else eat something).

By recovering all the four categories, the framework enables the organization to elicit users' needs that have never been found before.

The WCA 2x2 Matrix was proposed by Makino (2011) in her study of Wants Chain Analysis. In her study, this matrix is provided as a supportive framework to conduct Wants Chain Analysis. This framework does not require large-scale user research but allows for defining people's wants and needs exhaustively in a relatively short period of time. This framework could be used without professional skills, and is applied in the field of marketing related to the process of need definition (Aso, 2012).

As shown in Figure 6, the vertical axis shows the distinctions of the subject of needs as "Self" or "Others", and the horizontal axis shows the distinctions of the object of needs, again, as "Self" or "Others". By dividing the space into four categories based on the subject and object of needs, this matrix covers the following four mutually exclusive and collectively exhaustive types of needs. The second quadrant contains needs to be done by oneself for oneself - for example, "I want to eat something." The third quadrant contains needs to be done by others for oneself - for example, "I want someone to make me eat something." The first quadrant contains needs to be done by oneself for others - for example, "I want to make someone eat something." The fourth quadrant contains needs to be done by others for others - for example, "I want someone to make someone else eat something."

Compared with conventional needs definition methodologies such as ethnography, we consider this matrix could identify users' needs exhaustively in a relatively short time without professional skills. Especially for small-sized organizations who do not want to spend a lot of time and budget for defining stakeholders' needs and wants, this framework could support in-house personnel without professional skills for technical communication, i.e., no user research professionals are needed. What required is sufficient knowledge about the product(s)/service(s) of the organization.

4.2.2 UX Framework

For the function "(2) Turning stakeholders' requirements to system requirements that would maximize user experience" extracted from 3.4.1, we suggest utilizing the "UX framework" as shown in Figure 7. It is used as an interface to translate stakeholders' requirements into contents that can be communicated on a designated communication channel.

To realize a good user experience, many practitioners have introduced design frameworks. Some of them are for design processes, and the others are for design factors. In our study, we utilize a framework for design factors.

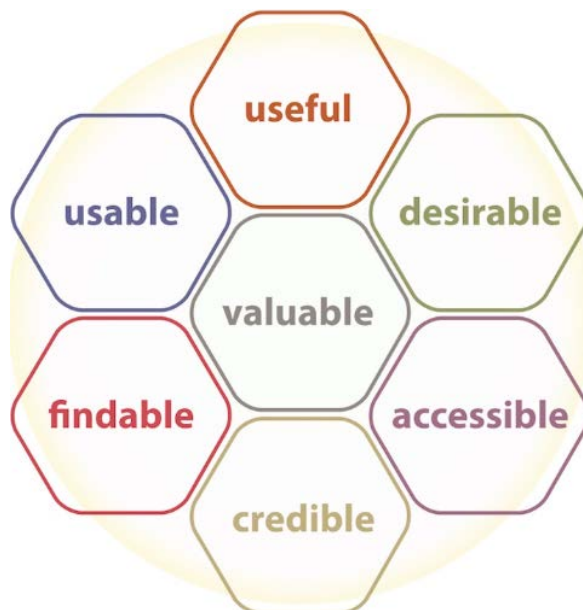


Figure 7. Peter Morville’s UX Honeycomb
Source: uxdesign.cc

Factors of user experience are introduced by Peter Morville as UX Honeycomb (see Figure 7). They are: (1) useful; (2) usable; (3) valuable; (4) desirable; (5) findable; (6) accessible, and; (7) Credible (Morville, 2005).

Four Elements of User Experience

<p>Value</p> <p>Is it useful?</p>	<p>Usability</p> <p>Is it easy to use?</p>
<p>Adoptability</p> <p>Is it easy to start using?</p>	<p>Desirability</p> <p>Is it fun and engaging?</p>

Figure 8. The four elements of user experience
Source: uxatters.com

Moreover, Guo (2012) introduced another framework called “The four elements of user experience” (see Figure 8). It consists of four elements instead of seven, achieving simplicity and ease of use for a user experience design.

Considering that the objective of this study is providing non-technical content communication operators, we employ Guo's framework as an interface for user experience design.

4.2.3 Content Lifecycle

For the function "(5) Maintaining good user experience by sustainable content communication operation" stated in 4.3.1, the concept of Content Lifecycle is employed.

As described in 1.3.2, in this study we identified a content life cycle that is divided into seven stages: (1) create; (2) review; (3) store; (4) publish/exchange; (5) inspect; (6) archive, and; (7) destroy (see Figure 2). Considering the changes in content through these stages, content communication is managed to maintain sustainable user experience.

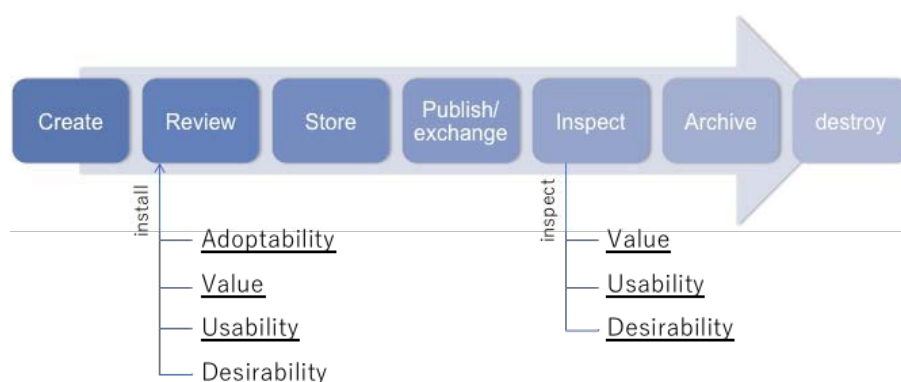


Figure 9. Content Lifecycle integrated with UX framework

We specified two stages to take some action to maintain the value of the contents by checking the UX elements of the contents. In Review stage, adoptability, value, usability and desirability of the contents are well considered and installed in the contents. And in Inspect stage, the contents are inspected in terms of their value, usability and desirability and determined whether they are up-to-date or outdated. When outdated, the contents are to be archived, wasted and replaced accordingly. (Figure 9)

5. APPLYING THE FRAMEWORK

This section introduces an application example of the designed framework. At the same time, it elaborates step-by-step activities to achieve sustainable UX.

5.1 Introduction to the case

In this example, the framework was applied to a website operated by a Japanese restaurant in Tokyo. It is a Tempura restaurant running two stores: one in Shibuya and the other in Ginza. The restaurant could be considered as a typical Japanese small family-owned business. As a communication channel with its customers, it has been operating a website for more than ten years. The website is managed by its in-house personnel without expertise in content communication management.

5.2 Conducting the Methodology Process using Worksheet

We conducted several group-work sessions using the tools and visualized the discussion output. This framework is designed to be applied in a group work session conducted by multiple stakeholders. To visualize the discussion, we prepared a set of worksheets.

5.2.1 Defining Stakeholders' Requirements using 2x2 Wants Matrix

In a group discussion including a customer and a restaurant management personnel, stakeholders' wants were identified in the WCA 2x2 matrix.

<p>Needs to be done by myself for myself</p> <p>I want to</p> <ul style="list-style-type: none"> • enjoy good food in a cozy atmosphere. • enjoy food in season. • enjoy good sake. • enjoy freshly fried Tempura. • enjoy food visually, too. • enjoy good Tempura at home. 	<p>Needs to be done by myself for others</p> <p>I want</p> <ul style="list-style-type: none"> • to make my guests satisfied. • to make my guests spend a good time • to make my foreign friends enjoy Japanese traditional food. • to make my company enjoy good food. • to make my company enjoy good sake. • to make my family enjoy good food. • to make my company enjoy freshly fried tempura. 
<p>Needs to be done by others for myself</p> <p>I want</p> <ul style="list-style-type: none"> • the restaurant to provide me with good service. • the restaurant to provide me with and recommend food in season • the restaurant to prepare for me a choice (not too large and not too small) of sake. • the restaurant to provide us with good cost performance. 	<p>Needs to be done by others for others</p> <p>I want</p> <ul style="list-style-type: none"> • the restaurant to serve the right dish at the right time for my guests. • the restaurant to prepare for English for my foreign friends. • the restaurant to respond to detailed needs of my guests. • the restaurant to clearly separate the smoking space for non-smokers. • the restaurant to make flexible menu changes for my company. 

Figure 10. 2x2 wants matrix output

On the 2x2 wants matrix worksheet, more than 20 wants and needs were identified. (Figure 10)

5.2.2 Translating the requirements to contents through UX elements framework

Each need or want is examined using the four elements of user experience and turned into contents that carries each UX element. For example, when a customer has a want “I want to enjoy good food in season,” you think about contents to provide value, usability, adaptability, and desirability to satisfy this specific need.

In the case of a restaurant, the menu contains the contents that bring about the values to satisfy the needs; usability in the menu should be realized to satisfy the needs; prices and food items should be described in the menu to bring about adaptability, and; some images should be provided to show the concepts of the season to bring about desirability (see Figure 11).

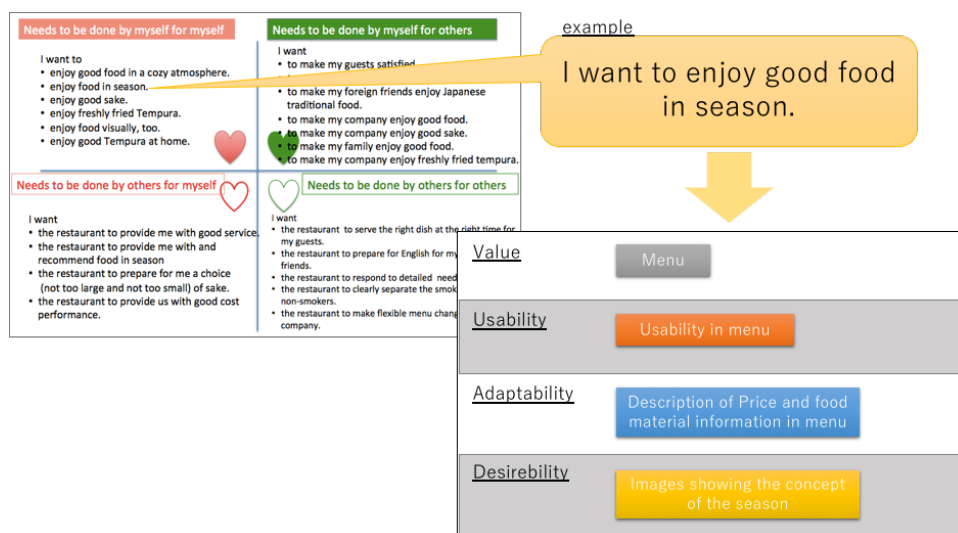


Figure 11. Translating requirements to contents through UX elements

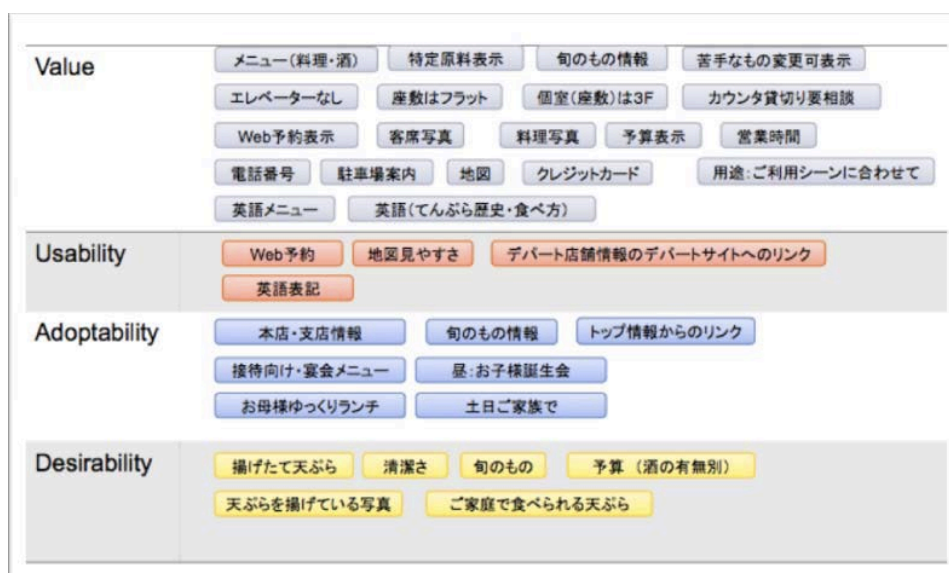


Figure 12. Items identified as contents to bring about the four UX elements

In total, 20 items were identified in the Value domain, 4 items in the Usability domain, 7 items in the Adoptability domain, and 6 items in the Desirability domain (see Figure 12).

5.2.3 Allocating Contents in a Web Structure (pages)

The identified items were allocated into a web structure. In this application case, the website already existed. The identified items were allocated mainly to the existing six webpages and several new webpages (see Figure 13).



Figure 13. Content allocation to web pages

5.2.4 Identify Content Management Policy considering Content Lifecycle

Considering the content lifecycle of each content item, a content life span was identified and put down on an operation schedule.

For example, to satisfy a customer need: “I want to eat good tempura in season,” a new content showing the food in season on a menu page with images and some descriptions are identified. Since it is food in season, the value of it expires after three months. Thus, the life span of this content about seasonal tempura food is set to last for three months and is designated to be archived after its value expires.

The life span and operation policy of each content are examined and put down on a website operation schedule (see Figure 14). The schedule sheet shows when and which contents on which pages are to be inspected. For example, seasonal tempura food contents are to be inspected every three months and be updated with new seasonal contents.

The schedule shows that contents should be updated once every month, every three months, every year, or every two years in accordance with the nature of the contents. The schedule should also include inspection of the 2x2 wants matrix to update the stakeholders’ needs. The external environment changes with time, and thus the schedule should be designed to take action to cope with changes so as to achieve sustainable content communication.

5.3 Application Result

This section discusses some changes in the website after the methodology was applied using the proposed framework.

5.3.1 Qualitative Change (Content)

Other than changes in images and content descriptions provided in the menu, one prominent change is the creation of accessibility information. Tracing back to one of the elicited stakeholder needs: “I want to come with my old parents,” we identified

contents that bring about the Value element for good UX. These include: (1) parking space availability; (2) elevator availability, and; (3) tatami room availability and on which floor it is located. The above contents were added to the website in order to communicate with stakeholders who are looking for information about the restaurant's accessibility.

Frequency					
page	per event	per month	per 3 months	per year	per 2 years
ページ	イベントごと	1ヶ月	3ヶ月	1年	2年
トップページ	催事情報	各店舗提供品 情報		基本情報	料理写真 背景
○○本店		おススメの一品	旬の天ぷら・酒	基本情報	
△△店		おススメの一品	旬の天ぷら・酒	基本情報	
××店		おススメの一品 百貨店サイトへ のリンクチェック	旬の天ぷら・酒	基本情報	
◇◇店		おススメの一品 百貨店サイトへ のリンクチェック	旬の天ぷら・酒	基本情報	
英語ページ	店舗情報など の変更時			基本情報	写真 天ぷら歴史・ 食べ方
Whole site					レ
2x2 wants matrix					レ

Figure 14. Website Operation Management Schedule

5.3.2 Quantitative Change (Access)

Quantitative change was also recorded in an access analysis report after the test. After the methodology using the designed framework was tested, the Tempura restaurant's website was updated in accordance with the result of the test. Eight weeks after the update, we compared the numbers of visits before and after the update reported by Google Analytics. According to the report, the number of visits increased.

We investigated the quantitative changes in the number of visits as reported by the access analysis system. That report covers the numbers of visitors, users, page views, time of stay of each visitor, and bounce rate. We aggregated the numbers every four weeks. The label "Before update" denotes the four-week period before the update, and the label "After update" denotes the fifth to the eighth week period after the update.

As shown in Table 1, the number of visitors increased by 22.5%, the number of users increased by 21.3%, the number of page view increased by 84.4%, the time of stay of each visit increased by 40.8%, and the bounce rate decreased by 43.1% (meaning that there was an increase in the number of visitors visiting two or more pages of the website).

Table 1. Website access report comparison

The number of*	Before update**	After update***	Change rate
Visitors	1630	1997	22.5% ↑
Users	1348	1635	21.3% ↑
Page views	2732	5038	84.4% ↑
Staying time (min)	1:12	1:41	40.8% ↑
Bounce rate (%)	65.95	37.56	43.1% ↓ (improve)

* The total number of the period of four weeks

** four weeks before the update

*** second four weeks after the update

6. EVALUATION OF THE FRAMEWORK

We conducted an evaluation of the framework. Eight evaluators participated in the evaluation by experiencing all the processes based on the designed framework and then answered a questionnaire survey. As the framework was designed for sustainable content communication that can be used by non-professional content management personnel, all the participants in this stage were non-professional content communicators.

6.1 Method

After conducting the work using the methodology and specified tools based on the framework, we conducted a questionnaire survey for evaluation. The questionnaire was designated to collect views about the following four factors: the ease of understanding, the ease of use, the effectiveness, and a comprehensive evaluation.

Since the website is the communication channel used in this evaluation, survey questions were asked based on the context of the website content communication operation. Specifically, questions were asked about the following processes.

- (1) The process of requirement definition using the 2x2 wants matrix.
- (2) The process of translating the requirements into contents through the UX elements framework.
- (3) The process of allocating the contents in a web structure.
- (4) The process of identifying content management policies after considering the content life cycle.
- (5) The process of making the website operation management schedule.

Each evaluation was conducted on a scale of one (the lowest) to five (the highest). In addition, the evaluators were allowed to provide extra comments on the above processes.

6.2 Result

6.2.1 Quantitative result

This section provides the results of the evaluation in terms of the average scores given by the responses to each process. The average scores for “(1) The process of requirement definition using the 2x2 matrix” are given as follows.

- (a) Ease of understanding: 3.38.
- (b) Ease of use: 3.38.
- (c) Effectiveness in defining wants: 4.5.
- (d) Effectiveness in finding new wants: 3.75.
- (e) Effectiveness in finding new customers: 3.75.
- (f) Effectiveness in empathizing with customers: 4.25.
- (g) Comprehensive evaluation: 4.75.

The average scores for “(2) The process of translating the requirements into contents through the UX elements framework” are given as follows.

- (a) Ease of understanding the four UX elements: 3.38.
- (b) Ease of understanding how to use the four UX elements: 4.
- (c) Ease of use: 3.25.
- (d) Effectiveness in using the four UX elements: 4.63.
- (e) Comprehensive evaluation: 4.63.

The average scores for “(3) The process of allocating the contents into a web structure” are given as follows.

- (a) Ease of understanding: 4.5.
- (b) Ease of use: 4.2.
- (c) Effectiveness: 4.6.
- (d) Comprehensive evaluation: 4.67.

The average scores for “(4) The process of identifying content management policies after considering the content life cycle” are given as follows.

- (a) Ease of understanding: 4.5
- (b) Ease of use: 4
- (c) Effectiveness: 4.57
- (d) Comprehensive evaluation: 4.5

The average scores for “(5) The process of making the website operation management schedule” are given as follows.

- (a) Ease of understanding: 4.38.
- (b) Ease of use: 3.38.
- (c) Effectiveness: 4.25.
- (d) Comprehensive evaluation: 4.5.

6.2.2 Qualitative result

The questionnaire also asks open-end questions for comments on each process. The comments were qualitatively coded using an open coding method, which are summarized as follows.

Comments on Process and Tools

- (1) “It was difficult to change the viewpoint when trying to figure out different stakeholders wants. Understanding someone else’s perspective is not easy.”
- (2) “Although it is difficult, understanding someone else’s perspective is quite effective.”
- (3) “It was difficult to distinguish between elements of user experience.”
- (4) “Translating stakeholders’ wants into website contents is not easy.”
- (3) “The process is effective in clarifying the image of a customer.”
- (4) “The process is effective in finding new customers.”
- (5) “The process is effective in keeping the website updated.”

Overall Comments

- (1) “Easy to use for people without expertise.”
- (2) “Easy to add contents for communicating with customers who have new wants.”

7. DISCUSSIONS

We conducted an evaluation to investigate whether the framework for sustainable content communication is easy to understand, easy to use, and effective. As shown in the quantitative results as reported in Section 6.3.1, the evaluation scored relatively high. The average score attained four out of five for around 80 percent of the survey questions designated for the evaluation. The evaluation attained high scores especially in the effectiveness and comprehensiveness of the framework. The qualitative result also showed positive comments about the effectiveness of the framework. However, some relatively low scores were found for questions about the framework’s ease of use.

In summary, the results indicate that the framework and the associated tools for using the process were considered by in-house personnel as highly valuable and effective. Most of the responses (around 20 percent) with a low score (below four) are those related to the framework’s ease of use (the lowest score attained was 3.2).

The results of the evaluation also indicate that efforts in the following areas would improve the usability of the framework proposed in this study: (1) providing more explicit instructions / descriptions in the process of defining stakeholders’ wants; (2) giving detailed examples in the process of figuring out wants from someone else’s perspectives, and; (3) providing detailed descriptions for the four UX elements.

8. CONCLUSION

In this study, we designed a framework that enables non-professional personnel to work on content strategy building and conduct content management, so that the organization could maintain sustainable content communication. The framework is structured on the basis of the methodology of systems engineering, which is a cross-functional approach for successfully realizing large and complex systems. We applied the framework to one communication channel, i.e., an organization’s website, and found that the framework worked well in updating the contents so as to satisfy newly elicited stakeholder needs. After updating the website’s contents within the framework, the number of website

visits and the length of stay of each visit significantly increased. We also conducted an evaluation on the framework by asking non-professional staff members of an organization to assess whether the framework is easy to understand, easy to use, and effective. The results indicated that the framework is highly valuable in terms of effectiveness but needs some more efforts in improving the ease of use.

The framework proposed in this study is designed for all kinds of communication channels, whereas this study's on-site evaluation was conducted only on website operations. For future research, we would apply and test the framework on several other communication channels commonly used by enterprises. Among different communication channels/outlets, paper documents such as brochures and booklets are usually managed and edited by professionals. Therefore, a potential research subject would be enterprises' digital communication on SNS. By studying the past literature and emerging discussions concerning enterprises' content communication on SNS, we would further develop the framework that enables non-professional personnel to maintain sustainable content communication using digital tools.

SNS is a kind of by-directional communication. Nowadays, values generated in the relationship between two entities have become increasingly focused on relational service design (Cipolla *et al.* 2009). In undertaking enterprise communication with customers, one way of communication is conveying contents and the other way is building relationships. Some researchers argued that relational communication is more important than anything expressed in written words. In the context of SNS, relational communication is created along with content communication, which makes communication more complex and more difficult to handle for non-professional personnel. Thus, the current framework needs to be further developed to make it a better fit for the new context.

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