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Research Grant Report - Executive Summary
FY2007 to FY2009

Securing the information society with the total security architecture design incorporating security fundamental technologies

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Summary

With increase of the dependence of society to information system, the measures for information security have become important issue more and more. About the fundamental technology of the measure for information security, there was the insufficient point, but various studies have been performed conventionally. However, research and development of the technology to design the desirable total system which consists of these fundamental technologies have hardly been conducted. The technology to be developed should answer the following requirements.

(Requirement 1) There are various kinds of risks in organizations such as companies, and the measure to decrease the security risk can cause a new risk concerning the privacy. Therefore, in consideration of various kinds of risks, means with the avoidance of opposition between risks is necessary.

(Requirement 2) Searching technology for optimal combination of measures is required, because it is difficult to achieve the objective with only one measure against various attacks.

(Requirement 3) Because there are many participants such as manager, customers, or workers for decision making with deferent opinions, risk communication is required to obtain consensus from many participants.

We developed the set of technologies named TSAP which represents Total Security Architecture Planning. The TSAP consists of following four technologies.

(1) TSAP-P (Procedure): It means Total Security Architecture Planning Procedure, and is the central technology for TSAP. To answer the requirement 1 and 2, combinatorial optimization method with 0-1 variables was adopted for the formulation and for obtaining the solution. Moreover, to answer the requirement 3, the process for risk communication for obtaining the consensus between the participants was introduced to the above process. In addition, this procedure was applied to the optimization problem of the personal information leakage measures considering digital forensics.

(2) TSAP-M (Modeling): This technology is for formulating the safety and brings the “anshin” which means relief of mind. Various kinds of consideration were performed about relationship between the security and the relief so that there was a phenomenon not to be able to feel the “anshin” even if safe. Moreover, exploratory factor analysis (EFA), was performed on the results from the user surveys, and the factors to bring “anshin” in terms of security were clarified. This study initiates the security psychology research in Japan.

(3) TSAP-D (Digital Forensics): TSAP-D is the technology for digital forensics to

maintain the evidence of digital data. From recognition to be late of digital forensics study in Japan in comparison with U.S.A., etc, we focused on the study to maintain the evidence of the data, even if the owners or the administrators of the computer tried to illegal operation, because such study has been hardly performed in the world. As a result, we could quickly achieve the level to be accepted by a top class Digital Forensics society, and to be able to hold the international conference of the society in Japan.

(4) TSAP-C (Confirmation): TSAP-C is the technology to confirm the safety of the system easily. As TSAP-C, it was essential to develop the visualization technology for adopting proper measure in restricted time, because the correspondence to security issues has many things needing emergency. Various technologies for visualization were developed and its usefulness was evaluated using experiments.

As a result of the application, usefulness of the TSAP could be confirmed. In future, we will improve the function of the TSAP for practical use.

1.3 Members and their Assignments

Research members and their assignments are as follows:

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Project Coordination and Management, TSAP-P and TSAP-D

<the members are listed in the order of the Japanese syllabify >

Kenichi Okada, Keio University, Faculty of Science & Technology, Professor, TSAP-C

Hidakazu Shiozawa, Tamagawa University, College of Engineering, Associate Professor, TSAP-C

Osamu Takahashi, Future University Hakodate, School of Systems Information Science, Professor, TSAP-C

Yoshimi Teshigawara, Soka University, Faculty of Engineering, Professor, TSAP-P

Masakatsu Nishigaki, Shizuoka University, Graduate School of Science and Technology, Associate Professor, TSAP-P

Teruo Higashino, Osaka University, Graduate School of Information Science and Technology, Professor, TSAP-C

Yuko Murayama, Iwate Prefectural University, Faculty of Software and Information Science, Professor, TSAP-M

Hiroshi Yoshiura, University of Electro-Communications, Faculty of Electro-Communications, Professor, TSAP-D