

Steering the Enterprise's Information System Security Risks in Relation with Uncertainty

(Information System, Risks)

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Abstract

The important task of an enterprise is decision making which involves the risk management that is to be carried out on a regular basis. This helps in steering the enterprise's information systems security. The processes that are into the risk management are to be ranked as per their usage and are to be safeguarded. This enables the avoidance of the data loss or theft thereby reducing the risk. Uncertainties associated with the risks are to be addressed with utmost care in decision making to make the enterprise more efficient. This motto of ours helps the enterprises to improve their performance as well as return on investment.

Keywords

Information Security, Risk Assessment, Uncertainty, Reliability, Risk Management

I. INTRODUCTION

Nowadays, security is the key factor for the effective management of the enterprises. The electronic information which can be termed as information asset, needs to be secured and protected against the malicious attacks. This protection of the information assets can be assured by implementing various security controls and policies. If the employees of an enterprise are unwilling to abide by the security policies then the security of the enterprise will be at stake. Studies and investigations revealed that employee's negligence alone might lead to the infringement of enterprise's security.

The security analysts play a vital role in decision making. The main parameters of the information security are confidentiality, integrity and availability. The resources of the security can be termed as the frameworks or the policies of the organization. The decision makers might concentrate on not only safeguarding the data but also on the important data that is lost. Mostly the feedback taken about such data losses will be considered for avoiding risks.

II. UNCERTAINTY

Uncertainty is a set of consequences where the probabilities of these outcomes are completely

unknown [1]. These uncertainties will have major impact on the enterprise's performance, and so they are to be understood and mitigated. Every organization should define its' own security controls in order to overcome the risks and uncertainties. This can be termed as risk and uncertainty management. The organizations' should satisfy many customers and their requirements for promoting trust.

Our main motto is to reduce the risks and uncertainties to improve the organization's performance. In this paper we discuss types of uncertainties, effects of risks and uncertainties and the measures for addressing uncertainties and risks.

III. TYPES OF UNCERTAINTIES

There are different types of uncertainties. They are:

A) State Uncertainty:

Decision maker is unable to take decisions with limited resources as per the given conditions.

B) Effect Uncertainty:

Decision makers identify that there will be after effects of risks. But cannot judge how far this effect will cause damage to the organization.

C) Response Uncertainty:

Planning and assessing a solution or a response for the effects of risk caused to the organization.

D) Knowledge Uncertainty (Type-I):

It occurs due to the lack of knowledge about model, factors and parameters etc.

E) Variability Uncertainty (Type-II):

It arises due to variability which can be characterised by the probability density function or frequency distribution.

F) Measurement Uncertainty:

It occurs due to the errors in the readings of laboratory experiments such as inaccurate measurements, incorrect precision, lack of sampling errors etc.;

G) Numerical Uncertainty:

It arises from the incorrect data values of the physical quantities that are to be used in calculations.

H) Model Uncertainty:

It arises from the various conceptual models or mathematical representation of the numerical values.

I) Scenario Uncertainty:

It refers to the changes in the states of the processes both in the present and past.

J) Conceptual Uncertainty:

It arises from the structural models where incorrect or inaccurate data will be used for the calculations.

IV. TYPES OF RISKS

Risks can be categorised into different types based on the enterprise's experience. They are:

A) Internal Risks

The risks that arise within the enterprise such as cost related, quality related, customer related and service related issues.

B) External Risks

the risks that occur from outside the enterprise such as Government related, market related, environmental etc.

C) Technical Risks

the risks that arise due to the changes in the technology.

D) Unforeseeable Risks

the risks that arise from unknown or unexpected events. They can be of 9 to 10% of the whole lot of risks.

V. UNCERTAINTY AND RISK MANAGEMENT

The state of affairs of an event if cannot be determined can be referred to as uncertainty. Risk can be defined as imperfect knowledge where each action leads to a set of possible outcomes each with a known probability [1]. Risk is a natural part of the business landscape. If left unmanaged, the uncertainty can spread like weeds, if managed effectively, losses can be avoided and benefits can be obtained [2].

The dimensions of risk are of two categories. They are degree of possibility and consequences. The degree of possibility of a risk can be termed as probability of finding the value or cause for an attack or a threat. The consequences are the after effects which are undesirable.

Every opportunity is associated with risks. The decision makers should make stringent choices to face the risk and uncertainty. The process of identifying, analyzing risks and implementing steps for mitigating risks can be referred to as risk management. Failure of the risk management techniques might result in the loss of confidential data. The process of identifying the uncertainties associated with risks and trying to avoid these uncertainties with risks can be referred to as managing the uncertainties.

A. Sources of Uncertainty

There are different sources of uncertainty. They are:

- Identifying risk events;
- Identifying interfaces;
- Estimating uncertainties; and
- Identifying scope of uncertainties.

B. Effects of Uncertainties

Uncertainties mainly affect the top notch executives, taking the role of decision makers of the organization. These uncertainty effects might look similar but they differ as per their operational meaning. The effects of uncertainties may be dreadful. The attackers might hack the confidential data and put the organization in losses.

C. Effects of Risks

The risks might have an adverse effect on the information systems. These risks might completely disrupt the systems thru a Denial of Service (DoS) attack or steal the confidential information such as credit card details etc. They also might cause potential damage to the nations by attacking huge data which is maintained in the finances, cyber grids etc.

D. Managing the Uncertainties and Risks

Uncertainties and risks can be managed by using the estimates and probabilities for characterizing the variables. Uncertainty can be referred to as incomplete knowledge and risk as unforeseen situation.

Managing the Uncertainties

Managing the uncertainty deals with the measurement of the enterprise’s effectiveness. First, uncertainties are to be clearly understood by the decision makers so as to make effective decisions. Second, identify the various types of uncertainties. Third, identify various sources of uncertainties. Fourth, analyze and try to deploy the methods to reduce uncertainty.

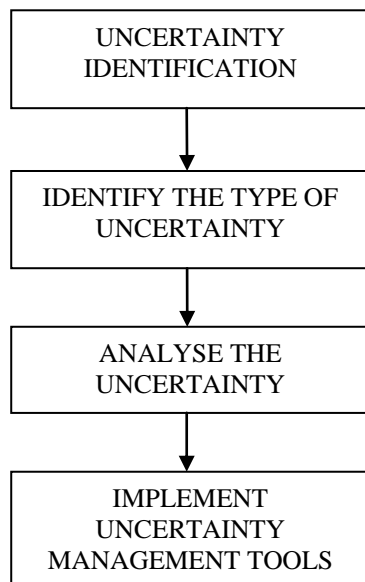


Fig.1. Managing the Uncertainties

Major steps in managing the uncertainties are:

- a) *Uncertainty Identification*
- b) *Identifying the sources of Uncertainties*
- c) *Analyse the Uncertainties*
- d) *Avoid the Uncertainties*

Managing the Risk

Managing the risk is nothing but choosing among the available options for mitigating the risk. There are many strategies for managing the risk.

They are:

- Mitigating the risk during the procedure;
- Transfer or divert the risk after the procedure; and
- Build a new procedure to mitigate the risk.

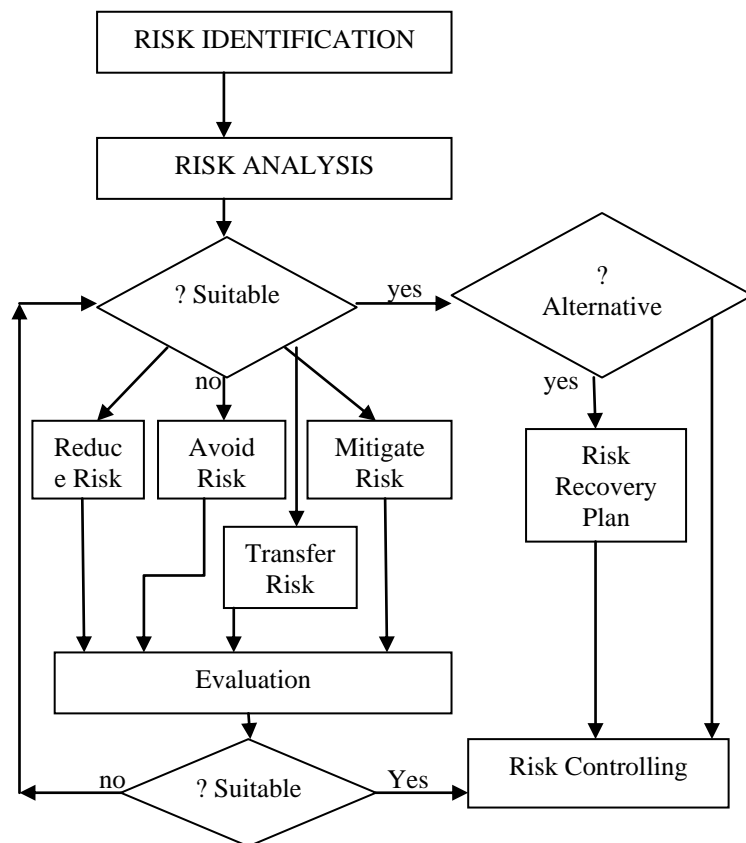


Fig.1. Managing the Risks.

Major steps in managing the risks are:

- e) *Risk Identification*
- f) *Risk Analysis*
- g) *Risk Mitigation*

VI. DEALING WITH UNCERTAINTIES

Dealing with uncertainties is a major step in achieving the enterprise’s security. There are many steps for addressing these uncertainties. They are:

- Problem Framing;
- Involvement of Stakeholder;
- Selection of indicators;
- Appraisal of knowledgebase;
- Mapping relevant uncertainties; and
- Reporting Uncertain Information.

A. Tools and Techniques for Managing Uncertainties

- Enterprise Earned Value management
- Enterprise Resource Management
- Decision Tree Diagrams
- Gantt Charts
- Critical Path Analysis
- Force Field Analysis and
- Conflict Management

B. Tools and Techniques for Managing Risks

There are different tools and techniques used for managing the risks based upon the various steps in the risk management process. They are:

- Brain Storming
- Sensitivity Analysis
- Probability Analysis
- Delphi Method
- Monte-Carlo Method
- Decision Tree Analysis
- Utility Theory
- Decision Theory

VII. CONCLUSION AND FUTURE WORK

For providing security to the high valued information, the risks and uncertainties are to be identified, analysed and are to be addressed. This paper mainly focuses on the concepts of risks and uncertainties and how to address them in order to improve enterprise's performance thereby increasing the return on investment of the organization. This

work can be further extended by the suggesting and implementing the tools for the risk avoidance.

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REFERENCES

- [1] Usha Bala Varanasi, A Framework for Auditing the Evaluation of Uncertainty for Compliance in Information Systems, Lecture Notes on Software Engineering, Vol. 3, No. 1, February 2015.
- [2] T. James, Managing Information Technology Projects: Applying Project Management Strategies to Software, Hardware, and Integration Initiatives, AMACOM, 2004.
- [3] N. Taleb, The Black Swan, The Impact of the Highly Improbable, Random House, New York, 2007. 2. M. Power, Organized Uncertainty. Oxford University Press, NewYork, NY 2007.
- [4] International Standard Organization (ISO). ISO Survey of Certifications 2010, <http://www.iso.org/iso/iso-survey2010.pdf>.
- [5] I. Brown, A. Steen and J. Foreman, "Risk management in corporate governance: A review and proposal," Corporate Governance: An International Review, vol. 17, no. 5, pp. 546-558 2009.
- [6] B. Windram and J. Song, "Non-executive directors and the changing nature of audit committees", Corporate Ownership and Control, vol. 1, pp. 108-115, 2004.
- [7] European Commission. "Company laws", http://ec.europa.eu/internal_market/company/official/index_en.html.
- [8] Corporate Law and Governance, "Corporate Law and Governance", <http://corporatelawandgovernance.blogspot.it/>.
- [9] S. Gates, J. Nicolas and P.L. Walker, "Enterprise risk management: A process for enhanced management and improved performance," Management Accounting Quarterly, vol. 13, no. 3, pp. 28-38 2012.
- [10] R.E. Hoyt and A.P. Liebenberg, "The value of enterprise risk management," Journal of Risk & Insurance, vol. 78, no. 4, pp. 795-822 2011.
- [11] V. Arnold, T.S. Benford, C. Hampton and S.G. Sutton, "Enterprise risk management as a strategic governance mechanism in B2Benabled transnational supply chains," J.Inf.Syst., vol. 26, no. 1, pp. 51-76 2012.
- [12] Azhmukhamedov, I.M. and Vybornova, O.N., The formalization of the concepts of acceptable and tolerant risks, Inzh. Vestn. Dona, 2015, no. 3. <http://www.ivdon.ru/ru/magazine/archive/n3y2015/3240>.
- [13] Azhmuhamedov, I.M. and Vybornova, O.N., Introduction of metric characteristics for solving the problem of risk assessment and management, Prikasp. Zh., Upr. Vys. Tekhnol., 2015, no. 4, pp. 10-22.
- [14] Zegzhda, P.D. and Kalinin, M.O., Automatic control of the security of computer systems, Probl. Inf. Bezop., Komp'yut. Sist., 2013, no. 4, pp. 32-39.