Data Controllability for Risk Management in Smart and Intelligent Systems

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Abstract

Information has become a major asset in companies that have based their business on the production and exploitation of this information, but also in traditional companies that exploit their information with a view to continuously improving their processes. This is the case in collaborative systems where companies are interconnected but also in intelligent systems that have many information exchanges with there environment. It is important that companies keep control of the information they import, process and distribute. In this article, in the context of a risk management approach, we present a new security criterion: controllability.

1. Introduction

Nowadays, whatever their sector of activity, information has become the center of concern for companies. This concerns not only their informational capital as such, but also all information flows in and out of the company. We are now in a (digital) information society where some companies produce information while others are consumers.

In this context, the information system (IS) is the nerve center of companies. If its constituent elements (personal, hardware, software,...) make it possible to acquire, process, store and communicate information. But the main purpose of an IS is no longer limited to being a "shared storage". Depending on the level of maturity of companies with respect to their information capital, the IS function can go beyond the role of support function (operational level, data warehouse, collaborative platform) and position itself as a business partner (decision-making function, economic intelligence). Companies must consider all factors related to the effective use of information. This is all the more true in the context of collaborative systems or smart and intelligent systems (like smart buildings, smart cities). For this, the current forms of IS governance must evolve to explicitly take into account the use of information, especially from the point of view of information security.

And in our opinion, information security can no longer be based solely on computer security mechanisms (hardware, software, networks,...). We have to take into account qualitative and organizational criteria to have a global approach to information control in the company. In this article we propose a new security criterion, the controllability, to evaluate the ability of the company to control its information following a risk management approach related to the information security.

This article is structured as follows. Section 2 explains how information became a corporate asset. Section 3 introduces various tools for information security, as well as the limitations of traditional security criteria with respect to our need for information (value) control. Section 4 provides an overview of some of the work related to data quality management. In Section 5 we propose a new criterion, the controllability, to quantify the level of control of an organization in the information it handles. The definition of this criterion is based on a risk management approach by presenting the vulnerabilities, threats and risk scenarios associated with this criterion. We then give in Section 6 our vision to implement these mechanisms in an architecture where the terms of use of information are specified in contracts whose semantics are formally defined. Finally, Section 7 concludes this article by mentioning some possible perspectives for this work.

2. Information security in digital economy

In many cases, it is common not to differentiate between the words "information" and "data". This abuse of language leads us to recall the following definition: « information is a set of data aggregated for human use ». Data is the elementary description, represented in coded (digital) form, of a reality (thing, event, measure, transaction,...) intended to be:

- collected, recorded
- processed, manipulated, transformed