Integrated Solution Modeling Software: 
A New Paradigm on Information Security 
Review and Assessment

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Abstract— Actually Information security becomes a very important part for the organization’s intangible assets, so level of confidence and stakeholder trusted are performance indicator as successes organization. Since information security has a very important role in supporting the activities of the organization, we need a standard or benchmark which regulates governance over information security. The main objective of this paper is to implement a novel practical approach framework to the development of information security management system (ISMS) assessment and monitoring software, called by I-SolFramework. System / software is expected to assist stakeholders in assessing the level of their ISO27001 compliance readiness, the software could help stakeholders understood security control or called by compliance parameters, being shorter and more structured. The case study illustrated provided to the reader with a set of guidelines, that aims easy understood and applicable as measuring tools for ISMS standards (ISO27001) compliance.

Keywords- I-Solution Framework, I-Solution Modelling Software, Six domain view, Information Security Assessment

I. INTRODUCTION

Today, security is a hot issue and topic to be discussed, ranging from business activities, correspondence, banking and financial activities, it requires prudence and high precision. Recent news indicates how many cases of data and information theft also credit card pishing that led to enormous losses. Information is the lifeblood of organizations, a vital business asset in today’s IT-enabled world. Access to high-quality, complete, accurate and up-to-date information is vital in supporting managerial decision-making process that leads to sound decisions. Thus, securing information system resources is extremely important to ensure that the resources are well protected.

Table 1 showed us the total cost of incident increases every year, as indicated by information security breaches survey (Chris Potter & Andrew Beard, 2010), this phenomenon is the negative effect for an organization operation. Research on information security area is extremely needed, especially in order to deal with the connectivity and cloud computing era. Information security is not just a simple matter of having usernames and passwords (Alan Calder and Setve Watkins, 2008). Regulations and various privacy / data protection policy impose a raft of obligations to organization. Meanwhile, viruses, worms, hackers, phishers and social engineers threaten an organization on all sides.

Although 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. Thus, securing information system...
resources is extremely important to ensure that the resources are well protected (Chris Potter & Andrew Beard, 2008). Regulations and various privacy/data protection policy impose a raft of obligations to organization. An organizational communication channel, which is using a network technology, such as intranet, extranet, internet, are a target for hackers in filtrated by [Figure 1].

![Figure 1. Activities of unidentified user as potential attack and threat to organization](image)

Furthermore, comprehensive and reliable information security controls reduce the organization’s overall risk profile. ISO 27001 is the standard relating to Information Security Management System (ISMS). Companies or organizations obtained of ISO 27001 Certificate meaning a well recognized for the security of information systems. Meaning, with this certification, the company’s credibility is expected to get good recognition from customers and client, thereby increasing the level of trust and the number of customers, affected on increasing company profit.

Since information security has a very important role in supporting the activities of the organization, we need a standard as benchmark which regulates governance over information security. Several private and government organizations developed standards bodies whose function is to setup benchmarks, standards and in some cases, legal regulations on information security to ensure that an adequate level of security is preserved, to ensure resources used in the right way, and to ensure the best security practices adopted in an organization. There are several standards for IT Governance which leads to information security such as PRINCE2, OPM3, CMMI, P-CMM, PMMM, ISO27001, BS7799, PCIDSS, COSO, SOA, ITIL and COBIT. However, some of these standards are not well adopted by the organizations, with a variety of reasons. In this paper we will discuss the big five of ISMS standards, widely used standards for information security. The big five are ISO27001, BS 7799, PCIDSS, ITIL and COBIT. The comparative study conducted to determine their respective strengths, focus, main components and their level of adoption, concluded that ISO 27011 is most widely used standard in the world in information security area (susanto, almunawar & yong, 2011b).

![Figure 2. Integrated solution modelling software view](image)
Unfortunately, many organizations find it difficult to implement ISO 27001, including the obstacle when measuring the readiness level of an organizational implementation, which includes document preparation as well as various scenarios and strategy relating to information security (Susanto, Almunawar & Yong, 2011a) and (Siponen & Willison, 2009). In addressing issue mentioned this research will provide creative solutions and a new paradigm in measuring readiness level of ISO27001 compliance, by developing an application system / software called by integrated modeling solution for ISO 27001 assessment and monitoring compliance (i-Solution Modeling software) [figure 2].

II. I-SOLUTION FRAMEWORK

This section we introduced 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 3]: organization, stakeholder, tools & technology, policy, culture, knowledge. Let us briefly introduced the basic elements of I-SolFramework, profile as illustrated (Susanto, Almunawar & Yong, 2011c).

III. ELUCIDATION OF TERM AND CONCEPT

| ISO 27001 Issues | Controls Essential | Section No. |
|------------------|-------------------|-------------|
| Policy           | Information Security Policy | 5.1.1 | 1 |
| Tool & Technology| Information Systems Acquisition, Development and Maintenance | 12.2.1 | 5 |
| Organization     | Organization of Information Security | 6.1.3 | 1 |
| Culture          | Information Security Incident Management | 13.2.1 | 3 |
|                  | Business Continuity Management | 14.1.1 | 5 |
| Stakeholder      | Human Resources Security | 8.2.1 | 3 |
| Knowledge        | Compliance | 15.1.2 | 3 |

Table 2. A view of ISO 27001 clauses, objectives, controls and essential controls

1. 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 (BD, 2012).

2. 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 (BD, 2012).

3. 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 (BD, 2012).

4. 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 (BD, 2012).

Figure 3. Integrated solution six domain framework
5. **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 sum total of an organization’s past and current assumptions (BD, 2012).

6. **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 (BD, 2012).

### IV. MATHEMATICAL MODELS

The mathematical model is explained on mentioned algorithms as well as facilitating readers to gaining a comprehensive and systematic overview of the mathematical point of view. Modeling starts by calculating the lowest level components of the framework, 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.

Formula works recursively; enumerate value from the lowest level, until the highest level of framework. Several variables indicated as level and contents position of framework indicator, where *k* as *control*, *j* as *section*, and *h* as a *top level*, details of these models are mention as follows.

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

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

\[
x_h = \sum_{i=1}^{n} \frac{\Sigma_{j=1}^{n} [section]_j}{n}
\]

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

\[
x_h = \sum_{i=1}^{6} \left[ \frac{\Sigma_{j=1}^{n} [section]_j}{n} \right]
\]

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

The algorithm is considered to be reliable and easy implementing in analyzing such problem (susanto, almunawar & tuan, 2011d), emphasized on divided problems into six layers as the initial reference in measuring and analyzing the object. The results obtained as full review indicators of an organization’s readiness in information security compliance, it showed us strong and weak point on layer of the object. Indicated that layer with a weak indicator has a high priority for improvement and refinement within organization as a whole. In the manner of the six layer framework, I-SolFramework, analysis could be works easily and simply observe.

### V. SOFTWARE DESIGN

The ISO recommendations are associated with two levels of security protection: a basic level that considers essential security controls; and an extended level that extends the essential controls in order to provide additional security protection (Kosutic, 2010). It should be noted here that some organizations may not only consider what ISO/IEC recommend, but they may also add to them special controls needed for the protection of their work, in order to achieve their business objectives (Alfantookh, 2009). It starts with the “21 essential security controls” of ISO 27001, which give the basic standard requirements of information security management. Controls are mapped on these domains and subsequently refined into “246 simple and easily comprehended elements”. These elements are subject to be reviewed and validated by specialized persons working on the field.
Figure 4. I-Solution Modeling Data flow diagram level 1
In general, i-Solution Modeling software consists of two major subsystems of e-assessment and e-monitoring [figure 5]. E-assessment to measure ISO 27001 parameters [Table 2] based on the proposed framework [figure 3] with 21 controls [figure 4]. Software is equipped with a login system, as the track record of the user, as function as to knows how many times try the experiment in assessing the organization so it can be determined patterns of assessment. Database will be updated automatically, so query and retrieval of newest records will be neater structured and well organized.

![Figure 5. I-Solution Modeling Data flow diagram level 0](image)

E-assessment utility is validating of the ISO 27001 parameters, through user interface provided by the system, follows i-solution framework rules that divided and segmented ISO 27001 essential controls into six main domains [figure 4].

Stakeholders have to entering desired grade level as implemented measurement security parameters. We defined specified level of assessment in range of 5 scales:

- 0 = not implementing
- 1= below average
- 2=average
- 3=above average
- 4=excellent

As a measurement example, we described it in details to several steps of parameters assessment as follows [figure 6]:

1. **Domain:** "Organization"
2. **Controls:** "Organization of information security: Allocation of Information Security Responsibilities"
3. **Assessment Issue:** "Are assets and security process Cleary Identified?"
4. Then stakeholders should analogize ongoing situation, implementation and scenario in organization, and benchmark it to the security standard level of assessment as reference standard.

![Figure 6. Assessment form](image)

**VI. SOFTWARE FEATURES**

In the main form, software is featuring by three main tabs as function as:

- **Tab Assessment**
  On this sub form, user is prompted to entering an achievements value based on ISO 27001 parameters, called by assessment issues. Level of assessment set out in range of 5 scales;

- **Tab Histogram**
  Histogram showed us details of the organization’s achievement and priority. Both statuses are important in reviews of strongest and weakness point on an organization current achievement.

As indicated is the system, “Achievement” declared the performance of an organization as final result of the measurement by validated by proposed framework.

Then another term is “Priority” indicated the gap between ideal values with achievement value. "Priority" and "achievement" 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 [figure 7].
Priority status or it could be referred as scale of priorities, is the best reference for evaluating of the organization based on six main domains. Scale of priority grading is helping stakeholder on evaluating, auditing and maintaining a problem, its becomes easier and highly precise, since the stakeholders and users do not need to evaluate all components of the organization, but could focused on repairs and improvements in the low achievement grade domain.

Figure 7. Final result view on histogram style

- **Tab Summarize**

  Sub menu summarize has a feature on provided a user to analyze the results of their estimates. Some of the assessment criteria are displayed, in addition system advice is prepared, and it gives advice based on the previous assessment. Four main features are:

  - Final result out of 4 scale
  - Final result out of 100 %
  - Final predicate of assessment result (not implementing, below average, average, above average, excellent)
  - Advice from the software regarding their final achievement, in which point their strongest area and also their weakness area.

  By marking estimated performance values for each parameter, as assessment and forecasting approach as well, stakeholders have a comprehensive overview achievement on their readiness level. In some cases, to assess their organization's readiness level, stakeholders needed more than once of experiment, marked by a significant increase in the final result grade of each experiment. One first experiments on stakeholder assessment called by first trying and training course, time required for each experiment was 30 minutes to 60 minutes, this achievement represents a significant contribution to an organization in understanding the ISO 27001 controls, clause and assessment issues as well, than normally step which is need between 12 months - 24 months (iso27001security.com).

VII. **An Illustrative Measurement**

An illustrative example is presented to delineate usability level of its approach. Each question of the refined simple elements, a value associated with the example is given. Table 2 summarizes the results of all domains together with their associated controls (susanto, almunawar & yong, 2011c) & (alfantookh, 2009), based on I-SolFramework measurements approaches.

Figure 8. Final result view on summarize style

The results given are illustrated in the following Figures. Figure 9 illustrates the state of five essential controls of the “tools & technology” domain. Figure 8 represents the condition of 21 essential controls of standards by table and also Figure 10 stated overall condition of 21 essential controls in histogram style.

The overall score of all domains is shown in the Table to be “2.66 points”. The domain of the “policy” scored highest at “4”, and the domain of the “knowledge” scored lowest at “2”. Ideal and priority figures are given to illustrate the strongest and weaknesses in the application of each control (figure 9 &10).
Figure 9. Six domain final result view on histogram style

Figure 10. 21-essential controls final result view on histogram style
VIII. CONCLUSION REMARKS

Securing and maintaining information from parties who do not have authorization to access such information is crucial priority. It is important for an organization to implement an information security standard, ISO 27001 as a reference. I-Solution modeling is software which has new paradigm framework, to make assessments and monitoring. It is expected to provide solutions to solved obstacles, challenges and difficulties in understanding standard term and concept, as well as assessing readiness level of an organization towards implementation of ISO 27001 for information security. On trials conducted, user can perform a test of his organization assessment within 30-60 minutes; in expected perhaps it could reduce time in understanding and assessing set of standard parameters leads obtain certification of information security.

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