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A Research of Ease of Evolution of Law Enforcing Information System

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1 Background and Purpose

Today, social system is becoming more electronically, and we are supported by information systems. Most information systems output results by applying social rules such as laws and local laws. These systems are required to be designed to satisfy social rules completely, and to be able to confirm the correctness. We define Law Enforcing Information Systems (LEIS) as systems satisfying these requirements.

Social rules may be changed adapting society changes. So a LEIS is required to be able to be modified quickly and cheaper to satisfy social rules always when a social rule is changed. We define Ease of Evolution as the requirements for LEIS.

The purpose of this research is realizing Ease of Evolution. To realize that, a logic to solve questions that system developers may have to evolve LEIS is needed. For example there are questions, "How is the social rule relating to functions of the LEIS?" and "How does the modification of social rules influence the LEIS design?".

In this research, a model of LEIS consists of a social model caused by social rules and a functional model caused by functional demands. To

solve the former question, first, the developer have to describe both a social model and a functional model. Last, the developer make a LEIS model by merging both models. To solve the latter question, first, the developer have to modify the social model. Last, the developer compare two LEIS models from both old and new social model. In this research, a Social model and a functional model is defined. And a method of making LEIS model is established.

2 Social model, functional model, LEIS model

Typical requested information by users for LEIS is how do social rules influence them. So typical LEIS solves their duties or permitted things by application of social rules. A social model was defined as a model for social rules' influence on them.

A social rule have provisions that restrict relations between past activities and present rights. The rule also have provisions that define category. These provisions are applied to us directly.

A provision is thought to be able to be expressed in formulas by using following constituents: propositions, predicates, functions and variables expressing past activities and current rights. A social model consist of these formulas.

A LEIS inputs information for application of social rules, and outputs results of application of social rules. The specific workings are defined by functional demands. So a functional demand mentions LEIS's working. For a web system, functional demand mentions relation between state of the system before and after current calculate process. A functional model realizes functional demands by using an operating environment and a Social model.

For the reasons stated above, a functional model consist of formulas by using following constituents: input data, output data, registered data, and parameters of social model before and after current calculate process.

A formula expressing the LEIS's working can be made by merging formulas of social model and functional model. LEIS model is defined as a set of these formulas.

3 Evaluation

To verify these models, I tried to make social model and functional model from a part of JAIST's rules of studying and course registration system. The subject on rules of studying is necessary conditions for presentation of a proposal. The subject on course registration system is function showing whether passed each necessary condition for presentation of proposal. A function's working is solved.

4 Conclusions and Future Works

In this research, It was proposed that describe a model caused by social rules and a model caused by functional model and make a model of LEIS's working from both models as a method for ease of evolution. Describing models for rules of studying and course registration system was tried. As a result, it was succeeded. It is necessary to apply to system other than course registration system, and to make the process of making LEIS model automatic.