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"Navigating Global Quality in a New Era"



June 21, 2011 (Tuesday) 55th EOQ Congress

CONCURRENT SESSIONS
KEMPINSKI HOTEL CORVINUS

Tuesday 13:30 – 17:30
Erzsébet tér 7-8, Budapest V.

SALON CORVINUS

Tuesday 15:30 – 17:30

14.1. QUALITY DEVELOPMENT AND MEASUREMENT METHODS

Session Chair: *Miflora M. Gatchalian, Quality Partners Co. Ltd., Philippines*

16.20 Methodology for the Establishment of "Standards" as Socio-technology

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Presenter: Kato, Shogo

Methodology for the Establishment of "Standards" as Sociotechnology

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Focus Area: Quality Development Tools and Methods, Standardization and Accreditation

1. Introduction

1.1 The Significance of Standardization and Accreditation

The term “standard” refers to a thing or method that has come to be considered acceptable on the basis of someone’s experience^[1]. Standards enable knowledge sharing in a group and can increase the intellectual and technological levels of that group. Appropriate standards need to be developed and be shared in order to strengthen a group’s competitive advantages. If the target of standardization is a highly public service like healthcare, standardization can benefit an entire society.

Those who employ established standards sometimes experience difficulties in evaluating their appropriateness. While determining standards concerning safety hazards, it is necessary to be very cautious; this can mean that a considerable amount of time and money can be spent in the determination process. In such circumstances, obtaining accreditation or certification from an appropriate organization can often be very helpful. This enables increased efficiency in the choosing of appropriate standards and can assist in ensuring the adoption of secure and safe standards. Eventually, the accredited or certified use of appropriate standards is likely to benefit an economy.

However, the existence of a variety of values in a society may impede the establishment of universally appropriate standards as well as the sharing of such standards. Therefore, a methodology for the establishment of standards for an entire society may be needed. This can be constituted as a kind of “sociotechnology” that can promote the visualizing, systematizing, sharing, and utilizing of relevant knowledge in various areas.

1.2 Investigation Objects of this Study

The work of this study will be focused on the establishment of a standard methodology for designing a long-term care program^{[2][3][4]}.

Kato et al. proposed a model for determining the care of the elderly^[2], intended to help care managers decide on the appropriate type of care required for an elderly person to achieve ADL (Activity of Daily Living). This model consists of both “procedure” and the “structure of the knowledge base required for the procedure.” By carrying out this procedure using the knowledge base, care managers can determine the levels of appropriate care needed for each elderly person., Kato et al., along with seven healthcare/welfare professionals, developed the knowledge base required for this model by standardizing their implicit knowledge^[3]. Finally, Kato et al. categorized the required types of work and proposed a methodology for designing a long-term care program^[4].

These works were highly valued and were awarded the Nikkei Quality Control Literature Prize 2009 ([2] and [3]). We consider that these works contains important factors related to the methodology for the establishment of standards.

2. Purpose

In this study, the following two aspects will be considered with regard to the “establishment of standards”: developing genuine standards and commoditizing them throughout society. The goal of this study is to propose a methodology for the establishment of such standards.

The intention here is to carefully review and analyze the nature of the work needed for the establishment of a standard methodology for designing a long-term care program^{[2][3][4]} (Chapter 3), and to consider how to create a general methodology for the establishment of standards (Chapter 4).

3. Review and Analysis of the Methodology for the Establishment of the Knowledge Contents required for Determining Elderly Care

In this chapter, we will be reviewing and analyzing previous studies related to this topic^{[2][3][4]}. Firstly, we will describe an outline of a model for determining the nature of care of the elderly (3.1). Subsequently, we will describe an outline of the methodology needed for doing this (3.2). Further, we will analyze the methodology (3.3).

3.1 A Model for Designing a Long-term Care Program^{[2][4]}

The process of designing a long-term care program has been defined as “a process that can be used to design practical measures to satisfy the care needs of an elderly person” (Figure 1). This process consists of five phases, as shown in Figure 1:

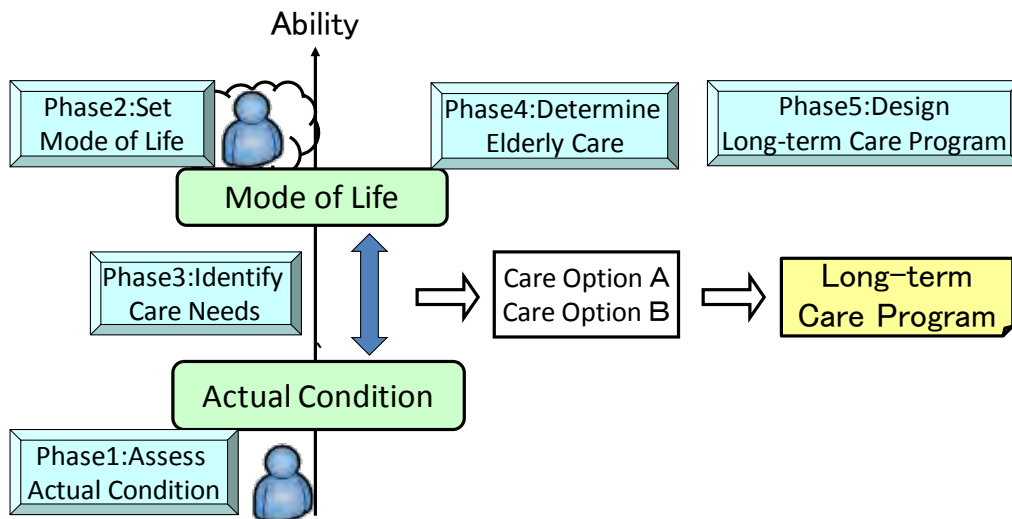


Figure 1: Core Concepts

Phase 1: Assessing the actual condition of the elderly person

Phase 2: Setting a mode of life for the elderly person

Phase 3: Identifying the care needs (identifying the needs for care of the elderly person on the basis of the gap between their actual condition and their established mode of life)

Phase 4: Determining the nature of the care required (determining the nature of this care as a measure to satisfy care needs)

Phase 5: Designing a long-term care program (designing a program of long-term care as required)

Based on this core concept, a logical model and implementation system that could be used to design a long-term care program for an elderly person was proposed. Figure 2 illustrates this logical model and the implementation system. The logical model as a whole defines a methodology for designing a long-term care program. The model includes three layers that have four hierarchical components, namely: “Framework,” “Method,” “Knowledge Structure,” and “Knowledge Content.” The implementation system designed on the basis of this model has two components: (1) “procedure,” which is optimized on the basis of the framework, method, and knowledge structure, and (2) the “knowledge base,” which is specifically established on the basis of the knowledge structure. This system supports the implementation of the methodology specified by this model.

Figure 3 shows the framework, which is defined as “the design of a long-term care program,” and it shows all the elements that need to be considered as well as the relationships between them.

In general, there are multiple ways of achieving each ADL aim. In order to take account of the variety of means needed for the achievement of an ADL item, an ADL needs to be divided into more basic “element actions.” Each ADL can then be expressed as a “realization pattern,” which is a combination of multiple element actions, based on which environmental conditions have been determined. In this way, a mode of life for the elderly person can be established with some precision.

An “ability element” is defined as a scale used to assess a person’s condition. The actual condition of an elderly person can be quantitatively expressed as a score for each ability element, and is referred to as

“actual ability.” If the person uses any wearable supporting devices, we need to assess the ability of the person separately for cases where devices are worn and for those where they are not worn.

The ability required for a person to perform an ADL in the manner expressed in their particular mode of life is referred to as “required ability.” For each element action included in the realization pattern for each ADL item, ability gaps are identified by comparing actual ability with the required ability, as determined by the element action. These gaps constitute the care needs.

After this, a feasible method to satisfy an elderly person’s care needs can be established. Such methods can be classified into two types. One is “decreasing required ability,” which can be achieved by improving the environmental conditions, using supporting devices, and providing assistance. The other is “improving actual ability,” which can be achieved by rehabilitation training, or by the use of wearable supporting devices (e.g., eyeglasses, acoustic aids).

Furthermore, practicable measures can be selected from the multiple elderly care options capable of fulfilling the ability gaps in each element action for which care needs can be identified. For each ability element, practicable elderly care items can be determined by comparing actual ability with the ability required for care.

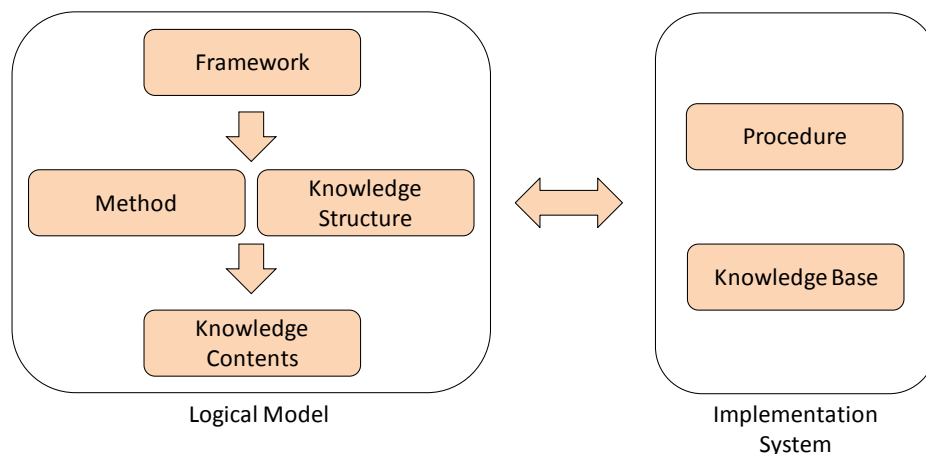


Figure 2: Structure of the Logical Model and Implementation System

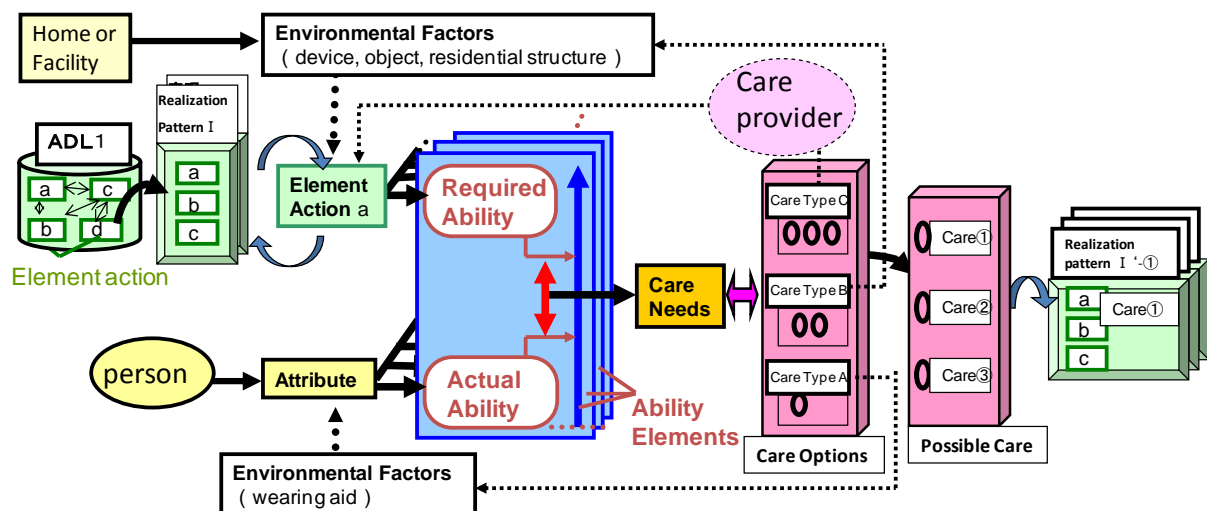


Figure 3: Framework

Table 1 and Figure 4 show the method and the knowledge structure, respectively. The method indicates the various functions (information conversion) that can be used to find a final solution, while the knowledge structure indicates the structure of knowledge used to implement the method.

Within a method, there are five phases composed of 11 functions. To implement the method, it is essential to use the knowledge structure shown in Figure 4. The knowledge contents developed on the basis of this knowledge structure can be converted into the six knowledge bases of the implementation system. These are: the assessment sheet, the home/facility information sheet, the actual ability calculation formula,

the realization pattern list, the table of required ability for element action, and the table of required ability for care.

Knowledge contents are specific contents developed using the knowledge structure. For example, the table of required ability for element actions contains 125 element actions and an organized required ability list created by using 32 ability elements.

Table 1: Method

Function		Outline of Function	Required Structured Knowledge
1-1	Evaluate Person's Condition	Evaluate person's condition	Assessment Sheet
1-2	Determine Actual Ability	Determine Actual Ability on the basis of the results of 1-1	Actual Ability Calculation Formula
2-1	Evaluate Home/Facility Environment	Evaluate home/facility environment, where the person will live	Table of Home/Facility Information
2-2	Reflect Home/Facility Environment	limit selectable Mode of Life on the basis of the results of 2-1	Table of Limitation to Mode of Life (included in Table of Home/Facility Information)
2-3	Set Mode of Life	Set (Multiple) Modes of Life for the person on the basis of the results of 2-2	List of Realization Pattern
3-1	Identify Care Needs	Identify person's care needs as gaps between Required Ability for (Multiple) Modes of Life set in 2-3 and Actual Ability determined in 1-2	Table of Required Ability for Element Action
4-1	Evaluate Elderly Care Options	Evaluate practicability of elderly care options to meet the person's care needs identified in 3-1	Table of Required Ability for Elderly Care
4-2	Determine Elderly Care	Select elderly care from the elderly care options found practicable in 4-1	
4-3	Determine Elderly Care Services	Determine elderly care services to implement elderly care selected in 4-2	Elderly Care Services Table (incorporated into Elderly Care List)
5-1	Determine Mode of Life	Determine Mode of Life from (Multiple) Mode of Life options set in 2-3	
5-2	Design Long-term Care Program	Determine person in charge and specific timeline of the elderly care based on the results of 5-1	(Design Item (PIC, Timeline etc.))

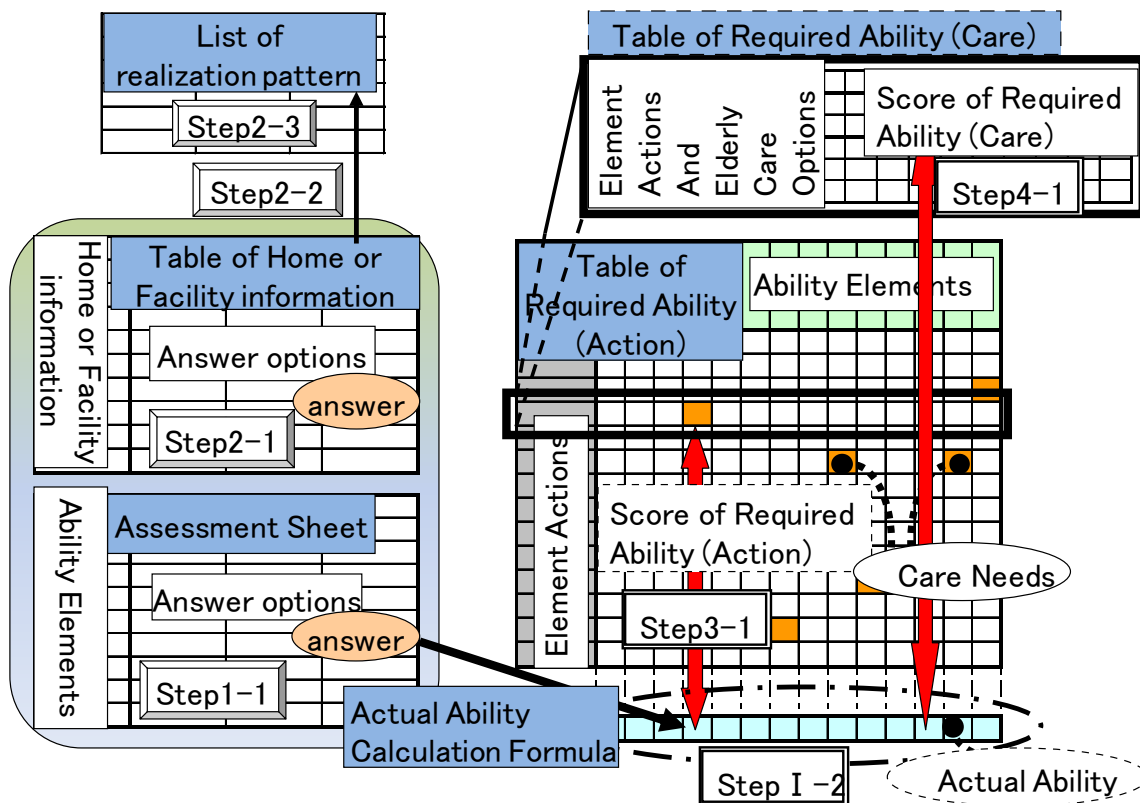


Figure 4: Knowledge Structure

3.2 Methodology for Developing Knowledge Contents^[3]

The Knowledge content method was first developed in collaboration with care managers, doctors, nurses, and social workers in the Ohme Area in Japan. An outline of the methodology for developing knowledge contents is illustrated in Table 2.

This was initially developed as a preliminary version through discussion with medical/welfare professionals, after the model and knowledge structure had been sufficiently explained.

Subsequently, the knowledge contents were applied to twelve actual cases that were being handled by concerned professionals, and were modified by comparing the output of the model to the actual situations in those cases.

At this point, the crucial factors of knowledge content, including the relationships between element actions, care and ability elements, and the logical steps for determining required ability, were structured.

Finally, knowledge contents were redeveloped on the basis of the structured core factors.

Table 2: Outline of the Methodology for Developing the Knowledge Contents

Phase	Output of each Phase
Phase 1: Developing the Preliminary Version by Structuring Technical Knowledge <ul style="list-style-type: none"> • Considerable points of argument should have been defined in advance. • Technical knowledge and implicit knowledges should be drawn out through concrete questions. • Parts, those are difficult to determine logically, should be identified. 	Knowledge Contents (Preliminary Version)
Phase 2: Modifying the Preliminary Version through Application to Actual Cases <ul style="list-style-type: none"> • Parts, those are difficult to determine logically, should be modified mainly based on the actual situation. • Selection of cases is important in order to obtain sufficient information. 	Knowledge Contents (Modified Version)
Phase 3: Structuring the Knowledge Contents <ul style="list-style-type: none"> • Modified version should be structured. • Core factor of knowledge contents should be developed. 	Core Factor of the Knowledge Contents <ul style="list-style-type: none"> • relationship between "element actions", "care", and "ability elements" • logic for determining "required ability"
Phase 4: Re-developing the Knowledge Contents based on the Core Structure <ul style="list-style-type: none"> • Knowledge Contents should be consistent with the core factor. • Parts, those have not modified enough in Phase 2, should be modified. 	Knowledge Contents (Completed Version)

3.3 Analysis of the Methodology

We analyzed the methodology for developing knowledge contents in accordance with the following procedure. The results of the analysis are shown in Table 3.

- (1): We extracted a total of 63 descriptions. These are concerned with the methodology for developing the knowledge contents, as described in relevant studies^[3].
- (2): For each description, we extracted the requirements for the operations and the required guides for the operation, through interpreting and generalizing.
- (3): We integrated each requirement based on what it is concerned with in the model.

For example, the original description of ID 8 is shown below.

We deconstructed ADL items into minute actions based upon the following two perspectives in order to fulfill "completion" and "clarity".

• "purpose of actions": purposes underlying the actions - by including this perspective, we can prevent omissions in fulfilling ADL items and we can thus fulfill "completion"

• "concrete actions": concrete actions needed to achieve the purpose of actions- by including this perspective, we can determine the makeup of element actions, and we can fulfill "clarity"

This describes ADL, realization patterns and element actions. We interpreted this to mean "when we deconstruct something, it is better for us to use two types of perspectives in order to deconstruct factors appropriately."

In general, purpose-means relationships and cause-effect relationships are noted as perspectives for deconstructing something^[5]. Having integrated these perspectives, we summarized our conclusions as shown below.

• The three following perspectives on the relationships between relevant factors can be useful in deconstructing these factors appropriately:

(1) "factor-factor": relationships between factors. These configure the upper factor in the same layer

(2) "purpose-means": the relationships between purpose and means required to achieve a purpose

(3) "cause-effect": relationships between cause and effect

As above, we extracted the requirements for the process for the establishment of standards by analyzing 63 descriptions.

Table 3: Analysis of the Methodology

Original Description		extraction of requirements		integration of requirements	
ID	description in the original paper	requirements (operation)	requirements (guide)	requirements (operation)	requirements (guide)
1	We developed knowledge contents (preliminary version) through discussion with seven experienced medical/welfare professionals (two nurses, three social workers, and two care managers), those have at least five years of experience, focusing on points in table 1.	organize the focus group	<ul style="list-style-type: none"> •It is needed to select such specialists, those have enough technical knowledge on relevant issue, as focus group member. •It is desirable to select multiple members from multiple organization in order to prevent a bias. 	organize the focus group	<ul style="list-style-type: none"> •It is needed to select such specialists, those have enough technical knowledge on relevant issue, as focus group member. •It is desirable to select multiple members from multiple organization in order to prevent a bias.
2	We determined that six ADL items to be included; dressing, eating, grooming, urination, bathing, moving, consulting with common ADL valuation method [14][17][22].	determine the scope of "purpose", which should be taken into consideration		determine the scope of "purpose", which should be taken into consideration	
5	We distinguished each "pattern of realization" if it includes distinct "element actions", arise from the difference of "place", "body position", "instruments" for each ADL.	develop the "purpose" and "implementation plan"	•It is appropriate to distinguish each "purpose" and "implementation plan" if it includes distinct factors.	develop the "purpose" and "implementation plan"	•It is appropriate to distinguish each "purpose" and "implementation plan" if it includes distinct factors.
6	We developed the list of "element action" by identifying the union of sets of all element actions included in all pattern of realization.	develop the components of "purpose" and "implementation plan"	•It is needed to eliminate overlap in components of "purpose" and "implementation plan" because it is possible that same factors are included in multiple "purpose" and "implementation plan".		•It is needed to eliminate overlap in components of "purpose" and "implementation plan" because it is possible that same factors are included in multiple "purpose" and "implementation plan".
8	We deconstructed ADL items into minute actions based upon the following two perspectives in order to fulfill "completion" and "clarity". <ul style="list-style-type: none"> • "purpose of actions": purposes underlying the actions—by including this perspective, we can prevent omission in fulfilling ADL items and we can thus fulfill "completion" • "concrete actions": concrete actions needed to achieve the purpose of actions—by including this perspective, we can determine the makeup of element actions, and we can fulfill "clarity" 	develop the components of "purpose" and "implementation plan"	<ul style="list-style-type: none"> •It is needed to use three perspectives: "factor-factor": relationship between factors: relationships between factors those configure the upper factor", "purpose-means": relationship between purpose and means required to achieve the purpose" and "cause-effect": relationship between cause and effect", in order to deconstruct factors. 	develop the components of "purpose" and "implementation plan"	<ul style="list-style-type: none"> • The three following perspectives on the relationships between relevant factors can be useful in deconstructing these factors appropriately. (1) "factor-factor": relationships between factors. These configure the upper factor in the same layer. (2) "purpose-means": relationship between purpose and means required to achieve a purpose" (3) "cause-effect": relationships between cause and effect"
9	We distinguished each "element actions" if there may be some differences in realizability of it, and in derived cares.	develop the components of "purpose" and "implementation plan"	•It is needed to deconstruct each factor to minimum, but meaningful level.		•It is needed to deconstruct each factor to minimum, but meaningful level.

4. A Process Model for Establishing "Standards"

4.1 Designing a Phase in the Process for Developing Genuine Standards

The process of developing knowledge content was composed of four phases (Table 2). However, it is appropriate to identify a "phase" as the point at which "taking new action about knowledge content" becomes necessary. Therefore, Phases 3 and Phase 4 could potentially be integrated. Including some verification may also be appropriate here. The process for developing genuine standards can be said to be comprised of the following four phases:

- Phase 1: development of the 1st draft by discussion in a focus group
- Phase 2: development of the 2nd draft by applying the 1st draft in actual cases
- Phase 3: development of the 3rd draft by systematizing the hypotheses
- Phase 4: applying the 3rd draft to actual comprehensive cases for verification

In this study, we regard completing the development of a standard as a hypothesis, and we can assert that there is no antilogy between the hypothesis and the standard. Because we are focusing on a methodology for a technically immature area, it is difficult to prove all the hypotheses theoretically, and an experimental hypothesis should therefore be included. With reference to this, an outline for each phase is shown in table 4.

4.2 Designing a Stage in the Process for Commoditizing Standards

Phase 1 to Phase 3 (in table 2) were carried out with a limited focus group, comprising highly skilled professionals selected from representative organizations in the area. The intention of using this method was to commoditize the standard, which is generally regarded as being an effective way of developing a genuine standard. In Phase 4 (in table 2), knowledge contents were set as a trial for the expanded group, so bringing the later spread into view.

In later stages, it was necessary to show that the standard was appropriate and that a business model could be designed by the relevant players. To achieve this, two approaches can be used: (1) continuing to using the standard on site and gathering data to prove its appropriateness; and (2) obtaining certification from the authorities in that area at some stage. In this study, we adopted the latter method as it is quicker and more efficient. Eventually, it was concluded that the process for commoditizing standards comprises the following four stages, and an outline of each stage is shown in table 5:

- Stage 1: development by a focus group
- Stage 2: creating publicity in order to attract participants
- Stage 3: evaluation by a competent authority
- Stage 4: authorization by an academic society or arbiter

Table 4: Outline of each Phase

Phase	outline of Phase	output (standard)	output (hypothesis)
Phase 1 : development of the 1st draft by discussion in a focus group	<ul style="list-style-type: none"> •develop the Standard (1st draft) through discussion in the focus group •develop theoretic hypothesis modules (1st draft) •determine the scope of relevant Standard 	Standard (1st draft)	Fragmented Hypothesis <ul style="list-style-type: none"> • theoretic hypothesis modules (1st draft) • experimental hypothesis modules (preliminary)
Phase 2 : development of the 2nd draft by applying the 1st draft in actual cases	<ul style="list-style-type: none"> •develop the Standard (2nd draft) through application to actual cases •develop data hypothesis modules (1st draft) •develop theoretic hypothesis modules (2nd draft) by modifying 1st draft 	Standard (2nd draft)	Fragmented Hypothesis <ul style="list-style-type: none"> • theoretic hypothesis modules (1st draft) • experimental hypothesis modules (1st draft)
Phase 3 : development of the 3rd draft by systematizing the hypotheses	<ul style="list-style-type: none"> •structurize theoretic hypothesis modules and data hypothesis modules •develop the Standard (3rd draft) based on structurized hypothesis 	Standard (3rd draft)	Structurized Hypothesis <ul style="list-style-type: none"> • theoretic hypothesis modules (2nd draft) • experimental hypothesis modules (2nd draft)
Phase 4 : applying the 3rd draft to actual comprehensive cases for verification	<ul style="list-style-type: none"> •verify the validity of the Standard through application to expanded actual cases •develop the standard (verified) based on the results of verification 	Standard (verified)	Structurized Hypothesis (verified) <ul style="list-style-type: none"> • theoretic hypothesis (verified) • experimental hypothesis modules (verified)

Table 5: Outline of each Stage

Stage	Outline of Stage	Output (standards)	Output (business model)
Stage I : development by a focus group	<ul style="list-style-type: none"> •design business model (in the broad sense of the term) •demonstrate the local availability in the focus group 	demonstrated in the focus group	model, from which each member of the focus group can benefit, is designed
Stage II : creating publicity in order to attract participants	<ul style="list-style-type: none"> •evaluate the business model among relevant players •demonstrate the local availability among relevant players 	demonstrated among relevant players	model, from which each relevant player can benefit, has designed
Stage III : evaluation by a competent authority	<ul style="list-style-type: none"> •evaluate the business model •evaluate the subject for standardization •evaluate the focus group •evaluate the versatile availability of the standard 	evaluated versatily	evaluated by a competent authority
Stage IV : authorization by an academic society or arbiter	<ul style="list-style-type: none"> •evaluate the knowledgeable person •evaluate the evaluation process in Stage III •recognize the validity of the business model •recognize the validity of the subject for standardization •recognize the validity of the focus group •recognize the versatile availability of the standard •Authorize the standard 	recognized versatily	authorized by an academic society or arbiter

4.3 Proposing the Process Model for Establishing Standards

An entire view of the process model for establishing standards, which integrates both the process for developing genuine standards and the process for commoditizing the standards, is shown in figure 5. Here a “solid square” expresses the idea of a “phase” in the process of developing genuine standards, and a “dotted square” expresses a “stage” in the process of commoditizing the standard.

Stage 1 includes phases 1 to 3, and Stage 2 includes phase 4. After the development of the standard is concluded, stages 3 to 4 are prepared to define the standard as commoditized in the expanded area.

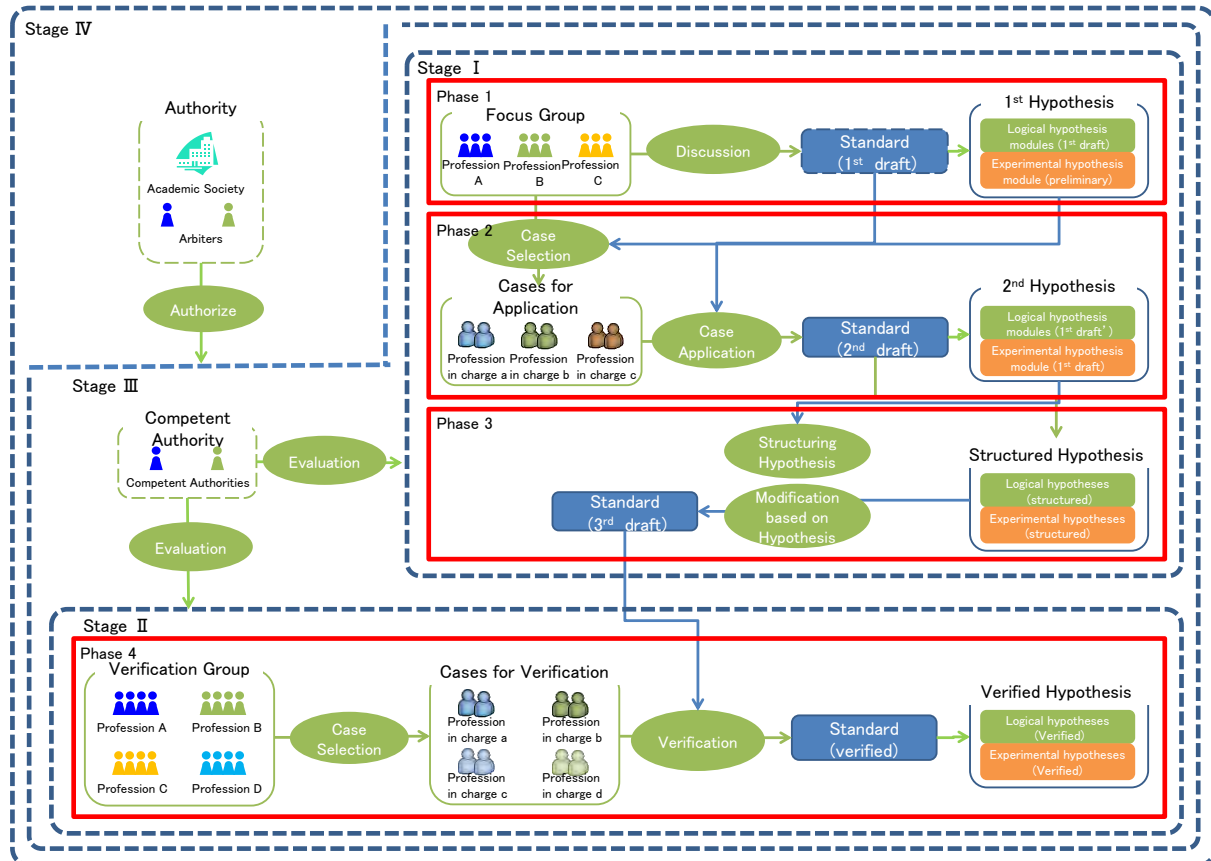


Figure 5: Entire View of the Process Model for Establishing Standards

5. Discussion

5.1 The Validity of the Process for Developing Genuine Standards

Our process for developing genuine standards can be characterized as a “small group approach.” More specifically, it is the approach used to summarize the best practice for a small group, rather than one genuine specialist (the one specialist approach) or a large group (large group approach).

Our small group approach has some merits: the lower the risk of missing details, the higher the completeness of detail. It also has some demerits: the more time it requires, the higher the risk that the genuine minority could be buried, compared with the one specialist approach. Other merits include: the lower the risk for exuding arguments, the less time is needed. There are some other demerits; depending on the inherent situation of the small group, which can make it difficult to deal with change easily, compared with the large group approach.

Because technology generally continues to make progress, it is necessary to continually deal with change. To achieve this, a group approach is usually superior to a specialist approach. For an area in which the specific technology has not yet been well established, the speed of standardization is important. Therefore, a small group approach may be more effective here than a large group approach.

In our process, the early part (Phase 1 ~ 2) is based on an inductive method, and the later part (Phase 3) is based on a deductive method. Because we are targeting a technically immature area, it may difficult to use a deductive method, though natural to take on an inductive method in the early phases. Subsequently, it may become possible to raise the completeness efficiently by changing to an inductive method.

5.2 The Validity of the Process for Commoditizing Standards

Our process for commoditizing standards can be characterized as the “endorsement along the way approach.” More specifically, it is an approach to achieve endorsement along the way, in contrast to approaches that have no endorsement (“grass-roots” approaches), or those that strive to obtain endorsement from the beginning (“endorsement from the beginning” approaches).

The endorsement along the way approach has some merits. It needs less time and it makes users feel safe. It also has some demerits: the higher the risk of limiting the scope for verification, the higher the risk for choosing the least effective method, compared with the grass-roots approach. Other merits include the lower the risk for limiting the scope for verification, the lower the risk of choosing the least effective one, and there are some other demerits; more time is needed and more difficulty may be experienced, compared with the endorsement from the beginning approaches.

The reason we adopted the endorsement along the way approach depended on having taken the small group approach during the process of developing genuine standards. When combined with each other, our processes for the establishment of the standards can lower the demerits and reinforce the merits of each sub process.

In addition, we required some assistance; including placing the opinion leader in that area in the focus group, and including the followers of the opinion leader as relevant players. This made our process more effective and efficient.

5.3 The Applicable Scope of the Proposed Model

As mentioned above, we designed our process model for the establishment of standards, assuming the existence of a technically immature area, in which it may be possible to find highly skilled professionals and to organize a focus group.

If an area is technically mature and only visualizing is required for developing a standard, our model is not so efficient, because adopting a deductive method from the beginning might be more applicable. Furthermore, in the earliest stages, our model would not be applicable if highly skill professionals could not be found to organize the focus group.

In addition, our model might not be applicable to areas that depend highly on particular values. In such an area, it could be difficult to organize a focus group of an appropriate size, because it would need to include individuals with a range of values. Furthermore, if we could organize a focus group of an appropriate size with various values, then it would be difficult to focus the arguments in such a group.

5.4 The Significance of this study

Developing and commoditizing standards can strengthen the entire basis of a society. If there are genuine standards in various areas, this can make the whole society productive and strong.

However, in many areas, it is difficult to develop genuine standards and commoditize them, because the knowledge of how to achieve them may not exist. In such areas, the quality of products or services depends on individual abilities, which may not be sufficiently established. In particular, in a highly public area like healthcare, genuine standards can have a favorable influence on the entire society.

A methodology for the establishment of standards can be a very important form of “sociotechnology,” and our model could be of great significance as a first step in this process.

6. Conclusion

In this study, we proposed a process model for the establishment of standards that could enable the development of appropriate standards and expedite their acceptance in society. In the future, we need to substantiate our methodology by applying it to the establishment of various types of standards, and consider the variation of our model adopting the type of subject of standardization.

Acknowledgements

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References

[1] Iizuka, Y., 2009: General Modern Quality Management, Asakura Publishing co., Ltd.

- [2] Kato, S., Tsuru, S., Iizuka, Y., 2008, A Process Model for Determining Elderly Care on ADL (Japanese), Journal of Japanese Society for Quality Control, 38(1), 119-141.
- [3] Kato, S., Tsuru, S., Iizuka, Y., 2010, A Model for Designing Long-term Care Program, Proc. of the 54th EOQ Congress, Izmir, CD-ROM, 8p.
- [4] Kato, S., Tsuru, S., Iizuka, Y., 2009, Developing the Knowledge Contents on ADL Required for the Processes for Determining Elderly Care (Japanese), Journal of Japanese Society for Quality Control, 39(2), 77-97.
- [5] Iwasaki, H., 2010: Quality Management Seminar Basic Course Text Chapter 2: Problem Solving Method, Union of Japanese Scientists and Engineers.