The Logical Model of Unified, Innovative Platform for Automation and Management of Standards (PAMS)

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A B S T R A C T :

This article presents results of a study of a high-tech innovative product in the field of information technologies and the elaboration of a unified platform for administration, automation and management of internationally recognized standards – PAMS. PAMS is a modern, integrated information and communication system that models, digitizes, registers, manages, stores and controls work processes and related information and documentation, in accordance with a variety of internationally recognized standards. By modelling different sets of standards implemented by the company with the unified objects and processes, PAMS is a highly effective in monitoring, control and operational management and can assure implementation of the requirements of the standards and their practical utility.

Introduction

Every organization or company, regardless of its scale, performs its operations in an internal and external work environment. The internal environment is determined by the company's resources (human, tangible and intangible assets, etc.)

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and by the work processes in it, related to the subject of activity. The outside environment is the customers, suppliers, partners and institutions with which the company operates.[1] Internationally recognized standards define, regulate, manage, monitor, record and archive the internal and external environment of functioning through the company's document system. The purpose of the platform explored is to use the latest technology advances in order to digitize, index, and revive the organisation's documents matrix and allow operational speed of management. When documents are in paper form, they are figuratively speaking dead. It is difficult to use them by multiple users at the same time, it is difficult to trace the numerous connections, it is difficult to multiply decisions, and it is difficult to control the processes on their base.

When the documents are digitized, the links between them are visualized, and the matrix get dressed in proper functionality, it produced an extremely effective system of monitoring, control and management at all levels and resources in commercial company or other organization. The basic concept is to structure an open platform that enables modelling and efficient management of systems defined by internationally recognized standards. The logical model of the platform is the result of a research process presented in five steps:

- Profound research and analysis of the information sources for internationally recognized standards in aspects - content, infrastructure, and superstructure;
- Defining evaluation criteria;
- Selection of the common set of information identifiers, constituting the information content of the platform;
- Structure of information identifiers (fields) in object-oriented information classes and subclasses, in accordance with their functional orientation in the description of the standards;
- Research and analysis of relationships and dependences between information objects and definition of a logical model.

The resulting logical model is represented by class diagrams of the information classes and subclasses and their attributes and is described by the Unified Modelling Language (UML) syntax.

Research and Analysis (R&A)

R&A of Information Sources

Researched information sources are grouped by type into three categories: 1) Sources and publications related to internationally recognized standards;[2, 3, 4] 2) Internationally recognized standards; 3) Sources and publications related to the platforms of information and communication technologies.[5, 9, 10]

Standard is "a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context."[6]

Given the wide variety of standards and practically unlimited volume of information about them, research has focused on the most common families of internationally recognized standards as: ISO 9000, ISO 14000, ISO 20000, ISO 22000, ISO 27000, ISO 28000, ISO 31000, ISO 50000, OHSAS, HACCP, EMAS, PAS 220-223, IFS LOGISTICS, IFS FOOD, BRC, TL 9000, SA 8000, etc.[6, 7, 8]

These are standards that relate mainly to the organization and management of the main processes in a company, regardless of the sector of the economy in which it operates and specific standards relating to its production activity.

Has been made an analysis for each of researched standard in four aspects:

- Content of the standard – name, aim, policies, scope, requirements, terms, definitions, type and area of applicability;

- Infrastructure – procedures, processes, documents, controls, registers, terms, tools and functional algorithms;

- Superstructure (external environment) – correspondents, customers, suppliers, partners and institutions, connected standards, possible integration options, audits;

- Resources – organizational structure and staff, assets, tools and materials, required for responsibility, planning, maintaining and control of standard mechanisms.

Evaluation criteria

Criteria have been developed to evaluate the information gathered from the research of information resources. Criteria are grouped into four categories as follows:

- Criteria reflecting user needs;
- Criteria related to the organization of the information system;
- Criteria related to system servicing;
- Characteristics of platform.

The evaluation criteria for designing the platform for administration, automation and management of internationally recognized standards are related to the main objectives to be achieved when it is implemented:

- To meet the needs of the users - for administration, automation and management of internationally recognized standards;

- To be as comfortable as possible;

- To provide an optimal organizational structure for real-time communication and content management.

The primary purpose of the PAMS is to satisfy users' needs for interoperability and functionality. Therefore, the volume and structure of the content of the information in the system must be responsive to user demand and acquisition.

Because *Information Search = Consumer Behaviour*, Information Search is directly related to the decision-making process.

Researchers of consumer behaviour argue that information search behaviour is a prerequisite for making a decision. In order to evaluate the different alternatives, the decision maker must know the attributes of each of them. When such information is not available, it has to go through the information search process. In any case, the goal is to maximize the value of decision-making and to reduce cognitive efforts.

Information identifiers

On the basis of the research and analyses carried out, is generated a full set of information descriptors with their attributes, that can be included in the platform. Identifiers are either common for a majority of the standards, or specific for some of them, or even applicable only for element of a standard. Analysis have shown that standards, despite their diversity, have many common elements. One of them, for example, is the PDCA (Plan --> Do --> Check --> Act) iterative four-step method, also known as the Deming circle. PDCA cycles are integral part of management and control algorithms, used for continuous improvement. PDCA model is used in ISO 9000, ISO 14000, ISO 20000, ISO 45000, ISO 27000, ISO 50000 and others. The method is used in different contexts: organization; needs, expectation and requirements of relevant parties; risk determining and assessing; process management and etc. In this sense, the descriptors of the method are used to describe a number of standards.
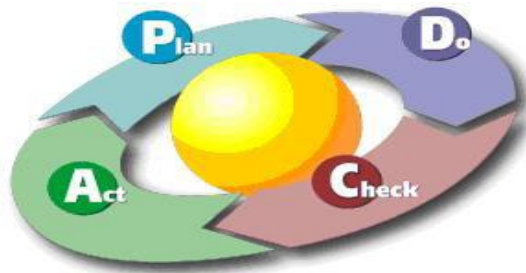
Figure 1: PDCA model.

On the basis of the developed evaluation criteria from the information array gathered during the research process, were selected the common set of information identifiers. The result is full set of descriptors with their definition and attributes, constituting the information content of the Platform for Automation and Management of Standards.

Modelling

The process of building the logical model of the platform consists of two phases.

Structuring of Information Identifiers (Fields) in Object-oriented Information Classes and Subclasses

The set of descriptors generated in the previous steps has been decomposed into logical information classes, in accordance with their functional orientation in the description of the standards. Information classes are considered as program objects and sub- objects. They are described by their information attributes, which are called information identifiers. Their presentation is unified by using a specific technical format that defines the form of representation of the values of each attribute of the information objects. The technical format of the information classes and their attributes is described by the syntax of the unified modeling language (UML).

Information identifiers are structured in five levels of information classes:

level 1 – main class "Standard";

level 2 – classes "Register," "Process," "Procedure";

level 3 – classes "Document," "Document turnover";

level 4 – classes "Node," "Application," "Activity"; and

general level classes – "Term," "Form," "Attribute," "Employee," "RCC – Registration Control Card," and "Correspondent."

STANDARD

- Name
- Aim
- Scope
- Requirements
- Terminology (n) - term
- Managed Processes (n) - process
- Procedures (n) - procedure
- Applications (n) - application
- Register (n) - register
- Connected standards (n) - standard

Class Level 1

REGSTER

- Name
- Description
- Document (n) - Document
- Data

Class Level 2

DOCUMENT

- Name
- Description
- Number
- Date
- Type
- Signature
- Made by (n) - Employee
- Proved by - Employee
- RCC - RCC

Class Level 3

EMPLOYEE

- Name
- Family name
- Position
- Department Directorate
- Signature
- Supervisor
- Responcibilities

Class General

APPLICATION

- Name
- Number
- Date
- Type
- Signature
- Proved by - Employee
- Attribute (n) - Attribute
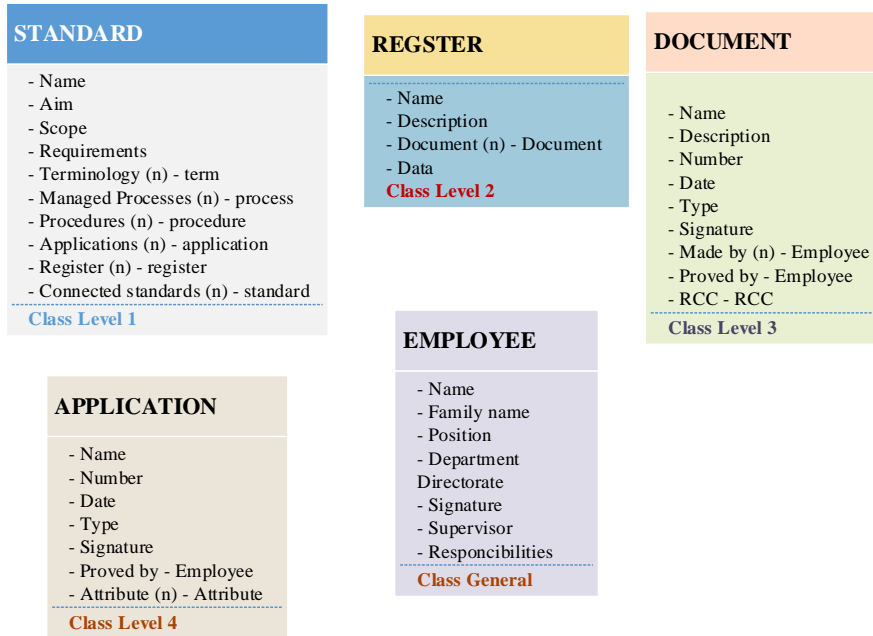
Class Level 4

Figure 2: Information classes.

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Logical Model of PAMS

The document is a record through which every action, norm, event, resource, attitude, process, and intellectual production is reflected in its development. The amount of all conventional and specialized records, provisionally called documents, defines and determine the company, its history, capacity, quality and competitiveness.

Documents in themselves are not independent separate units. They are linked in a company-specific document network. Each document is an end product, behind which there is a process of different complexity and scope. Each process consists of activities and stages, and as in any production, it needs resources and materials. Materials, in turn, are most often other documents that have their own processes and their life cycle.

Unlike the Internet, however, a company's document network has defined paths, links, and forms. For this reason, the company documents system is seen not as the document network, but as a documentary matrix of the company. The document matrix affects every element of the organization's internal and external work environment, and it is logical that it gives the tools and the possibility for maximum control and monitoring. The company document matrix is the basis for the management of any internationally recognized standard. Amongst standards, we have work processes, procedures, and many forms of control.

PAMC's mission is to integrate all working processes, associated with document flows into the client organization, model the company's document matrix, and to provide an integrated environment for digitization, storage, management and exchange. The Platform allows to keep track of the information flows, structured into separate types of document units and to provide reliable control.

The platform builds models related with the management of different types of internationally recognized standards through rich toolset as typified processes, developed scenarios and conventional and specialized registers, a set of predefined forms, internal communication environment, audit planning, assessment and support systems; and other.

The resulting logical model of the Platform for Automation and Management of Standards is defined after research and analysis of relationships and dependences between information objects. The model is shown in Figure 3.

Conclusions

The results of administration, automation and management of internationally recognized standards in an organization using a unified platform can be compared to the effect of introducing the production line into a manufacturing enterprise.
It speeds up the transmission of data between different units, setting out the precise regulation of the actions at each stage of the data processing. As a consequence, it reduces the number of mistakes made, increases the specialization of the employees in carrying out the individual operations and increases the productivity of labour. The organization is able to carry out more business operations without increasing the number of its employees.
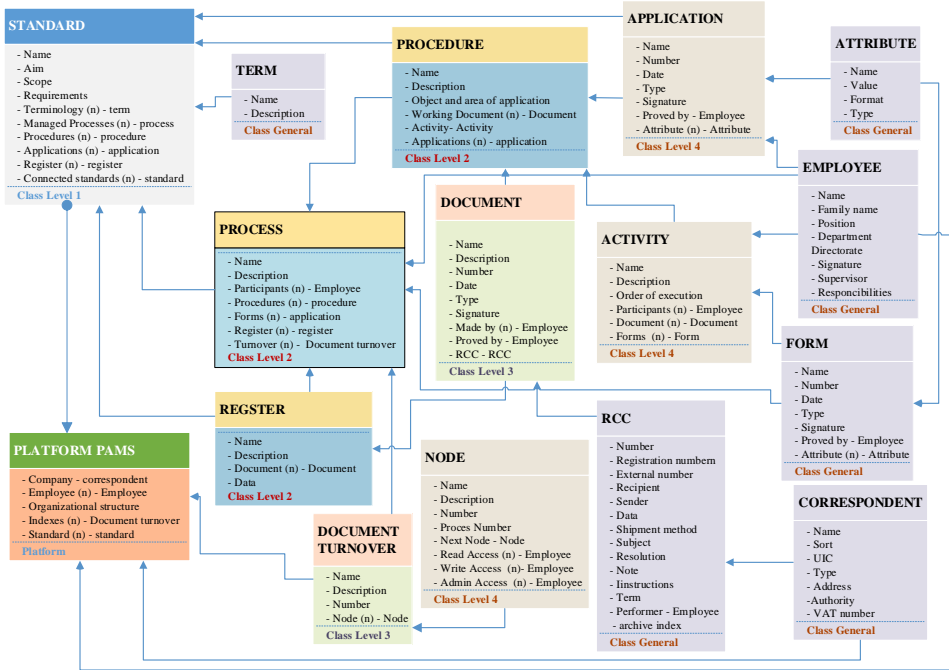
Figure 3: Logical model of PAMS (PDCA model).

Traditionally, efficiency is assessed on the basis of the relationship between the performance and the cost of achieving it. It can therefore be increased in two ways – by reducing costs or increasing results. A unified platform for automation and management of internationally recognized standards makes it possible to implement both options.

The added value of PAMS is expressed in:

- Reduction of paper documents;
- Reduction of non-productive working hours of employees;
- Speeding up information flows;
- Minimizing costs from losing intellectual capital;
- Minimal risk of customer dissatisfaction;
- Centralized monitoring of work processes and control of decisions;
- Automated processes and audits;
- Changing corporate culture.

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