**I-SolFramework:** An Integrated Solution Framework
Six Layers Assessment on Multimedia Information Security Architecture Policy Compliance

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Abstract. – Multimedia Information security becomes an important part for the organization’s intangible assets. Level of confidence and stakeholder trusted are performance indicator as successes organization, it is imperative for organizations to use Information Security Management System (ISMS) to effectively manage their multimedia information assets. The main objective of this paper is to Provide a novel practical framework approach to the development of ISMS, Called by the I-SolFramework, implemented in multimedia information security architecture (MISA), it divides a problem into six object domains or six layers, namely organization, stakeholders, tool & technology, policy, knowledge, and culture. In addition, this framework also introduced novelty algorithm and mathematic models as measurement and assessment tools of MISA parameters.

Keywords–
I-SolFramework, Integrated Solution, Multimedia Information Security Architecture, Six Layers Framework, Information Security Management System

I. INTRODUCTION

The development of IT security framework has gained much needed momentum in recent years, there continues to be a need for more writings on best theoretical and practical approaches to security framework development (potter & beard, 2010). Thus, securing information system resources is extremely important to ensure that the resources are well protected. Information security is not just a simple matter of having usernames and passwords (solms & solms, 2004). This paper proposed novel framework as information security assessment, might be implemented in various kinds, types and sizes of object or organization, called by integrated solution framework (I-SolFramework), which has various characteristics, including six major domains or layers, namely: Organization, Stakeholders, Tools & Technology, Policy, Culture and Knowledge. At the end of the paper, I-SolFramework would implement on multimedia information security architecture (susanto & muhaya, 2010) to assessing and measuring organization readiness level for multimedia information security compliance.

II. RELATED WORK

In this chapter we discussed several framework issues as state of the art as author’s development guidance to introduced new paradigm of information security framework. Information Security Governance Framework (ohki, 2009) proposed Information Security Governance Framework which combines and inter-relates existing information security schemes. (eloff & eloff, 2005) Introduced security architecture includes process of developing risk awareness, the assessment of current controls, and finally, alignment of current and new controls to meet the organization’s information security requirements. Integrated information security architecture (ISA) is the mechanism to ensure that all individuals know their responsibilities and how
they need to go about protecting the company’s information security resources. Multimedia Information Security Architecture (susanto & muhaya, 2010) introduced us eight layers as MISA as main parameters of multimedia security [figure 1].

III. MULTIMEDIA INFORMATION SECURITY ARCHITECTURE

![Multimedia Information Security Architecture –MISA](image)

The framework is emphasizing on information security in multimedia issue, into existing architecture. Based on ISA architecture, it has five main components, authors’ proposed MISA architecture which has eight major components, called by MISA controls, namely;

**Security Infrastructure** indicated all components of the infrastructure in organization affected to the information security, especially those directly related to multimedia information.

**Security Policies** defined as measures taken by an organization with respect to their information security. Some of the information security standard provides a comprehensive overview of security policies, the top five information security standards that exist and widely used are BS 7799, ISO 27001, COBIT, ITIL, PCIDSS (susanto, almnawar & tuan, 2011b).

| Control Title                          | Structure of MISA |
|----------------------------------------|-------------------|
|                                        | Control Number   | Section  |
|                                        | 5                | 5.1.     |
|                                        | 5                | 5.2.     |
|                                        | 5                | 5.n.     |
| Security Program                       | 8                | 8.1.     |
|                                        | 8                | 8.2.     |
|                                        | 8                | 8.n.     |
| Security Awareness                     | 1                | 1.1.     |
|                                        | 1                | 1.2.     |
|                                        | 1                | 1.n.     |
| Security Infrastructure                | 2                | 2.1.     |
|                                        | 2                | 2.2.     |
|                                        | 2                | 2.n.     |
| Enterprise Security                    | 3                | 3.1.     |
|                                        | 3                | 3.2.     |
|                                        | 3                | 3.n.     |
| Multimedia Information Sharing         | 4                | 4.1.     |
|                                        | 4                | 4.2.     |
|                                        | 4                | 4.n.     |

**Table 1. Multimedia Information Security Architecture –MISA**

**Security Culture** is recognizing the importance of bringing collaboration and governance process. The values and behaviors that contribute to the unique social and psychological environment of an organization, its culture is the sum total of an organization's past and current assumptions (BDO).

**Monitoring Compliance** is reconciling exist multimedia information with the benchmarking of standard. Standard is expected to guide and limited on the object and domain.

**Security Program** stated to make recommendations for improving the security of computer systems and the
information residing on them and provide security initiative recommendations and priorities, and to perform high level threat and risk analysis.

**Multimedia Information Sharing** indicated critical relationships among key multimedia information resources to share information with other important and relevant components.

**Enterprise Security** the practice of applying a comprehensive and rigorous method for describing a current and/or future structure and behavior for an organization's security processes, information security systems, personnel and organizational sub-units, so that they align with the organization's core goals and strategic direction (gardner).

**Security awareness** is the knowledge and attitude members of an organization possess regarding the protection of the physical and, especially, information assets of that organization (gardner).

IV. SIX LAYERS ASSESSMENT FRAMEWORK: I-SOLFRAMEWORK

![Proposed framework]

This section introduced the new framework for approaching object and organization analyst, called by I-SolFramework, abbreviation from Integrated Solution for Information Security.

**Framework.** The framework consists of six layers component [figure 2]: organization, stakeholder, tools & technology, policy, culture, knowledge. We introduced the basic elements of development in I-SolFramework profile as illustrated. These elements are identified in the following subsection (elucidation of terms and concepts).

V. ELUCIDATION OF TERM AND CONCEPT

- **Organization:** A social unit of people, systematically structured and managed to meet a need or to pursue collective goals on a continuing basis, the organizations associated with or related to, the industry or the service concerned (BDO).
- **Stakeholder:** A person, group, or organization that has direct or indirect stake in an organization because it can affect or be affected by the organization's actions, objectives, and policies (BDO).
- **Tools & Technology:** the technology upon which the industry or the service concerned is based. The purposeful application of information in the design, production, and utilization of goods and services, and in the organization of human activities, divided into two categories (1) Tangible: blueprints, models, operating manuals, prototypes. (2) Intangible: consultancy, problem-solving, and training methods (BDO).
- **Policy:** typically described as a principle or rule to guide decisions and achieve rational outcome(s), the policy of the country with regards to the future development of the industry or the service concerned (BDO).
- **Culture:** determines what is acceptable or unacceptable, important or unimportant, right or wrong, workable or unworkable. **Organization Culture:** The values and behaviors that contribute to the unique social and psychological environment of an organization, its culture is the sumtotal of an organization's past and current assumptions (BDO).
- **Knowledge:** in an organizational context, knowledge is the sum of what is known and resides in the intelligence and the competence of people. In recent years, knowledge has come to be recognized as a factor of production (BDO).
VI. ALGORITHM AND MATHEMATICS MODEL FOR ASSESSING PARAMETERS OF MISA

Assessment is a deterministic process, which is ubiquitously present in the world. Assessment tools on measuring MISA controls on organization readiness level, MISA control and structure content is mapping to the six layers framework are provided [figure 3].

| Six Layer on Framework | Structure of MISA | Title                          | Control Number |
|------------------------|-------------------|--------------------------------|----------------|
| Organization           |                   | Security Program               | 5              |
| Stakeholder            |                   | Security Awareness             | 8              |
| Tool & Technology      |                   | Security Infrastructure        | 1              |
|                        |                   | Enterprise Security            | 7              |
| Policy                 |                   | Multimedia Information Sharing | 6              |
|                        |                   | Security Policies              | 2              |
| Culture                |                   | Security Culture               | 3              |
| Knowledge              |                   | Monitoring Compliance          | 4              |

*Table 2. Multimedia Information Security Architecture –MISA*

*Figure 3. Proposed framework*

VI.I. ALGORITHM

Six layer framework algorithms is calculating eight controls of MISA, as parameter, trough framework layers, measurement results is an indicator for an organization readiness for MISA compliance. Algorithm works based on lowest level calculation, bottom up approach of estimation, of sub control [figure 4]. Details of 1st level and 2nd level of algorithm are presented below.
# Algorithm level-2 for measuring Section issues#
Initiate;
Step 1 [measuring section]
SectionIssue#1, SectionIssue#2,..., SectionIssue#n
as property of dependent Control;
TotalSectionIssue =
SectionIssue #1 + SectionIssue #2 + ... + SectionIssue #n;
ValControl #1 = TotalSectionIssue / n;
Control #1 = ValControl #1
# end #

# Algorithm level-1 for measuring assessment control#
Initiate;
Step 2 [measuring control]
Coltrol#1, Control#2,...,Control#n as property of dependent MISA;
TotalValControl = ValControl#1 + ValControl#2 + ... + ValControl#n;
ValMISA = TotalValControl / n;
MISA = ValMISA
# end #

**Figure 4.** Algorithm 2\textsuperscript{nd} level for measuring assessment issues

**Figure 5.** Algorithm 1\textsuperscript{st} level for measuring assessment issues
Figure 6, explain us how controls of MISA is mapped to six layers framework, I-SolFramework, table 2 descript each control, section and top layer domain of framework is given. Table 2 summarizes mapping results of all layers together with their associated controls (alfantookh, 2009), (susanto et al, 2011a) and (susanto, almunawar and tuan, 2011b) based on six layers framework.

VI.II. MATHEMATICAL MODEL

The mathematical model is explaining us as well as facilitating readers gain a comprehensive and systematic overview of the mathematical point of view. Modeling begins by calculated lowest level components, namely section. Determining the lowest level could be flexible, depending on the problems facing the object, might be up to 3rd, 4th, 5th ... Nth level, for MISA case study, authors define problem until 2nd level.

Formula works recursively; enumerate value from the lowest level, until the highest level of framework. several variables used as position and contents of framework indicator, where k as control, j as section, and h as a top level, details of these models are mention as follows.
(a) $x_j = \sum_{k=1}^{n} \frac{[section]_k}{n}$

$\text{control}_j$

$(a) \rightarrow x_j$ Indicate value of control of MISA which is resulting from $\sigma$ of section(s) assessment, divided by number of section(s) contained on the lowest level.

(b) $x_i = \sum_{j=1}^{n} \frac{[control]_j}{n}$

$\text{domain}_i$

$(b) \rightarrow x_i$ Stated value of domain of MISA which is resulting from $\sigma$ of control(s) assessment, divided by number of control(s) contained at concerned level.

After $(a)$, $(b)$, defined, next step is substituted of mathematical equations, into new comprehensive modeling notation in a single mathematical equation, as follows.

$$x_h = \sum_{i=1}^{n} \frac{[control]_i}{n}$$

$$x_h = \sum_{i=1}^{n} \frac{[control]_i}{n}$$

$$x_h = \sum_{i=1}^{n} \frac{\sum_{j=1}^{n} \frac{[section]_k}{n}}{n}$$

So that for six layer, or we called it by top level, equation will be:

$$x_h = \sum_{i=1}^{6} \frac{\sum_{j=1}^{6} \frac{[control]_k}{n}}{n}$$

Where: $k=section; J=control; I=domain \text{ (organization, stakeholder, tools & technology, policy, knowledge, and culture)}$.

The algorithm is considered to be reliable and easy implementing in analyzing such problem, emphasized on divided problems into six layers as the initial reference in measuring and analyzing the object (susanto et al, 2011c) and (susanto, almunawar and tuan, 2012). The results obtained as full figure indicators of an organization’s readiness in multimedia security compliance, it showed us strong and weak point on layer of the object. Indicated, layer with a weak indicator has a high priority for higher visibility in the framework of improvement and perfection of the system as a whole. In the manner of the six layer framework, I-SolFramework, analysis could be done easily and simply observe.

VII. AN ILLUSTRATIVE MEASUREMENT

An illustrative example has been considered in order to illustrate used of approach. Each control, section and top layer domain of framework, a value associated with the example is given. Table 3 summarizes the results of all layers together with their associated controls based.

| Six Layer on Framework       | Structure of MISA                                      |
|------------------------------|-------------------------------------------------------|
|                              | Title       | Control Number | Assessment Result |
| Organization                 | Security Program | 5              | 54.5             |
| Stakeholder                  | Security Awareness | 8              | 50               |
| Tool & Technology            | Security Infrastructure | 1              | 51.1             |
|                             | Enterprise Security | 7              | 53.5             |
| Policy                       | Multimedia Information Sharing | 6              | 78.5             |
|                             | Security Policies | 2              | 72               |
| Culture                      | Security Culture | 3              | 47.5             |
| Knowledge                    | Monitoring Compliance | 4              | 59               |
|                              | Overall Score | 57.2           |                  |

Table 3. Multimedia Information Security Architecture –MISA

The results given in table 3, are illustrated in the following figures. Figure 1 illustrates the state of the six layers based on MISA controls assessment result. The overall score of all domains is shown in the table to be “57.2 points”. The layer of “policy” scored highest at “78.5”; and the domain of the “culture” scored lowest at “47.5”. Ideal and priority figures are given to illustrate the strongest and weaknesses in the application of each control [figure 7].
“Ideal” stated the highest value that can be achieved by an organization, based on six layers framework mentioned.

“Achievement” declared the performance of an organization which is the result of the measurement by the framework.

“Priority” indicated the gap between ideal values with achievement value. “Priority” and “achievement” it showed inverse relationship. If achievement is high, then domain has a low priority for further work, and conversely, if achievement is low, then the priority will be high.

Priority status or it could be referred as scale of priorities, is the best reference for evaluating of the object or organization based on six main domains. Scale of priority value helping us on evaluating, auditing and maintaining a problem, becomes easier and highly precise.

![Figure 7. Algorithm 1st level for measuring assessment issues](image_url)

VIII. CONCLUSION REMARKS

We discussed and showed definitions, step by step how we came ISMS and MISA novelty approach. The approach is about how to finding and collaborate ISMS framework, namely six layers assessment framework, I-SolFramework, to assessing multimedia security controls, which is contains of eight main controls and sub control / sections, works presented in this paper has emphasized the application of new algorithm and mathematic model in measuring readiness level on that multimedia security controls and sections.

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