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ZEN: The Self-Elicitation Method of Requirements for Public Policy Designers

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ABSTRACT

The ZEN, the Zero-requirements–creep Elicitation tools-Nests is a standardized self-elicitation process for a public policy designer by applying a standard set for self-reflecting the completeness and the clarity of the policy requirements. It is the new methodology to compose a dozen of existing tools of the business strategy and decision, and to function with four categories of tools; for identifying proper stakeholders; for recognizing clearly the boundary of a system; for developing further logical-thinking; for visualizing properly information chains and causal relations.

KEYWORDS: Requirements engineering; elicitation, social system, public policy, requirements creep.

1. INTRODUCTION

The requirements engineering has conventionally recommended system engineers to use some methods for engaging them in requirements dialogues with customers. Because a project without such a dialogue often results in requirements leakage or creep, which may cause grave cost and/or time over-run of the project. For instance, Halligan [1] pointed out by quoting the data from TRW in early 1980s that "30 per cent of design problems requiring correction were due to erroneous or incomplete specifications".

However, as for the social system projects, it is widely observed that a system analyst faces a challenge to have requirements dialogues due to reasons indigenous to the social domains; e.g. incomplete identification of a problem owner, ambiguous demands of stakeholders, unbalanced volumes of customers' voices. As well as other social systems projects, accurate and precise grasp of stakeholders' requirements is the key of success to a public policy projects.

Nonetheless, such grasp is the most challenging part of the project because of social features. Nor have there been few proposed methods to help a practitioner in the public policy analysis overcome these challenges. Thus this paper is to conceptualize the standard method to organize properly the streamlined way to implement self-elicitation of requirements for making public policy alternatives.

2. PROBLEM AND PREVIOUS STUDIES

There are two different kinds of challenges to elicit right requirements for a public policy problem; one inherent in a social system; and another inherent in a policy problem. A public policy analysis is to propose policy alternatives for a problem in a social system. Dunn [2] defined the public policy analysis a problem-solving discipline drawing on social sciences for complex and multifaceted social problems. Thus it is necessary to address this double-fold challenges.

2.1 Social System Challenge

Checkland and Scholes [3] defined a social system as composed of three elements: roles, norms and vales. And these three elements interactively define each other and change to redefine others. As three elements mutually depend upon to be defined, the identification of system-element, as Jackson [4] set the first step in systems approach, is a challenge in nature.

For socio-technical systems, there are several methods proposed to help an analyst specify requirements for those systems (for instance, Maté & Silva [5]). Nonetheless, Maté & Silva [5] strongly stressed the reciprocal interrelationship between human and machines in the socio-technical system, thus narrowly focusing upon a theoretical construct for describing and explaining technology for the system. They do not deal with any methods to a 'pure 'social system which has nothing to do with technology.

For example, Easton [6] described politics as a system with inputs and outputs without referring to technological factors. But the political system to input demands and supports from voters and to out put policies, in Easton's sense, is left generally without any proposals for requirements engineering.

2.2 Public Policy Challenge

Public policy analysis is a social inquiry to systematically find and propose policy choices for social problem. However, the incomplete rationality, the complex social structures and organizations, as well as many variables and feedback loops and interactions tend to make the inquiry difficult and produce multiple consequences (Walker [7]).

Moreover, the problem structuring is a challenge in the public policy. As Dunn [8] described, policy analyst, policy makers and diversified stakeholders in the society cannot agree often on how to structure the problem because of their different assumptions on what caused the problem.

There are two other challenges to specify policy requirements with hearing customers' voices. A policy analyst may be given the limited time to identify all stakeholders and to formulate a problem. Due to partiality for influences to the policy makers and/or analysts among various social conditions and environments, all stakeholders' requirements may not be collected. Most of the policy decision models show this risk. For example, Sabatier [9] implicitly indicated in his 'advocacy coalition model', a policy-decision model to explain policy outcomes as competing and cooperating advocacy groups with different belief systems, that the weaker and uncoordinated advocacy group may not reflect their policy agenda in the policy system and thus excluded from the policy decision process.

2.3 Importance of User Requirements Definition Phase

Proper identification of stakeholders and their requirements is quite important also from the project management perspective.

A project management cycle has four phases (Forsberg, K. et al. [10]); user requirements definition, concept definition, system specification definition, and acquisition preparation. Among these four phases, user requirements definition, which is equivalent to the stage of stakeholders and problems analysis in the public policy analysis, has significance to lead a governmental project to success because this phase determines feasibility and boundary of requirements to be addressed to the solution of a social system problem.

2.4 Rationales for Two-way Functions

As we referred in the subsections 2.1 and 2.2, there are two major challenges for a public policy analysts; the interdependency of elements in the social system and ill- and/or biased-structured problem with limited coverage of stakeholders. These two challenges require them to be equipped with the requirements elicitation methods particularly designed for them in considering policy alternatives.

To address the interdependency of the social system, a method is needed to transfer elements to sub-elements by the layered view point model (Shirasaka [11]). The causal view, a view pursuing causal relations of sub-elements at the sub-system level, and its repeated usages pursuing causal relations in details to the below sub-level, is important to make requirements clearer in the social system.

To address the ill- and/or biased-structured problem with imperfect identifying stakeholders, a

policy analyst may employ a method which helps her looking around from her standpoint for radar out all possible problems and stakeholders. This employment is not depending upon self-claiming from already identified or loud stakeholders about their own problem-formulations and assumptions. Rather it is the elicitation work from the analyst as center point to extend the scope of problems and also to confirm the boundary of the system.

The particular method for a public policy analyst for formulating stakeholders' requirements thus needs two features; the layered view point function pursuing causal relations (i.e., the vertical view); and the self-elicitation function to watch around all problems and stakeholders (i.e., the horizontal view). The relation of these two functions is described as complementary in the Fig. 1.

Maté & Silva [5] proposed several approaches to identify the causal relations of elements in the socio-technical system. However, they did not address to the challenge inherent to the public policy issues. On the contrary, Dunn [8] recommended eight methods to address the issue of ill-structured problem in the public sector. However, it did not address to the challenge inherent to the social system.

The proper requirements management in public policy analysis is required to satisfy simultaneously the layered pursue of causal relations of (sub-)elements and the self-elicitation to look around for identifying problems and stakeholders without creep.

This analysts' two-way work resembles the Zen, one school of the Buddhists' meditation. Because Daisetsu Suzuki, an eminent Zen theorist and practitioner in the early 20 Century explained [12] that Zen is the "systemic training of the mind" to bring "what is up in the heavens" down to the earth (the vertical view) and also of enlarging "the heart to embrace eternity of time and infinity of space" (the horizontal view).

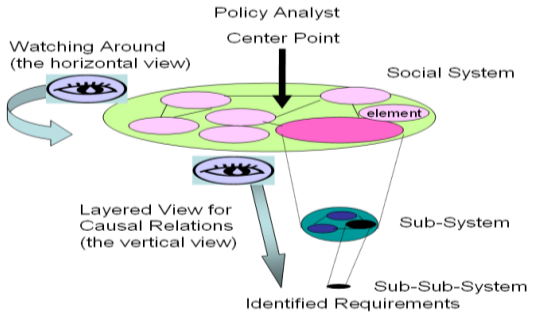

Fig. 1. Two-way functions of the method.

3. ZEN PROCESS

3.1 Basic Feature of ZEN

The Zen is the standardized method to formulate requirements of stakeholders without any creeps for public policy design. There are other methods proposed to streamline for collecting and structuring requirements, to name a few, Jones and Maiden's RESCUE [13] for the socio-technical system and Robertson and Robertson's Volere© [14] mainly for the human-related system. Differently from these already existing methods, the Zen is unique in the sense that it is totally designed for requirements engineering for a public policy analysis.

Nonetheless, the Zen does not confront or contradict with the conventional methods to identify stakeholders and their requirements for policy alternatives as well as with existing methods in requirement engineering. Rather it is complementary to these and suitable for the situation where a policy analyst anticipates that stakeholders can be identified very poorly in an ill- and/or biased-structured problem. The Zen and any conventional methods can be implemented in the dual tracks.

The Zen has four basic features (abbreviated as 'SANE');

a) *Self-elicitation*; not necessarily this method needs physical gathering stakeholders' voice. A policy designer may utilize existing literatures and the set data of the past surveys. Following the Zen process, a policy designer can elicit and prioritize requirements in self-guided way.
b) *Automatic writing-format*; the Zen uses a preset sheet for formatting and evaluation to work orderly and afterwards to reflect the process. The sheet invites a user in fairly automatic and organized way to elicit and prioritize requirements on it.
c) *Nested Structure*; at any levels of social systems (e.g. the meta-system, the system, the sub-system, and the further sub-system), the Zen can be implemented repeatedly and par-

tially in the limited scope.

d) *Economy to implement*; The Zen is a sequential process with combining existing tools of business strategy in innovative way. So it needs no new investment in expensive hardware and/or software to introduce the Zen into a field of public policy formulating. Ultimately we need only a pencil and a piece of paper to practice the ZEN.

3.2 ZEN Process

The Zen has five stages in its process. This sub-section is to describe its process in sequence; the tool-box (the first stage), the check-sheet (the second stage), the aggregation (the third stage), the dots-connection (the fourth stage), and the reflection (the final stage).

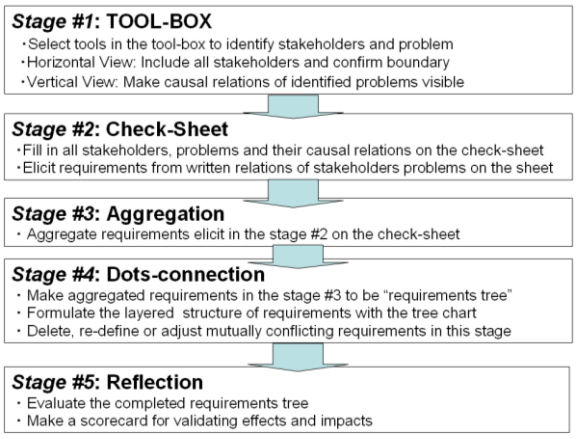

Fig. 1. 5 Stages of ZEN

3.2.1 Tool-Box

The tool-box (Fig.1) is the list composed of existing tools for business strategy which can be applied to identify stakeholders and problems of a social system (Fig.1). These tools are categorized by two standards; a tool strongly oriented or neutral for scrutiny of causal relations; and a tool strongly oriented or neutral for including all stakeholders and problems. These two standards correspond to the vertical view and the horizontal view described in the subsection 2.3.

A policy analyst will choose any of tools in the tool-box to identify proper stakeholders and to formulate problems. For example, the analyst follows the cyclical applications of tools between horizontal-oriented and vertical-oriented. The analyst will repeat the horizontal-vertical cycle until it feels stakeholders and problems all identified and formulated like kneading bread.

Table 1. Tool-Box of ZEN.

		Horizontal View (For Inclusion)	
		Strongly Oriented	Neutral
Vertical View (For Causal Scrutiny)	Strongly Oriented	Tools to visualize information chains and causal relations *・CVCA Analysis* *・Scenario Graph*	Tools to solely pursue causal relations *・Fishbone Method*
	Neutral	Tools to include all stakeholders and problems *・Mind Map* *・Brain Storming* *・KJ Method* *・SWOT Analysis* *・5 Forces Analysis* *・3C Analysis* *・PEST Analysis*	Tools to develop further logical thinking *・MECE* *・Logic Tree*

The Check-sheet (Fig.2) is the preset writing format which has five columns; used tool, identified problems, identified stakeholders, stakeholders' requirements and remarks.

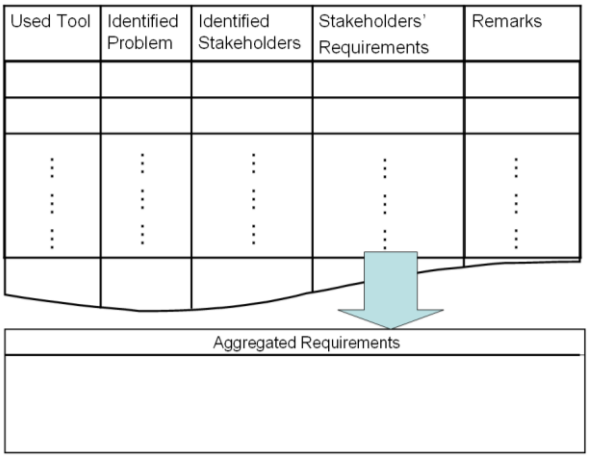

Fig.2. Check-Sheet

On the tool-box stage, all stakeholders and their problems are identified. A policy analyst will fill them in the sheet. From these data, a analyst will elicit and write requirement(s) corresponding to those stakeholders and problems in one-by-one basis on the sheet.

3.2.3 Aggregation

Requirements written down on the check-sheet will be re-written into another column in the sheet for aggregation (see the bottom part of Fig.2).

The aggregation process is important to recognize requirements without creep or errors. The aggregated requirements formulate the list of "customers' voices" for a public policy designer. If it

feels this tabulation not exhaustive, it can come back to the previous stage to identify more stakeholders and problems again.

On this stage there will be no rewrite nor adjust requirements elicit and aggregated even if some of them are contradictory or conflicting. Adjustments will be done in the next stage.

3.2.4 Dots-connection

By making "requirement tree" (Fig.3), requirements aggregated in the stage #3 are logically tested and put priority. Requirement tree is the tree-shape diagram to visualize functional relations between requirements. Requirements are put in hierarchal order from the meta/macro level to the sub/micro level.

Contradictory or conflicting requirements are deleted, re-written or adjusted in the diagram. Requirements located in the most meta/macro level will be put first priority to design policy alternatives.

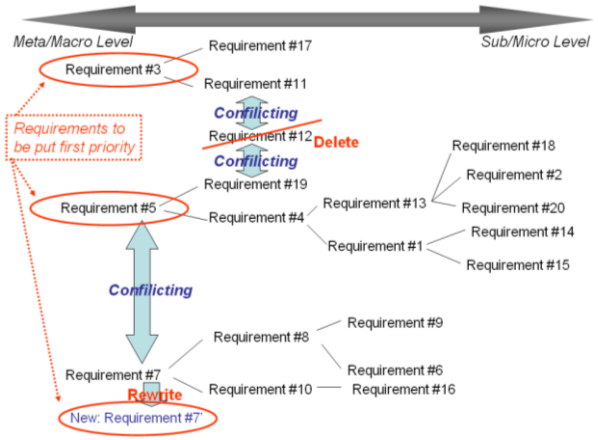

Fig.3 Requirements Tree Diagram

Davis [15] proposed the requirements triage, where an analyst put priority on requirements by weighed scores with each stakeholder's scoring results. Nonetheless, an analyst may face a challenge to ask stakeholders scoring the priority of requirements in cases of the public policy problem. As we described in 2.2, listed stakeholders may not rightly represent the problem-structure and their assumptions to the problem often conflicting. Therefore, we need the tree-shape diagram and literal adjustments process to correctly weigh the priority of requirements instead of the quantitative requirements triage.

The requirements tree and the adjustments process contribute to the early corrections of requirements errors and creeps. Thus it alleviates the requirements volatility, which is defined in Boehm [16] as the amount of change in requirements between the start and the end of a project and thus a significant factor affecting the cost.

3.2.5 Reflection

A policy analyst will evaluate by itself performance of the ZEN work with the reflection sheet (Fig.4). The sheet has five columns; identified requirements, expected effects, adverse impacts, reflection, and idea for improvement.

The sheet is a form of the scorecard to compare expected effects and adverse impacts, and feedback those to new and improved idea to better requirement elicitations. An analyst will fill anticipated effects and impacts, both qualitative and quantitative, which bear in its mind. Reflection will come out from the comparison of those effects and impacts. If many ideas for improvement come out, an analyst may come back to the stage #1 of the ZEN to re-start the whole process.

Identified Requirements	Expected Effects	Adverse Impacts	Reflection	Idea for Improvement
⋮	⋮	⋮	⋮	⋮

Fig.4. Reflection Sheet

4. CONCLUSIONS

4.1 Conclusion

In this manuscript, the ZEN is conceptualized as the specially designed process to be effective for public policy analysis. The ZEN has originality in the requirements engineering as it is characteristics of self-elicitation, automatic writing-format, nested structure, and economy to implement. The five stages of the ZEN process, which are tool-box, check-sheet, aggregation, dots-connection, and reflection, provide sequential and orderly analysis of requirements in the public policy domain.

4.2 Further Research Agenda

This paper remains to describe the ZEN and its background. Further research agenda is the empirical study on the effectiveness of the ZEN in an actual public policy problem.

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