

An approach towards information integrity problem resolving information error issues

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ABSTRACT

This paper covers the meaning of information in information system. It derives the loss of efficiency, effectiveness with time bounds and loss of information processes reduced by the information integrity aspect in the system. It helps for error reduction and moderate complex errors in IS. In the real environment most business system processes makes errors due to loss of Information Integrity, for reducing the errors using feedback in complex and changing environment issues. It derives the informational work system and information integrity there form in it.

This paper imposes that information environment need a model of I²I Technology Development for improving the efficiency, usefulness and usability of the IS.

Keywords: Information Integrity (I²I), Information System (IS), Information Technology Development.

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I. INTRODUCTION

The concept of information has become a crucial topic in several emerging scientific disciplines, as well as in systems, in business organizations, in industries and in everyday life. It is legitimate to speak of the so called information society; but a scientific understanding of the Information age has not time to develop. For this user require correct decision in flexible information situations. Thus to improve information evolution there is a need of a new trans-disciplinary understanding of information, encompassing many academic disciplines and new fields of interest. Therefore science of information integrity is required in Information System (IS).

Information is emerging as a new and large prospective area of study. The notion of information has become a crucial topic in several emerging scientific disciplines such as Philosophy of Information, Nanoscience, Quantum Information, Bioinformatics and Biosemiotics, Theory of Mind, Systems Theory, Internet Research, Embedded system, Cloud Computing and many more. The information has passed through an evolutionary development because of the theoretical efforts of scientists, from Claude Shannon, Warren Weaver, and Norbert Wiener through Gregory Bateson to Klaus Haefner and Tom Stonier, just to mention a few. Scientists such as John Archibald Wheeler, Anton Zeilinger, Stephen Hawking and Daniel Gottesman are currently internationally renowned for their

endeavors which shape our concept of information in Information System [1].

Over the last fifteen years, an international online discussion group called Foundations of Information Science has made efforts to bring information theorists together around the concept of information as a theoretical subject. The work of scientists such as Hans Christian Von Baeyer and Wolfgang Hofkirchner forms the basis for a new unifying perspective of information, which builds a necessary foundation for a new trans-disciplinary science of information [2]. Data information is developing its own theoretical basis as well as scientific, societal, personal, commercial and system applications. Following these developments, the need for establishing a new international and trans-disciplinary development and coordination organization, the new Science of Information Integrity (I*I) takes into consideration a larger perspective encompassing many academic disciplines, system process and new fields of interest in Information System.

2. MEANING OF INFORMATION

Information is an organizing mechanism, which provides an ability to deal with the environment. Given the reality of ever changing environment, the assumption that data and information are perfect, once validated, and the practice that most information processing systems do not anticipate defective data and information are not acceptable. This is requiring scientific processes to pass on the control baton for controlling Information Integrity, the correctness aspect of unstructured and a periodic, flexible information decision, which is an information origination situation in the presence of uncertainty.

3. INFORMATIONAL WORK SYSTEM

Traditionally, with enterprise seeking to produce only standard products in high volumes, control systems tuned to fixed information decisions could ensure systems objectives of operational optimization and cost efficiency and giving the system strategic advantages. The enterprise did have computerized IS developed in isolation, and there was no effort to optimize data or information for improved decision making. The requirement of the system enterprise was in terms of automation of functions of hard components, i.e., of mechanical or physical work wherein physical variables or rather material was transformed or processed or converted so as to add value to the product produced. However, with data-driven

technologies keyed to the flow of digital data throughout an enterprise and on the Net and with pressures of achieving business objectives of effectiveness and efficiency through requirements of mass-customization, agility, focused on customer responsiveness, IT driven market differentiation, supply chain synchronization by integration maximization and financial optimization for strategic advantage, business enterprise has a further requirement for utilizing information decisions smarter[3]. This calls for automation of informational work carried out by the soft components of the enterprise wherein data is seen as raw material, data processing or transformation or conversion as the system function and data product or information as processed data used to trigger information use as decision making stages to deliver information decisions in the form of information to add value to the product. This information system is characterized by:

- i. Computing processes under system function that include microcomputer and telecommunication and
- ii. Pre and post-processing stage communication channels at various data/information processing nodes.

The people based requirement includes data communication and transaction processing networks with worldwide reach is an application of flexible automation accounting for product innovation; customer needs product requirements and constraints of costs and capabilities, a structural variant from inflexible automation. Specifically, the flexible automation is becoming possible due to:

- i. Availability of on-line computers,
- ii. Computers providing capability for moment by moment optimization of processes and decision-making, and
- iii. Availability of system integration capability so as to yield a computer integrated system for attaining business objectives.

It is possible to put it together in a total production and delivery system is technological reality of digital data as medium of information flows across the enterprise [4]. Further such systems can be applied to both hard components of production like processes, machinery and equipment, and soft components like information flow and data bases, informational work systems, etc.

It is within the framework of centrality of the informational work in achieving agility in the enterprise's functioning and handling large and

constantly changing variety of produced items, that a conceptualization emerges to model all business procedures as data processing procedures, i.e., all process data in some manner to deliver information for use in decision making processes. Taking the triple $\langle e, a, v \rangle$ to represent a data/information model while studying information flow model for integrity analysis identify 10 data processing activities corresponding to the Data Origin Stage, Conversion Stage and Output i.e., Information Representation and use Stage of the informational work system[5]. Particularly as information emanating from the output stage gets used or transformed or converted into another information, now in the form of 'information decision' for control implementation at the physical work system stage, the informational work system acquires one more stage in its operation, i.e., Decision Processing Stage [6]. Delineation of information flow requirements for the decision processing stage as above and putting them together with data processing activities for data origin, conversion and output stages, then gives an IS View model for the Business Process.

4. INFORMATION INTEGRITY (I*I)

I*I is dependability and trustworthiness of information and controlling is a key factor for determining strategic system advantage. Its determinants are accuracy, consistency, and reliability of IS. Given the reality of ever changing environment, this leads to correctness and exactness requirements of information. Economists and systems theorists argue that the complexity of an organization or a system is limited by amount of information that can economically process and transfer, by the costly bandwidth of its internal communication channels. This holds for a business organization as a whole, also for its systems and sub-systems and their components in information system.

In changing system environment, system or business organizations are, getting recognized to be "open systems". The open systems necessarily originate information to formalize environment as a major decision making factor for improved system performance, and information origination is a costly activity [7]. The degree to which the business system needs competitive advantage is feasible information system. Therefore it is controlled by integrity of the information originated, processed and transferred, by the cost and benefit analysis of the available Integrity Information Systems (IIS). At

an operational level, integrity deviation (i.e., loss of I*I) is the result of errors, which are seen as information errors. For minimizing system failures due to errors, this makes I*I a holistic, system requirement, which includes incorrect operation consequences of mechanistic failures, which are stochastic in nature of data errors results in loss of Data Integrity, failure of computer controlled equipment and of incorrect production of information[8].

5. NEED OF I*I TECHNOLOGY DEVELOPMENT

I*I Technology Development (IITD) takes system's approach to solve real world open ended problems, which are characterized by multiple long term goals, operable goals etc. The effort is to consider the environment while developing Information Systems which is otherwise done in isolation. The process of development starts with identifying the correct information variables which defines the systems boundaries. For designing and developing integrity information system, required Information Integrity Technology Development using system dynamics in information system to reduce overruns of cost, time, delay and errors, i.e. loss of information integrity in the phase where requirements are instant and local. This is a science for reduction of the cost and time overruns in information integrity system. I*I problem model is proposed as a tool for resolving the problem and competitive advantages in complex and changing environment issues.

6. IMPLEMENTATION STAGES OF INFORMATION INTEGRITY TECHNOLOGY

Within the framework of Information Integrity attributes of Accuracy (A), Consistency (C) and Reliability (R) argued, we can then identify Information Integrity Technology Implementation stages as follows:

- i. Understand the user application of the computer based information system under consideration and Establish organizational standard pertaining to data/information vis-à-vis requirements of: accuracy, consistency, reliability and cumulative integrity, based on application area. Study data/information that flows through the Information System and define the source and destination data sources.
- ii. Develop the Model of the Information System under consideration as in Figure (1), based on understanding of data/ information flow in the system for the identified data sources

and also specify and document data rules, also known as edits, that is to be implemented to study accuracy and consistency of the data/information in proposed system.

- iii. Choose a method for calculating Reliability Index, keeping in view advantages, disadvantages and convenience of application while accounting for factors such as nature and form of available data, and available computation aids.
- iv. Propose Integrity Analysis method for analyzing intrinsic Integrity attributes of accuracy, consistency and reliability. In addition to this, the proposed method may also undertake statistical analysis (time series analysis and other techniques) of error patterns signifying irregular changes, which contributes to loss of accuracy and consistency and of causes, which contribute to loss of Reliability.
- v. The proposed method can be adapted for analyzing the error Detection in Database constructs so as to identify the data rule violations in terms of accuracy and consistency attributes and set up the degree of integrity of data/ information in respect of Information Integrity.

Make Comparative study of the Integrity profile and indices acquire with: standards in local, regional, national, and international as the case may be, so as to know what is to be expected of Information Integrity Technology. This would also assist in ordering or ranking of the Integrity attributes from the points of which attributes needs utmost improvement effort. This can also provide efficiencies and deficiencies for anticipated system and will also pave way to propose certain adjustment on the anticipated system so that these deficiencies are shortened. After locating the pairs of a given field at a given subsystem, each for enhancement of accuracy and consistency and having located given subsystems for reliability improvement opportunities, further analyze the Error Detection Database [9]. As a final point after applying various attributes on various Information Systems/ Data Sources the proposed system is evaluated for whether these intrinsic attributes have modified the data from its original version or not. These changes could be detrimental for the data and need to be analyzed properly. To overcome these situations effective data mining techniques will be implemented before and after

these operations are carried on the proposed data like Classification, Clustering, Association, Predication and Sequential Pattern on this attributes as shown in figure 1.

7. CONCLUSION

The information errors lead to loss of decision integrity in information system. There may be a loss of efficiency, effectiveness with time bounds and loss of information processes reduced by the information integrity aspect in the system. It helps for error reduction and moderate complex errors in IS. In the real environment most business system processes makes errors due to loss of Information Integrity, for reducing the Errors using feedback in complex and changing environment issues.

Thus information environment need a model of I²I Technology Development for improving the efficiency, usefulness and usability of the information system. Researcher proposed to design the mathematical model for designing and development of information integrity technology in IS.

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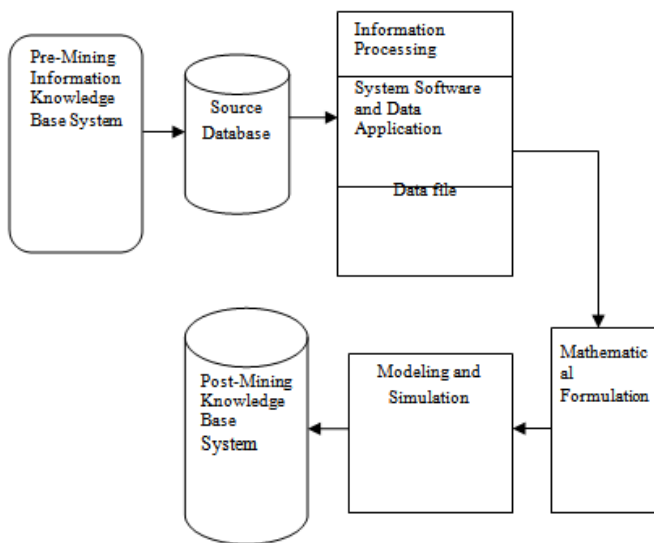


Figure 1. Implementation of Information Integrity Technology Model for Information System.