



MINISTRY OF EDUCATION

National University of Science and Technology

POLITEHNICA BUCUREȘTI

Doctoral School of Industrial Engineering and Robotics

PhD program in Engineering Sciences

PhD Domain: ENGINEERING and MANAGEMENT

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THESIS SUMMARY

**Contributions on improving the quality management of
local and zonal services by implementing integrated
information systems**

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2024

CONTENT OF THE DOCTORAL THESIS

	PAG.
FOREWORD	8
INTRODUCTION	9
LIST OF ABBREVIATIONS	14
KEYWORDS LIST	16
LIST OF FIGURES	18
LIST OF TABLES	21
PART I: THE STATE OF THE ART IN THE FIELD OF DESIGN AND IMPLEMENTATION OF INTEGRATED INFORMATION SYSTEMS FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS	22
1. THE CURRENT STATE OF THE ART ON THE ACTIVITIES OF LOCAL AND AREA SERVICE DELIVERY IN KNOWLEDGE AND KNOWLEDGE-BASED ORGANIZATIONS	23
1.1. Organization providing services of local and regional interest	23
1.1.1. Organization - concept and typology	24
1.1.2 The concept of organization as a system. The absamble model of the organizational system	25
1.1.3. Knowledge and knowledge-based organization. Innovative organization. Learning organization	28
1.1.4. Characteristics of the knowledge and knowledge-based organization	29
1.1.5. Knowledge-based organization providing services of local and regional interest	29
1.2 Knowledge-based management in the context of the doctoral research topic	31
1.2.1. The management concept	31
1.2.2. Management functions	32
1.2.3. Factors that can drive knowledge-based management	33
1.2.4 The correlation between knowledge-based management and global management - the organization of the future	37
1.3. Knowledge-based economics in the context of the doctoral research topic	38
1.3.1 The concept of knowledge-based economy	38
1.3.2. Particular features of the knowledge-based economy in the context of the doctoral research topic	39
1.3.3. Knowledge. Place and role of knowledge within the doctoral research topic	40
1.4. Conclusions	41
2. THE CURRENT STATE OF KNOWLEDGE THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC ON QUALITY ASSURANCE AND QUALITY MANAGEMENT IN ORGANIZATIONS SUBJECT TO RESEARCH	43
2.1. General considerations on quality assurance in the modern view	43
2.2. The concept of quality now and in perspective. Conceptual framework of quality	44
2.2.1. Conceptual framework of quality	46
2.3. Issues associated with the concept of quality directly related to the doctoral research topic	48
2.3.1. Principle I. Customer (citizen) focus	51
2.3.2. Principle II. Process-centered method.	52

2.3.3. Principle III. Continuous improvement	52
2.4. Internal quality assurance. External quality assurance SIILZ Current and prospective trends on an analysis linked to the doctoral research topic	54
2.4.1. Total quality and zero defects strategy in the context of the doctoral research topic	55
2.4.2. Continuous improvement - a solution for increasing the quality of services analyzed and presented in doctoral research	56
2.5. The process of service quality planning in the analyzed organizations within the framework of doctoral research	56
2.6. Organization and coordination of specific quality management activities related to the doctoral research topic	57
2.6.1. Designing a SWOT analysis of the examined organization	57
2.6.2. Strategies based on SWOT analysis	60
2.7. Quality standards applicable and possible to be implemented in knowledge-based organizations considered in doctoral research	62
2.8. Conclusions	65
3. THE CURRENT STATE OF KNOWLEDGE ON THE POSSIBILITY OF DESIGNING AND IMPLEMENTING EMBEDDED INFORMATION SYSTEMS IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC	67
3.1. Computer system versus information system	67
3.2. Peculiarities of the computer and information system	69
3.3. Place and role of embedded information systems in the knowledge-based organization with reference to the doctoral research topic	72
3.3.1. Typology of the information system with direct reference to doctoral research	73
3.3.2. Review of existing solutions	76
3.3.3. Proposed solution architecture	79
3.4. Data protection versus data network protection	80
3.5. Design and implementation of an IT system in knowledge-based organizations considered in doctoral research	83
3.6. Specific requirements regarding the possibility of designing and implementing integrated information systems within an organization analyzed in the doctoral research topic	85
3.9. Conclusions	86
4. FINAL CONCLUSIONS ON THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC	88
PART II: CONTRIBUTIONS ON THE DESIGN AND IMPLEMENTATION OF AN INTEGRATED SERVICE FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS	95
5. DIRECTIONS, MAIN OBJECTIVE, SPECIFIC OBJECTIVES AND RESEARCH METHODOLOGY IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC	96
5.1. Research directions	96
5.2. Main objective and specific objectives	96
5.3. Research methodology	97

6. CONTRIBUTIONS ON MANAGEMENT IMPROVEMENT IN KNOWLEDGE-BASED PUBLIC ORGANIZATIONS DELIVERING SERVICES TO CITIZENS	99
6.1. Examining the applicability of existing models	99
6.1.1. Organizational culture	99
6.1.2. Organizational learning	100
6.1.3. Improving knowledge management and dissemination	101
6.2. A3 analysis method	104
6.2.1. Viability of using A3 analysis	104
6.2.2. Management concept: Continuous improvement of zonal maintenance activities	108
6.3. Application of FMEA in organizations providing integrated local and area-based services	111
6.3.1. F.M.E.E.A. method of analysis	111
6.3.2. Available FMEA categories	114
6.3.3. Application of FMEA to the de-tarring process	114
6.4. Synthesizing the findings	117
7. CONTRIBUTIONS ON MODELING THE IMPLEMENTATION PROCESS OF THE INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST USING IDEF 0 METHODOLOGY	120
7.1. Examination of the applicability of the methodology	120
7.2. Community requirements for SIILZ	122
7.2.1. Protection of users and consumers	123
7.3. Designing a process map in the organization under analysis	124
7.4. Application of the IDEF0 methodology to the processes carried out in the analyzed organization	125
7.4.1. Overview of the IDEF 0 methodology	126
7.4.2. The place and role of the proposed process in the context of organizational management improvement	127
7.4.3. Establishing steps to improve management processes	133
7.4.4. Designed executive processes	134
7.4.5. SIILZ design	135
8. CONTRIBUTIONS ON THE DEFINITION OF INDICATORS USED IN THE EVALUATION AND MONITORING OF THE INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST	151
8.1. Categories of beneficiaries, types of public services applied at local and zonal level	151
8.1.1. Categories of beneficiaries	151
8.1.2. Types of public services applied at local and zonal level	152
8.2. Indicators for monitoring and evaluating the quality of public services	154
8.2.1. Set 1. Indicators with immediate impact	159
8.2.2. Set 2. Resource, response and intervention time indicators	161
8.2.3. Set 3. Monitoring and evaluation indicators	163
8.2.4. Set 4. Progress indicators	165
8.2.5. Set 5. Indicators for technical service fulfillment	167
8.2.6. Set 6. Indicators with long-term impact	169
8.2.7. Set 7. Environmental indicators, planning and emissions	170

9. RESEARCH ON THE TAKE-UP OF COMMUNITY MEASURES ON SERVICES OF LOCAL AND AREA-WIDE INTEREST	173
9.1. General framework	173
9.1.1. Project information	173
9.1.2. Beneficiary of the project	173
9.2. Research objectives	174
9.3. Research methodology	174
9.3.1. Entities	175
9.4. Responses and their interpretation	175
10. FINAL CONCLUSIONS, ORIGINAL CONTRIBUTIONS AND FUTURE RESEARCH DIRECTIONS	193
10.1. Final conclusions	193
10.2. Original contributions	193
10.3. Future research directions	195
Bibliography	196
Annexes	210

CONTENT OF THE DOCTORAL THESIS SUMMARY

	PAG.
FOREWORD	8
INTRODUCTION	9
PART I: THE STATE OF THE ART IN THE FIELD OF DESIGN AND IMPLEMENTATION OF INTEGRATED INFORMATION SYSTEMS FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS	10
1. THE CURRENT STATE OF THE ART ON THE ACTIVITIES OF LOCAL AND AREA SERVICE DELIVERY IN KNOWLEDGE AND KNOWLEDGE-BASED ORGANIZATIONS	11
2. THE CURRENT STATE OF KNOWLEDGE THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC ON QUALITY ASSURANCE AND QUALITY MANAGEMENT IN ORGANIZATIONS SUBJECT TO RESEARCH	11
3. THE CURRENT STATE OF KNOWLEDGE ON THE POSSIBILITY OF DESIGNING AND IMPLEMENTING EMBEDDED INFORMATION SYSTEMS IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC	12
4. FINAL CONCLUSIONS ON THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC	16
PART II: CONTRIBUTIONS ON THE DESIGN AND IMPLEMENTATION OF AN INTEGRATED SERVICE FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS	17
5. DIRECTIONS, MAIN OBJECTIVE, SPECIFIC OBJECTIVES AND RESEARCH METHODOLOGY IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC	18
6. CONTRIBUTIONS ON MANAGEMENT IMPROVEMENT IN KNOWLEDGE-BASED PUBLIC ORGANIZATIONS DELIVERING SERVICES TO CITIZENS	19
6.2. A3 analysis method	20
6.3.3. Application of FMEA to the de-tarring process	21
6.4. Synthesizing the findings	22
7. CONTRIBUTIONS ON MODELING THE IMPLEMENTATION PROCESS OF THE INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST USING IDEF 0 METHODOLOGY	23

7.3. Designing a process map in the analyzed organization	23
7.4. Application of the IDEF0 methodology to the processes carried out in the analyzed organization	24
7.4.3. Establishing steps to improve management processes	27
7.4.5. SIILZ design	27
8. CONTRIBUTIONS ON THE DEFINITION OF INDICATORS USED IN THE EVALUATION AND MONITORING OF THE INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST	31
8.2. Indicators for monitoring and evaluating the quality of public services	32
9. RESEARCH ON THE TAKE-UP OF COMMUNITY MEASURES ON SERVICES OF LOCAL AND AREA-WIDE INTEREST	34
10. FINAL CONCLUSIONS, ORIGINAL CONTRIBUTIONS AND FUTURE RESEARCH DIRECTIONS	35
BIBLIOGRAPHY	37

FOREWORD

"Education is the most powerful weapon you can use to change the world" (Nelson Mandela)

The thesis titled "Contributions to the implementation of Integrated Information Systems for the management of activities within local and zonal services for improving the quality of services in knowledge-based organizations" is the subject of research for the improvement of management in an organization providing road and bridge maintenance services in Sibiu County. This topic was and is very important both for the analyzed organization and for the author, representing the completion of the 4-year term of office as administrator of the organization.

Scientific coordinator, prof. univ. dr. eng. ȚÎȚU Aurel Mihail, has provided rigorous guidance during the research and the process of elaboration of the doctoral thesis, for which I am grateful and I address him my full consideration and sincere thanks for the meticulous guidance, genuine support, kindness and availability during the entire research and during the creation of this doctoral thesis.

I chose to publish my PhD thesis according to the rules of the University of Science and Technology POLITEHNICA Bucharest.

My deepest consideration goes to the university teachers: prof. univ. dr. eng. Doicin Cristian, prof. univ. dr. eng. Ionescu Nicolae, prof. univ. Emerit dr. ing Oprean Constantin, prof. univ. dr. ing. Dragomir Mihai, prof. univ. dr. eng. Popa Maria and prof. univ. dr. eng. ec. Bucur Viorel who guided me with patience, kindness and desire to succeed in my endeavor to complete my thesis.

At the same time I would like to thank the management of S.C. Drumuri și Poduri S.A., namely Mr. Ovidiu Spătari, Nicolaie Cocos, Ioan Călin and especially Mrs. Emilia Răcuciu and Mădălina Stoica for their cooperation in providing me with the data I needed for research and for their willingness to put into practice the strategies we discussed.

I would like to take this opportunity to express my gratitude to my fellow PhDs and PhD students supervised by Prof. dr. Eng. ȚÎȚU Aurel Mihail for their active involvement in the joint online and face-to-face sessions and I congratulate them for their courage to embark on the journey towards doctoral excellence.

I would especially like to thank the most important people in my life: my family, my wife Anca and children Sofia and David, and our parents who have supported, motivated and inspired me throughout this period. At critical moments of my study, their confidence in my abilities has been the greatest source of encouragement.

Author

INTRODUCTION

The main objective of the PhD thesis "**Contributions to the implementation of Integrated Information Systems for the management of activities in local and zonal services for improving the quality of services in knowledge-based organizations**" is the technical and functional configuration of the Integrated Service of Local and Zonal Interest - SIILZ in an organization that carries out activities in the field of public services. The thesis consists of two interrelated sections. The first section, entitled "**Current state of knowledge in the field of design and implementation of integrated information systems for the management of activities in local and zonal services in knowledge-based organizations**" covers the examination, analysis and identification of key points, but also provides an overview of existing knowledge on the subject. **CHAPTER 1** presents the findings of the analysis of the evolution of organizations involving the increasing importance of intellectual capital. Our ability to define precise objectives is facilitated by identifying the model of the type of organization and the organizational mode it uses. In **CHAPTER 2**, a more specific study of the current state of organizations in this field was made. This study was carried out in the knowledge that the current state of organizations in the public service sector, as well as the legislation that is relevant to this sector, can be approached from a general perspective. It was considered appropriate to investigate in **CHAPTER 3** the management of public service quality requirements in the organizational context. In this way, the elements of quality management that are presented in quality management standards, but which are only partially understood and applied in organizations, can be noticed. The results of the current state of knowledge in the research area are presented in **CHAPTER 4** which includes the analysis of this state of knowledge, identifying areas that might need improvement. The second part of the thesis, entitled "**Contributions on the design and implementation of an integrated service for the management of activities within local and area service activities in knowledge-based organizations**" contains 5 chapters that present the research plans, main aim, specific objectives, research methods, and original contributions. Therefore, the study directions, main research aim, particular objectives, and research technique are all defined in the first chapter of this section, which is **CHAPTER 5**. The first stage that has been proposed in the research technique has been discussed in **CHAPTER 6**, which is the stage of analyzing and hierarchically structuring the needs into requirements. This is done using two approaches, A3 format and FMEA, which are used for a process that can have economic and image consequences on the activity of the organization that is being assessed. The SIILZ design was developed using functional graphical modeling using the IDEF0 technique, which resulted in an improved organizational chart for the organization under analysis. Thus, **CHAPTER 7**, illustrates the starting point of the design and the actual design of the SIILZ. In **CHAPTER 8**, the techniques for evaluating the results of the activities of different organizations providing public services of local and zonal interest are discussed. In addition, performance indicators for the SIILZ are designed for integration with the component processes of the SIILZ. SIILZ comes equipped with functional tools that are tailored for each procedure. Thus, in **CHAPTER 9**, we validated the survey by means of a questionnaire containing questions and statements on the main aspects of the survey. The final conclusions, original contributions and further research directions are presented in **CHAPTER 10** in which, starting from the main objective, the specific objectives and the title of the thesis, the elements of the treated research area are detailed in order to understand the concept of service of local and zonal interest. The chapter also includes the presentation of the original contributions that constitute an essential part of the thesis and consist of the configuration of the processes embedded in the newly proposed service developed within a knowledge and knowledge-based organization responsible for county and municipal road infrastructure and their modelling by IDEF0 methodology.

PART I

THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF DESIGN AND IMPLEMENTATION OF INTEGRATED INFORMATION SYSTEMS FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS

CHAPTER 1. THE CURRENT STATE OF THE ART IN THE FIELD OF LOCAL AND AREA SERVICE DELIVERY ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS AND KNOWLEDGE

In order to address the problem that was mentioned in the main objective of the thesis, it was necessary to compile an account of the current state of how organizations are set up and operate. This topic is discussed in detail in this chapter. According to the findings of the literature review, there is a pattern in the evolution of organizations that involves giving increasing importance to intellectual capital. Our ability to define precise goals in order to achieve the main objective is facilitated by identifying the pattern of the type of organization and the organizational mode it uses. A first example of a type of economic unit that falls into the category of 'provision of public services and/or production of public goods' is an organization whose primary mission is to serve the public interest through the provision of various services. It is an organization with legal personality that is established on the basis of public or private capital and is under the authority of the State. The workforce of an organization consists of workers who are subject to various employment laws. In some cases (such as gas and electricity companies), the legislator has provided for the replacement of a collective agreement with a regulated status out of a desire to provide employees with a favorable social position. The concern to offer employees a particularly advantageous social position was the reason why this was done.

The chapter provides research findings on process management, which is supposed to be responsible management, can be seen as something that evolves in and through situational practices. This is in contrast to adopting a 'best practice' that has been taken out of its original context and imported into a local environment. When considering PPPM in the context of Integrated Services of Local and Zonal Interest - SIILZ, a different definition of a public service of local and zonal interest is required. This is necessary in the sense that the objective is to ensure that emerging community needs are met with excellent services. When we turn our attention to investigating the integration of technologies or tools that are used in building administrative systems, it is particularly pertinent to focus our attention on the overlaps that exist between people and organizations.

CHAPTER 2. CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC ON QUALITY ASSURANCE AND QUALITY MANAGEMENT IN RESEARCH ORGANIZATIONS

Chapter 2 examines the use of the term 'quality', used by experts and lay people alike, in both specific and general contexts, giving the impression that everyone is familiar with its meaning. The quality of a service or system is defined as its set of attributes. At the same time, the quality of a process or system cannot be reduced to a single measure. With regard to the subject of the doctoral research, the aim of the research is to investigate the ways in which management can better contribute to the quality assurance procedure. Understanding the elements and levers that contribute to the seamless integration of methods for establishing and cultivating quality cultures is central to the overall aim of the study to answer how managerial functions are exercised for continuous quality assurance. As these are matters of great public importance, the findings of the study will be shared with those in charge of public service organizations serving local and regional communities, as well as those in the system committed to fostering a culture of quality. As the population has grown in recent years, the connection of the citizen (the client or consumer of public services) with the institutions responsible for public administration has also grown with the population. In other words, the status of the citizen has shifted from that of a beneficiary to that of a 'judge', which means that the citizen now possesses the rights and privileges necessary to access certain services. Society

generally puts pressure on administrations to use resources more efficiently and to orient their activities in line with society's demands. There are cases where these demands are not explicitly formulated, but this may be due to the fact that there are not enough systems in place to enable communication and interaction between citizens and the administration. There are four quality imperatives that can be identified for the public sector (Sallis, 2005), adaptable for local and area-based service:

- a) As a general rule, given that residents are expected to pay taxes to support the public sector, consumers and customers of public services have the right to the highest possible level of service;
- b) when it comes to the obligations and requirements of people using public services, the professional imperative indicates that the institution is committed to fulfilling these responsibilities. on the other hand, the method by which people's requirements, problems, and requests are resolved must be carried out in a professional manner. This, in essence, translates into high requirements and standards for the quality of the services provided;
- c) In modern times, public sector organizations often compete with private sector companies in certain areas;
- d) Given that all public institutions are a part of our social life, it is imperative that they are held accountable to different types of people as well as to society as a whole.

CHAPTER 3. CURRENT STATE OF THE ART ON THE POSSIBILITY OF DESIGNING AND IMPLEMENTING EMBEDDED INFORMATION SYSTEMS IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC

Note that the graphs, tables and figures are numbered as in the full thesis. Chapter 3 discusses opportunities to provide information support for goal setting and forecasting for the organization. The information system encompasses all the parameters, information, data flows, procedures and techniques used to process, record and process information. The information system serves as an intermediary between the operational system and the management system and enables most of the activities mentioned above to be carried out. The information system is usually the tool used to impose restrictions and changes on the organization. The computer model system analyzes and processes almost all data that is sent into the organization.

Informatization is present in all activities of an organization, but the two notions remain distinct because the information system will have to perform manual operations such as collecting data, interpreting results and so on. The information system is a set of independent or related information flows, organized in a unified way. Whatever the domain of activity, that activity is driven by an information flow. At the level of an organization, the role of the information system is to ensure the bidirectional link between the decision-making system and the

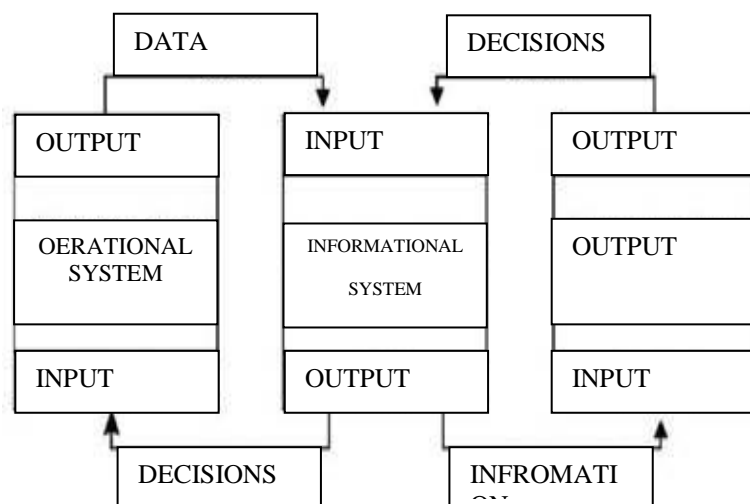


Fig. 3.1. The information system within the information system

operational system (Chiru & Jeflea, 2015). Functionally, the information system involves carrying out the following activities:

- presentation of operational system data;
- processing data to provide decision-useful information;
- collecting the information required to make choices that will be transmitted to the operational system;
- supervising and monitoring compliance with decisions, as shown in Figure 3.1.

Within an information system, almost all activities can be transferred to be carried out with the help of computer technology. Everything can be transferred to another department, starting with the primary data and ending with the processing results as input data or partial information for further processing.

The information system includes within it one or more specialized information systems. It is important to keep in mind that the information system should not be confused or completely overlapped with the computer system. This is due to the fact that, through the functions it performs, the information system serves as an intermediary between the operational and decision-making systems, illustrated in Figure 3.1. The pilot project aims to build the platform on the core business of an organization under the authority of the County Council (CJ), whose main activity is the construction, repair, and maintenance of regional roads within the CJ's sphere of administration (Sibiu C. J., 1998). The main connections will be made with GPS systems, shown in Figure 3.2, which manage information related to the organization's object of activity: Google Map, Google Street, Apple Maps, Waze, etc. which will provide real-time data related to traffic, congestion or GPS location, respectively selecting and mapping information of interest to the user, for example:

- information on works planned by various economic agents (road, gas, electricity) or unforeseen interventions;
- information on the existence or deployment schedule of new electric vehicle (cars, bicycles, scooters) filling stations, availability check, reservation, data communicated from the platforms of specialized providers, based on the selection of user-defined vehicle characteristics;
- information on the incidence of COVID;
- information on the existence of health restrictions, a data history and a set of travel advice;
- information on the conditions for recreational activities, information on the possibility of hiking, wildlife watching or information on the possibility of crossing potentially risky areas.

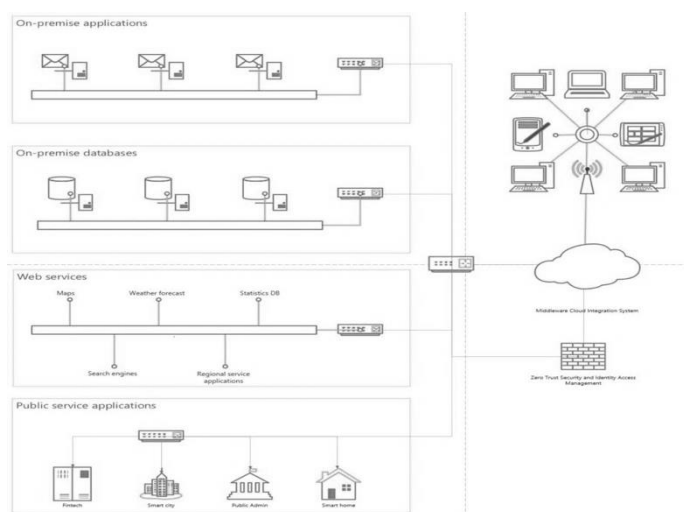


Fig. 3.2. General scheme of SIILZ connections

The solution must provide flexibility and security to allow the user to make trust-based decisions, and must be compatible with smartphone, tablet, laptop, desktop. The Covid-19 pandemic has forced many knowledge-based organizations to reshape their business and interact in a digital environment. The difficulties identified by the business environment presented above, become more

relevant in the public administration system, especially public utility companies under the coordination of regional public structures, for which finding the resources to adapt to the work regime imposed by the pandemic was achieved by going through the steps required by the legislation on procurement from public funds. For organizations in this area, the challenges of carrying out profitable work came from at least 3 directions:

- a) the obligation to ensure continuity of public service;
- b) delivering concise, accurate information to a wide variety of communication channels and in much faster streams;
- c) reconsidering priorities set by regional steering groups, rationalizing the workforce, and respecting health restrictions.

Each of the listed challenges, in comparison to the situation before the pandemic, was given a different dimension due to the staggered presence of staff at work, but also due to the need to ensure the tele-communication regime.

In these conditions, the main deficit characteristic was represented by the limited portfolio of IT and communication services and infrastructure, determined both by the fact that investment in technology, equipment, licenses, and specialized human resources is relatively limited, imposed by the allocation of the investment budget mainly for the main object of activity, by the phasing over an extended period of the policies of computerization of the activity, and by

the fact that the implementation of some solutions requires an adequate period of time that includes the reaction to the change of the organizational culture. Prior to the pandemic, the solution for conducting business in the scenarios presented above involved the purchase of an IT solution consisting of software applications and related physical IT resources. Nowadays it can be said that every employee uses at least one piece of IT equipment, personal or assigned by the employer: a smartphone, GPS car device, laptop, respectively an IT service: internet connection, email, application or backup services for smartphone, etc. Already from this point we have established contact with at least one Cloud service, illustrated in Figure 3.5. As presented so far, the realization and access to a Cloud Ecosystem raises a level of specialization for the IT department of the organization or the existence of an integrated IT system that allows interfacing with Cloud Services. At the same time, data collection, processing, transformation and publishing is only performed on applications designed by the organization to support business and compliant reporting. But in the pandemic, all activities were reshaped to protect the citizen, and so the public emerged as a category in its own right, illustrated in Figure 3.6, to which the information transmitted had to be consolidated

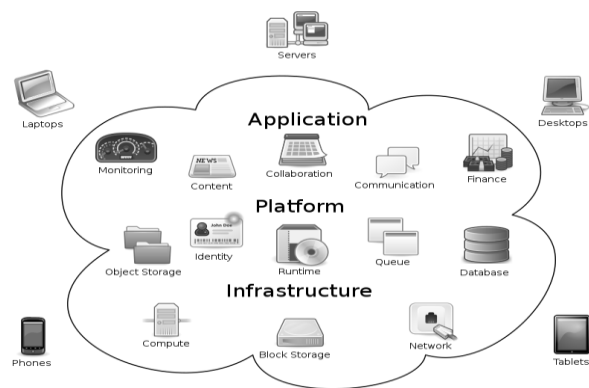


Fig. 3.5. Example of currently available Cloud services (Deac-Suteu, D.V., Titu, M.A., & Stanciu, A., 2021)

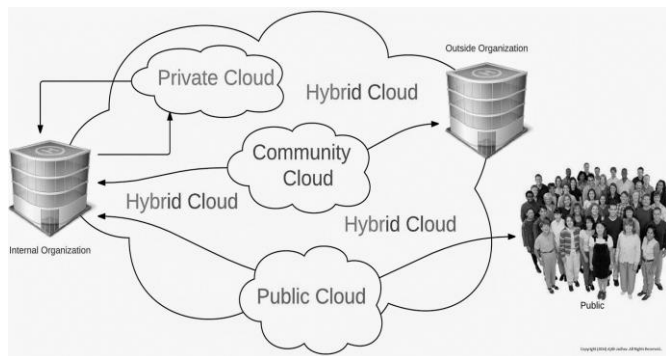


Fig. 3.6 Usage model of different Cloud services

and summarized in correlation with the provisions of the Emergency Situation Committees. In a highly diversified and frequently updated information flow, the public would greatly benefit from having a solution to obtain results and answers to a series of query hypotheses, illustrated in Figure 3.6.

Professional ethics, for example, can be used to determine whether an organization provides a computer system and a computer scientist designs and deploys a virus that renders the system unusable or to determine how a computer scientist employee reacts when his or her boss asks him or her to make an unauthorized save of a restricted program (Verizon, 2022). The proposed solution is the integration of specialized information systems performed in several stages:

- a) audit of IT activity to identify the IT systems used in the organization;
- b) establishing the computerization needs in the production and support departments, which are not yet computerized;
- c) determining the versions to which existing IT systems will be upgraded before integration
- d) establishing workflows, document flow
- e) Establishment of 7 assumptions on which the technical specification in the specifications will be based:

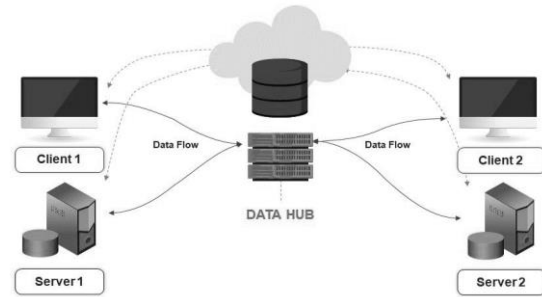


Fig. 3.7. Hub middleware running in parallel with existing SI

Assumption 1: Changes in the beneficiary's management team occur during the development cycle of the integrated system. The specifications are likely to change if a new management team has a different perspective on the aggregated indicators on which it bases its decisions. This leads to changes in the structure and importance of stand-alone information systems.

Hypothesis 2: Continuous adaptation by the integration solution development team is required due to new information technology. producing changes in the way support tools and options are used. Finally, new resources are used to create a multitude of parts.

Hypothesis 3: The structure and functioning of the information system is qualitatively and quantitatively affected by the implementation of total quality management elements as the organization continues to grow. Robotized production lines and program-controlled machines change the data acquisition problem.

Hypothesis 4: There is a possibility that team members of programmers, web designers, testers and implementers may change. A large number of professionals rejoin the team. All these variations are visible in the working system and in the quality of the different parts or stages of the IT system.

Hypothesis 5: The economic environment, laws and changes in the information society cause changes that need to be reflected in information systems.

Assumption 6: There are internal and external threats to computer systems. People with good intentions can make lots of different types of execution mistakes or bad people can waste time and money trying to break into computers. Technical problems such as errors in processing or communication software or computer or communication equipment failure are some of the things that can affect security. One of the biggest threats to the security of computer networks is when people abuse them.

Hypothesis 7: Analogous to the ethics of doctors, lawyers and teachers, the ethics of computer professionals should set standards of conduct and address the issues that computer

professionals face when working. It should take into account the responsibilities that a computer scientist has in dealing with his or her employer, co-workers, potential clients, and all others who may be influenced by his or her work.

CHAPTER 4. FINAL CONCLUSIONS ON THE CURRENT STATE OF KNOWLEDGE IN THE FIELD OF THE DOCTORAL RESEARCH TOPIC

This paper was motivated by the need to improve industrial engineering procedures in an organization responsible for county road infrastructure maintenance that is evolving and adapting to the economic demands of the market. This organization, despite being wholly owned by the public sector, participates in the establishment and correlation of all standards for the quality management system, product requirements, processes, and customer management processes for local and regional road and bridge infrastructure. Our goal for the future is to create a successful interoperability based on information and culture, including all organizations providing services of local and regional interest, as well as the inhabitants of these areas. Because the IT systems in Romania do not work with each other, people have to queue at the counters to receive files with documents "in original and in copy", to get their documents stamped and signed, to take lunch breaks, to take sick leave and to do other things. The following five strategic proposals are offered for knowledge management:

- a) knowledge is a product;
- b) customer-centered knowledge;
- c) personal responsibility for knowledge;
- d) customer-centered knowledge, and
- e) intellectual asset management approach.

In correlation with the main objective of the doctoral dissertation, in Part I the research, analysis and knowledge consolidation work was carried out on the current status and evolution of knowledge-based organizations, whose activity is computerized and possess information and knowledge management systems. These contributions were valued: defining the knowledge economy; defining types of knowledge and knowledge management; creating the idea of an information system; creating reference models for implementation. Future research directions identified at present will be to extend the research on evaluation of the potential to improve the effectiveness of organizational management, analysis of the main models for evaluating the effectiveness of the integrated information system.

PART II

CONTRIBUTIONS ON THE DESIGN AND IMPLEMENTATION OF AN INTEGRATED SERVICE FOR THE MANAGEMENT OF LOCAL AND AREA SERVICE ACTIVITIES IN KNOWLEDGE-BASED ORGANIZATIONS

CHAPTER 5. DIRECTIONS, MAIN OBJECTIVE, SPECIFIC OBJECTIVES AND RESEARCH METHODOLOGY IN THE CONTEXT OF THE DOCTORAL RESEARCH TOPIC

Chapter 5 sets the framework for the process of improving organizational management, the development of a horizontal collaboration model for integrated services of local and zonal public interest by the administration through knowledge based organizations and providers is the first main research direction. This model involves forming partnerships and cooperation at the appropriate levels that are already present in government departments, agencies, and organizations that deliver local and area public services. The aim of this collaborative strategy is to increase efficiency, reduce duplication, and ensure that service delivery is seamless. A model of horizontal collaboration between government departments, agencies and companies delivering seamless public services would make it possible to filter news in a more specialized way and communicate with citizens in a more consistent way. With more activities moving online, information systems can no longer be considered on the secondary level by managers, as they perform several strategic level functions: assisting in managerial decision making, providing contact between the organization and the business environment, providing access to information, enabling communication and document transfer, etc. The logical context of the research process that is the subject of this thesis and consists of the phases listed below is described in Annex 10:

- formulating objectives;
- examining the current state of the field;
- formulating hypotheses;
- conducting an experiment;
- evaluation of results;
- presentation of the final conclusions.

Following their integration into the quality management system, the processes in the organization investigated were the subject of the present study, which focused on improving the quality of these processes. We highlighted the main challenges that are provided by the performance indicators that are placed on the management of the organization. In addition, we defined processes that can be modeled using graphical methods to determine the connections and interactions that exist between these processes. With the help of these graphical models and the use of IDEF0 interaction methods, it will be possible to trace the mutual interactions between characteristics that have the potential to influence the quality of public service provided at the local and zonal level. Considering these findings, the following theories could be put forward as possibilities:

- Integrated Service of Local and Zonal Interest, a concept known as SIILZ, is a service that allows organizations providing services of local and zonal interest to combine their common procedures into a single service,
- The establishment of performance indicators for SIILZ and the development of the equations to calculate them will be done to ensure that each organization joining SIILZ is able to quantify the expected benefit of transforming the quality level of the service provided;
- This service will be designed using the IDEF0 methodology as a starting point for understanding how processes work, both individually and integrated.

During the research, under the direction of Professor dr.ing. dr.ec. Țițu Mihail Aurel, the research technique was finalized, and the five research reports were written using the "Mind Map" approach, which was applied for this particular situation. Thus, the stages of the research, the content of the research reports, as well as the possibilities of disseminating the research results through publication in specialized journals and participation in national and international scientific

conferences were outlined. Each research report addressed one or more specific objectives, and the findings from these reports served as the basis for the subsequent report, and their conclusions were ultimately used to construct the thesis. The research technique is an original modification that was constructed specifically for this thesis; however, it is applicable to any research procedure and can be effectively implemented elsewhere.

CHAPTER 6. CONTRIBUTIONS ON MANAGEMENT IMPROVEMENT IN KNOWLEDGE-BASED PUBLIC ORGANIZATIONS DELIVERING SERVICES TO CITIZENS

Note that the graphical forms, tables and figures are numbered as in the full thesis. The first stage that was proposed in the research technique is presented in this chapter. This stage consists in the analysis and hierarchical structuring of needs by requirements. This is done using two approaches, A3 format and FMEA, which are used for a process that can have economic and image consequences on the activity of the organization that is being assessed. Almost all decision makers agree that the performance of an organization is highly dependent on organizational culture. Culture is influenced by many things, such as values and social norms, as well as the way public officials lead, and the human resources policies that have been implemented in the public service.

Finding a good balance between action, discussion and reflection in organizational culture is a significant cultural characteristic of an organization that promotes organizational learning. These organizational competencies work together. The concept of organizational learning accepts that public management in today's complex modern world is not an automatic distribution of tasks that can be performed in the future; rather, it requires the continual creation of new competencies and skills for staff where citizens are being treated inadequately. Recognizing the professionalism and knowledge of staff is essential for the development of organizational learning in the public service. Consequently, employees aspiring to senior positions are usually generalist managers rather than knowledge leaders.

Management's obligation is to create an environment that encourages people to obtain, share and manage knowledge, to relate and collaborate with colleagues and external partners, to assimilate lessons and other tacit knowledge, to constantly think about the future and to build skills in line with the competency-based capability development framework, governments can easily

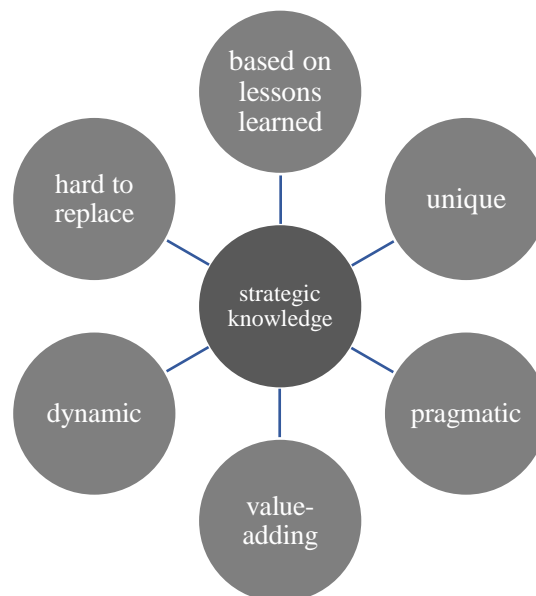


Fig. 6.1. Knowledge of an organization providing services of local and zonal interest

facilitate organizational learning (Behn, 2001). For this desideratum, we have focused on three areas that could help organizational learning and improve public service performance:

- improving the knowledge dissemination and management system;
- Support mentoring programs for employees;
- increasing the ability to manage analytically.

Mentoring helps more experienced employees pass on tacit knowledge to younger employees in the organization. A more performance-oriented workforce is the result of a well-managed career development system. An effective career system allows employees to develop and grow professionally. The less strategic knowledge is dispersed, the greater strategic advantage the organization has. 'Dynamism' covers both the content of information and the form and modes of expression that are based on intensive learning processes (Schein, 2004). According to research, the only way to benefit from strategic or critical knowledge is to implement an organization's strategy.

6.2. A3 analysis method

In the case of the analyzed organization, the level of strategic collaboration between managers and executives is lower than average in most companies and teams. The aim of this is to establish a system in which all parties involved continuously try to improve it, as shown in Figure 6.2.

An organization that intends to carry out road infrastructure maintenance work during the cold season may face difficulties for several reasons, including the following:

- snow clearing machines need to be prepared for work on the roads, but most of these machines and equipment are adaptations of machines and equipment that are used and worked on during the regular season;
- machines are usually used in works that take place outside of technology bases and mechanical workshops;
- high fuel costs with a high degree of unpredictability.

More and more manufacturers and service operators are turning to multi-purpose machine solutions that could be used in a variety of activities and can be turned into highly reliable solutions in the process of snow clearing and snow prevention.

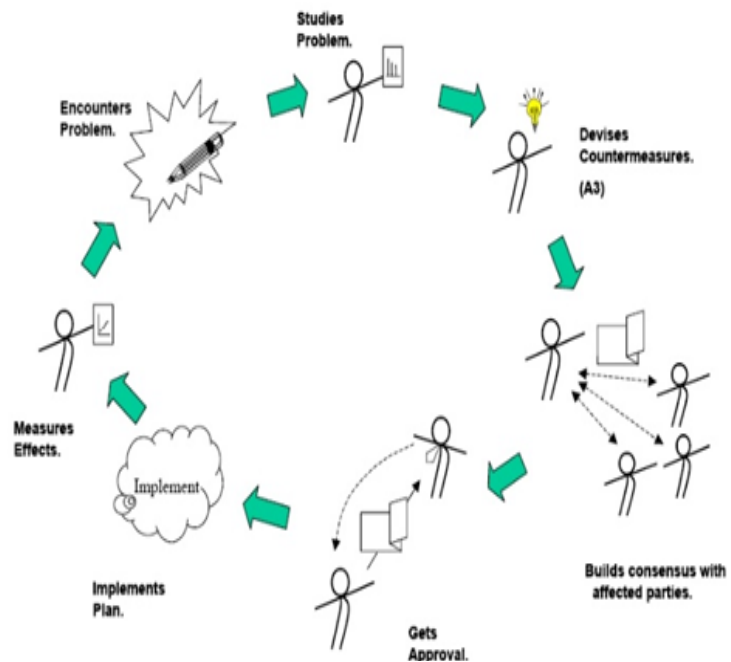


Fig. 6.2. The continuous improvement cycle (O.L. Team, 2010)

This is due to the fact that these solutions are of course more cost-effective, and allow for fleet optimization. For example, many machines have the ability to be equipped with over forty distinct types of attachments and can be used in a significant variety of contexts. It shouldn't come as a surprise that a necessary component of these goods is the ideal equipment for the winter months. There are a variety of dependable attachments that will help you remove snow faster and reduce the amount of new snow accumulated (Tools, 2020). Some examples of these accessories are plows, snow brushes, and snow plows. The ultimate goal of this strategy is to make the organization run more efficiently. Continuous improvement in both the quality of operations and end-user happiness will be possible through CI programs that have utilized public-private partnerships through their implementation. Residents' immediate satisfaction rates, on the other

hand, are expected to improve at a much slower pace; however, the consequences for daily life will create a sense of security that the essential circumstances for doing business will be provided even on when things are difficult.

We have concluded that by using the Failure Mode and Effect Analysis (FMEA) technique, we will be able to greatly reduce the impact of faults once they have been identified, potential impact identified and a plan action implemented in a timely manner. Figure 6.6 illustrates some different ways in which the FMEA approach can be defined (Curry & Herbert, 2022):

- analytical approach that serves the purpose of ensuring that all potential problems have been taken account and that they have examined in detail, not only during the production process but also in the goods themselves.
- Methodology that is recognized as a systematic procedure that is used by the team to recognize the assessment and prevention of errors during the design and planning phases for assets and processes.

The manager responsible for a new public sector decommissioning project should carry out an FMEA to identify any shortcomings or problems that may arise during the decommissioning process. This is an important step that should be taken when the project is assigned to the manager.

6.3.3. Application of FMEA to the de-tarringing process

The FMEA is conceptually organized into three main domains: the effects domain, the defects domain, and the causes domain. The terms "auxiliary" and "helping" fields refer to the other fields that may be present in the equation. There are system elements, functions and erroneous functions that are contained within each field, therefore the process is differentiated according to product requirements, manufacturing phases and quality measurements. It was essential to apply a rating that is based on the severity of the defect (S), the occurrence of the defect (O) and the chance of detecting the defect (D). In the following, the R.P.N. (risk priority number) will be calculated according to figure number 2. In order to calculate the R.P.N., all the values of S, O and D are summed up. (Gusan, Titu, & Deac-Suteu, 2022). Despite the fact that the road cleaning method is inefficient, we identified all the possible causes: the machines reach a low level of effectiveness due to the low frequency at which they pass and the intervention mode they use. The communication mode needs some improvement. There is a lack of efficiency in the approach used to prepare the machines for snow clearance, illustrated in Figure 6.7.

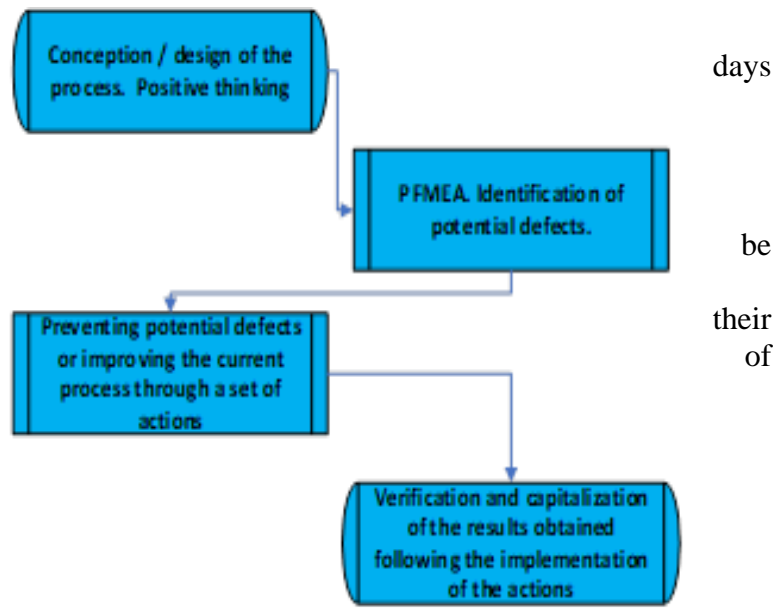


Fig. 6.6. PFMEA flow diagram

Process / product name	FUNCTION of the subassembly / product / process	MODE OF FAILURE / DEFICIENCY	POTENTIAL EFFECT	S	POTENTIAL CAUSE	O	D	Risk Priority Number (RPN)	Action results				
									PROPOSED MEASURES	S	O	D	RPN
		The process of snow removal of the road is not effective	Roads are covered with snow	8	The intervention method of the machines and the reduced frequency to which they pass is reduced as efficiency	5	10	400	GPS installation on snow removal machines	8	5	1	40
			Accidents may occur between cars.	10	The communication method is faulty	8	10	800	Streamlining the transfer of information so that communication is carried out in the shortest possible time between the driver and the operator of the weather station.	8	1	10	80
									Monitoring and recording calls between the weather station operator and the snow removal machine driver	8	1	2	16
				Traffic may be jammed	7	The method of preparing the machines for snow removal is not efficient	4	4	112	Update the organization plan of the activities to facilitate the standardization of the method of preparing the machines	7	2	4
									Streamlining the transfer of information so that communication is carried out in the shortest possible time between the driver and the operator of the weather station.	10	1	10	100

Fig. 6.7. Analysis of the snow clearing process

As the procedure of clearing the roads is inefficient, we have shifted one of the possible causes to the following: the method of communication is faulty, there is no way to estimate the traffic flow, and the clearing machines are forced to wait in queues. As a result of the numerous penalties that are issued annually by various state agencies for not clearing the roads properly, we have identified a possible cause: We don't have equipment or human resources dedicated solely to snow removal. The communication technique is poor and the way the equipment is prepared for snow removal is counterproductive. Incorrect communication between the team members who were involved in the process, we rearranged one of the possible causes: the communication strategy is faulty and there are no machines or human resources that are specifically designated for snow clearing. We gave a grade to each cause based on the occupation of these assumed reasons using the criteria we established. We then considered the prospect of identifying these problems in a timely manner, which we did. Next, we determined the R.P.N. index by calculating the product of the three distinguishing features.

6.4. Synthesizing the findings

Taking into consideration the data that was obtained, we concluded that the R.P.N. index is extremely high for each problem that was discovered during the FMEA development. As a result of this particular element, we considered the timely application of a collection of operations to help lower the R.P.N. index. It is necessary to correct the R.P.N. score which is the highest. Considering this particular element, we considered it appropriate to take certain prompt measures to reduce the frequency of events and increase the detectability of probable causes. As a result, we concluded that the following activities should be undertaken:

- Installation of Global Positioning Systems (G.P.S.) on snow clearing machines to increase the machines' ability to be detected in the field;
- Streamlining the information transfer process to ensure that the contact between the driver and the weather station operator is made as quickly as possible. To reduce the likelihood of misunderstandings between the many teams involved in the process, this solution was used.
- monitoring and recording the conversations that take place between the weather station

operator and the snow plow driver. It was decided that this approach would facilitate the identification of any communication problems that may have arisen between the driver and the weather station operator. If problems continue to occur, management may decide to take ad hoc action based on call assessment.

- Ensuring that the work organization plan is updated to help standardize the vehicle preparation method. This will lead to a decrease in the occupancy rate of the inefficient vehicle preparation method. It is essential that each person employed is aware of the specific steps that need to be followed to ensure vehicles are prepared in the shortest possible time.
- Using traffic monitoring software to enable the dispatcher to provide the driver with GPS information on the quickest route that can be taken to avoid congestion. This step will allow the driver to identify routes that are blocked or congested, allowing them to avoid these routes and get to the area to be cleared as quickly as possible;
- allocating additional resources, in terms of human resources, and adding to the vehicle fleet.

These measures will reduce the likelihood that the organization under review does not have sufficient resources to handle emergencies. As these actions were deliberately taken for each of the probable reasons mentioned above, further assessments of occupancy and detectability were made. Given that the intensity of the effects cannot be changed, the severity that was originally assigned to the potential impact has not been changed. The fact that the actions were implemented in a timely manner, it is evident that the number of risk priorities has been significantly reduced. In the process of conducting the FMEA, the likely reasons that could have contributed to the potential consequences were eliminated. By addressing in a timely manner the factors that contribute to the occurrence of negative effects in a process, we will considerably minimize the occurrence of these effects in the long term, which will ensure an increase in the efficiency and effectiveness of the de-icing process.

In the public sector, the process of snow clearance is particularly difficult to understand and to carry out. It is likely to have negative consequences, some of which can be life-threatening. Through this scientific endeavor, we have demonstrated that a technique that is mainly used in the automotive industry can be used in the public sector to assess the possibilities for improving the procedures. In this paper, a theoretical perspective or personal viewpoint on FMEA is presented, explaining the objectives, phases, and the many forms that are currently being used. In addition, the analysis provides a concrete illustration of how FMEA can be used in any public service of local and area-wide interest, resulting in a multitude of benefits.

CHAPTER 7. CONTRIBUTIONS ON MODELING THE IMPLEMENTATION PROCESS OF THE INTEGRATED SERVICE OF LOCAL AND ZONAL INTEREST USING IDEF 0 METHODOLOGY

Note that the graphs, tables and figures are numbered as in the doctoral thesis in extenso. The main objective is represented by the research on the management of a knowledge-based organization providing services of local and regional interest, S.C. "Roads and Bridges" in the context created by the intention to align with the principles of the Community provisions on Services of General Interest.

7.3. Designing a process map in the organization under analysis

The organization's activity is presented as a process through which business objectives are to be achieved. Any process carried out, which can be considered perfect at a given moment, can be

improved, simplified and changed, as a result of or in reaction to the organization's adaptation to the new business environmental change due to competitive market incentives.

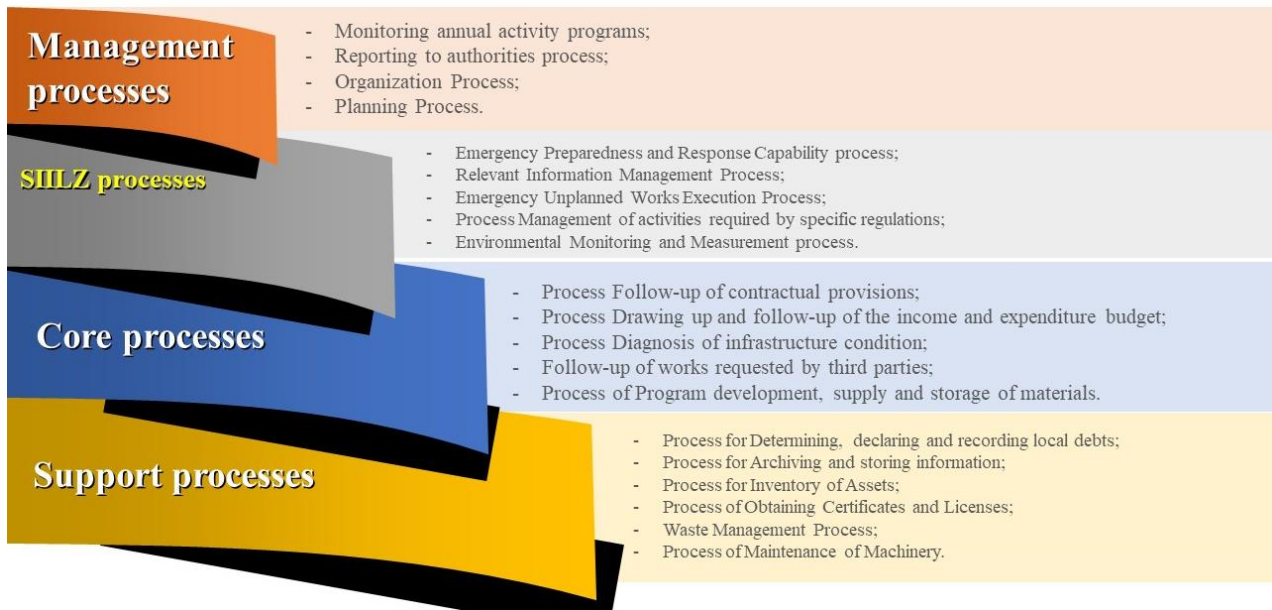


Fig. 7.2 The identified process map

7.4. Application of the IDEF0 methodology to the processes carried out in the analyzed organization

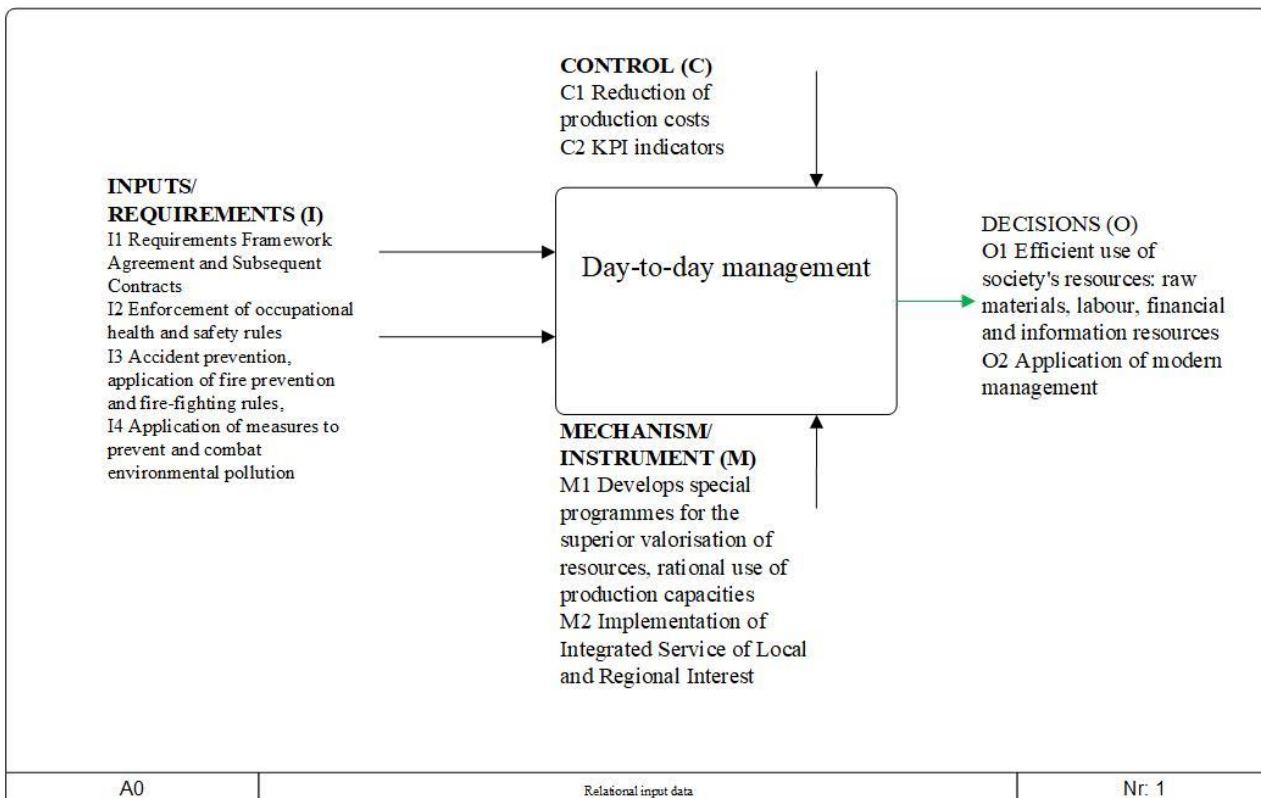


Fig. 7.4 Relational input data

The process analysis of the organization's activity was initiated from the general shape of the

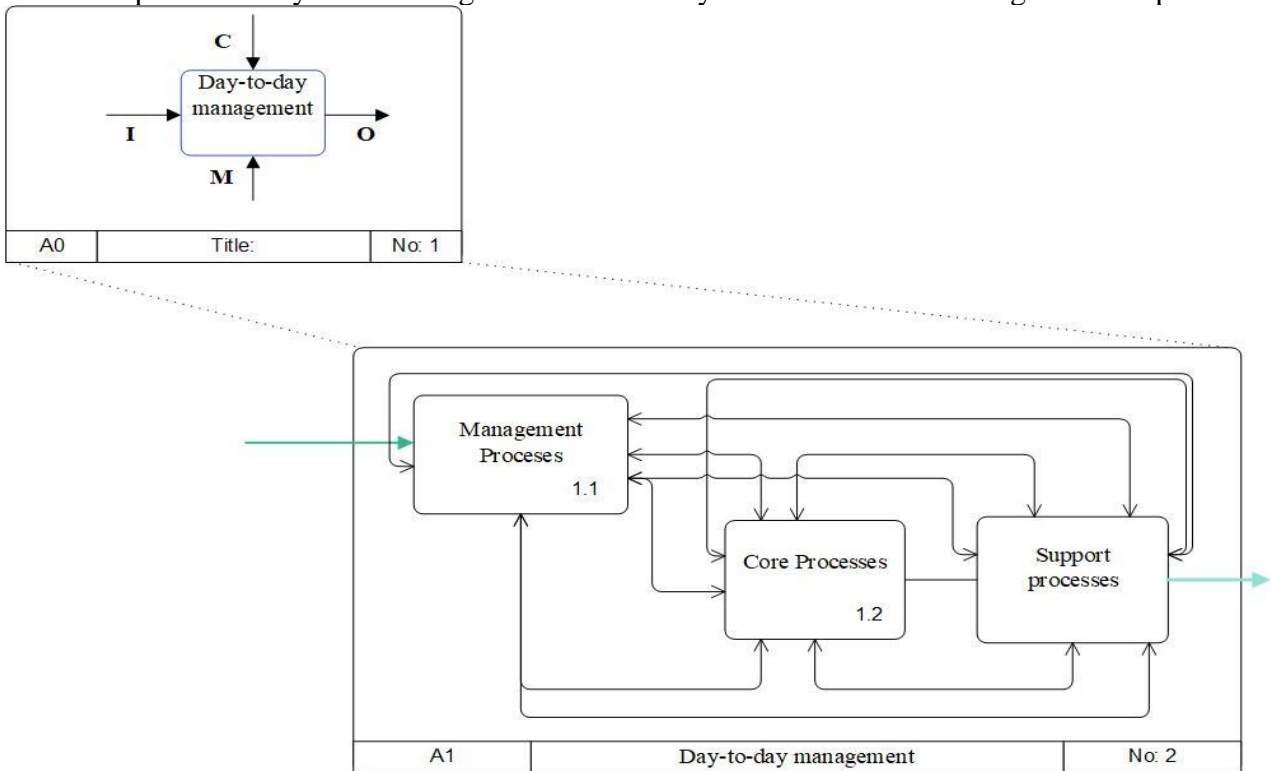


Fig. 7.5. Detailing the next level of day-to-day management of activities

process map to identify the critical points, the way of prioritizing tasks, and last but not least the degree of vertical relationship of competences. The identified process map that is proposed for the

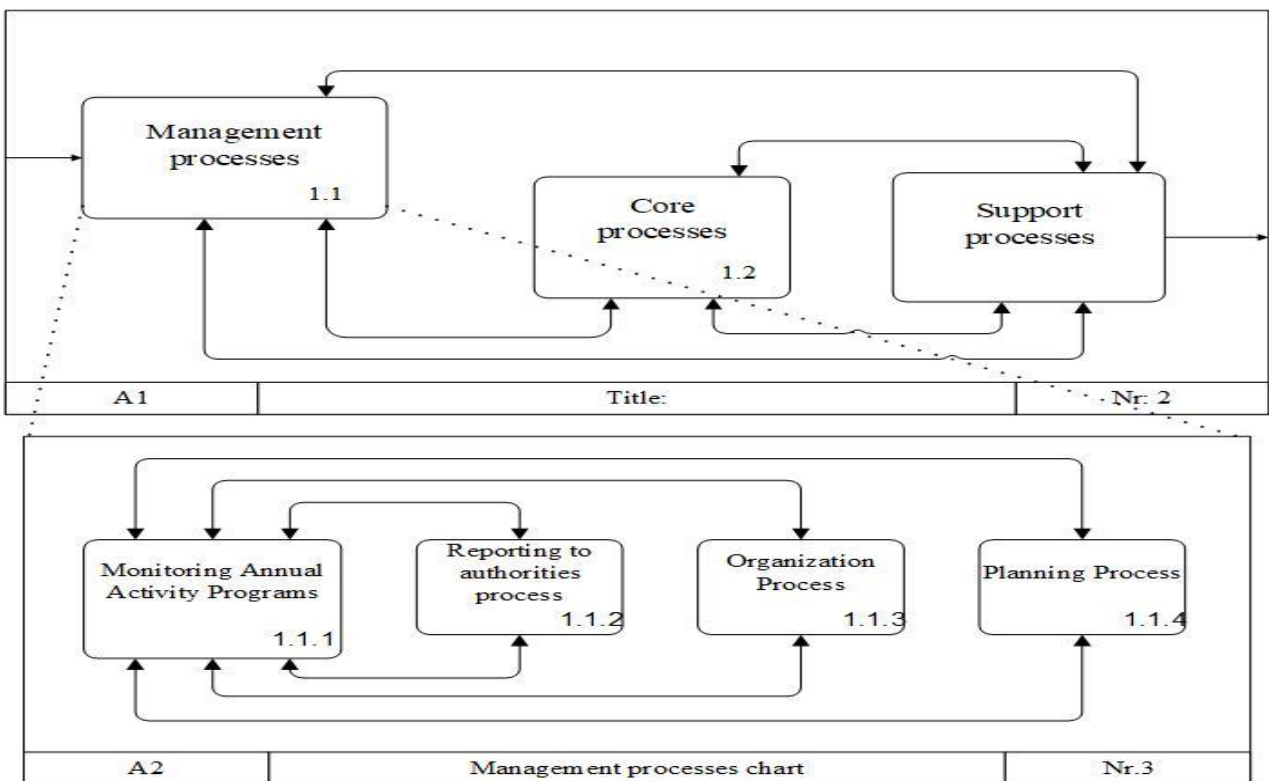


Fig. 7.6. Detailing the level of management processes

analyzed organization is presented in Figure 7.2. Depending on the scope of impact of the interventions and their nature, the concrete measures of measures may include, as appropriate, system measures, front-office measures and simplification measures. back-office measures. Figure 7.3 details the sub-processes for each of the individual processes and then projects the interactions between them. The model has been developed in a pyramidal direction, starting with the input data and the organization's relationship with the business environment, shown in Figure 7.4. where the main processes identified in the organization and how they interact are presented. The three processes comprise activities that ensure the conduct of contractual relationships with the outside of the organization and which have been presented in nominative form in Figure 7.5. are presented and explained below. The starting point of the analysis presented in Figure 7.5 is the operational plans, which refer to the daily or monthly activities required to fulfill the strategic plans and, therefore, the strategic objectives. These plans cover a smaller area. The management process can be understood as a collection of interventions that the manager uses to fulfill management functions. The proposed management process, shown structurally in Figure 7.6, emphasizes the ever-changing nature of management, which is manifested as a result of factors internal and external to the organization.

These influences imply significant changes in the operating parameters of the management system, which in turn enable the organization to adapt to new conditions (Randsepp, 1978). The fact that only certain communication channels are used in the execution of the management process is what generates stability, credibility, and notoriety. It is through these channels that the structural foundation of the management system is built, which is then documented in organizational actions, which guarantees the stability of the system. After the implementation of SIILZ, a transformation of the management process on the organization's capability maturity model is expected, by moving from the extreme situation resolution stage to continuous improvement by establishing a documented resolution model based on predictability, illustrated in Figure 7.7.

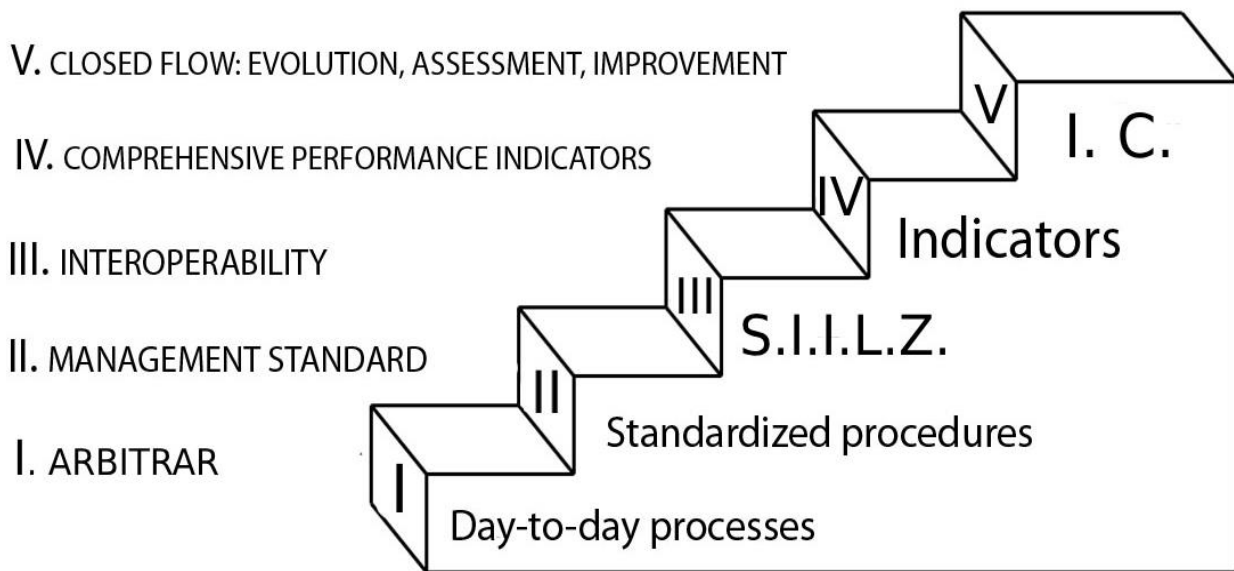


Fig. 7.7. Detailing the function of the SIILZ in the organization's management evolution scale

In Figure 7.7, we have conceptualized five levels on which the organization should transform. The main benefits will come from the reuse of common software components from the other SIILZ participating enterprises, and there will also be value in reusing common procedures. Each

individual project manager in the organization is responsible for defining their own project, but will have access to the resources that are pooled. On the detailed project schedule, these should also be noted as separate items. Project managers will have access to multiple resources to monitor quality, risk, and scope. Despite the fact that this is not a new idea, each of these procedures should be specified once by each organization, and then all project managers should reuse them whenever possible:

Level I: Arbitrary - considering potential outcomes. Only a handful of the organization's procedures are shared by all employees. It is the strength and expertise of individuals working within the organization that determine the success or failure of initiatives. In terms of providing a supportive atmosphere that can help projects achieve their objectives, the organization offers very little. Most companies operate at this level; however, there are a few that make a half-joking statement that they operate at level 0 or even level -1.

Level II: Standardized Management - the organization has adopted standardized project management procedures, and these procedures are universally applicable to all projects now under consideration. As the SIILZ is consolidated at this level, which is considered to be the baseline level, this becomes a requirement to be met by all organizations participating in SIILZ

Level III: SIILZ Adoption of requirements that are common and repeatable for software, communications, deliverables, tools, and other things that are associated with the new integrated service.

Level IV: Comprehensive performance indicators - measurements for all areas of project management, and development processes, as well as the use of Key Performance Indicators (KPIs) created for SIILZ Creation of an archive, in this case - the MariaDB database, for the purpose of storing measurements, and important lessons learned from the project's past. This archive can serve as a source of improvement for future projects.

Level V: Continuous Improvement, and Process Optimization - by using the integrated service, it will be possible to establish a process loop, measurement, and continuous improvement, measurement monitoring, feedback, and innovation, ultimately leading to process optimization.

7.4.3. Establishing steps to improve management processes

- a) The first step is to set your goals, and objectives in line with your management plan. Market positioning, innovation, productivity, profitability, physical, and financial resources, management performance, and development, and cost-effectiveness are important factors to consider, as well as the attitudes, and performance of the workforce, and accountability to the public (or community)
- b) The second step is the definition of the current scenario, which includes determining the organization's strengths, and weaknesses, as well as the resources that can be leveraged within the organization to achieve the objectives.
- c) The third step is: Setting the premises of future conditions. The purpose of this step is to identify elements that have the potential to cause difficulties in the process of achieving the objectives.
- d) The fourth step involves selecting a course of action, and developing potential alternatives.
- e) Fifth step: plans are implemented, and results are evaluated through indicators, target setting, objective assessment, and risk mitigation.

7.4.5. SIILZ design

The new process, called the process of implementation of the integrated service of Local and Zonal Interest is designed on the management level of the daily activity of the organization representing an informational connection with the other operators of activities that are characteristic of the SIILR, and that have effects or are dependent on the infrastructure managed by the organization. In Figure

7.10. information exchange relationships are established with the core processes in the organization, the colored flows representing the decision relationships taken from the existing processes to be used for the automatic exchange of messages related to the road infrastructure.

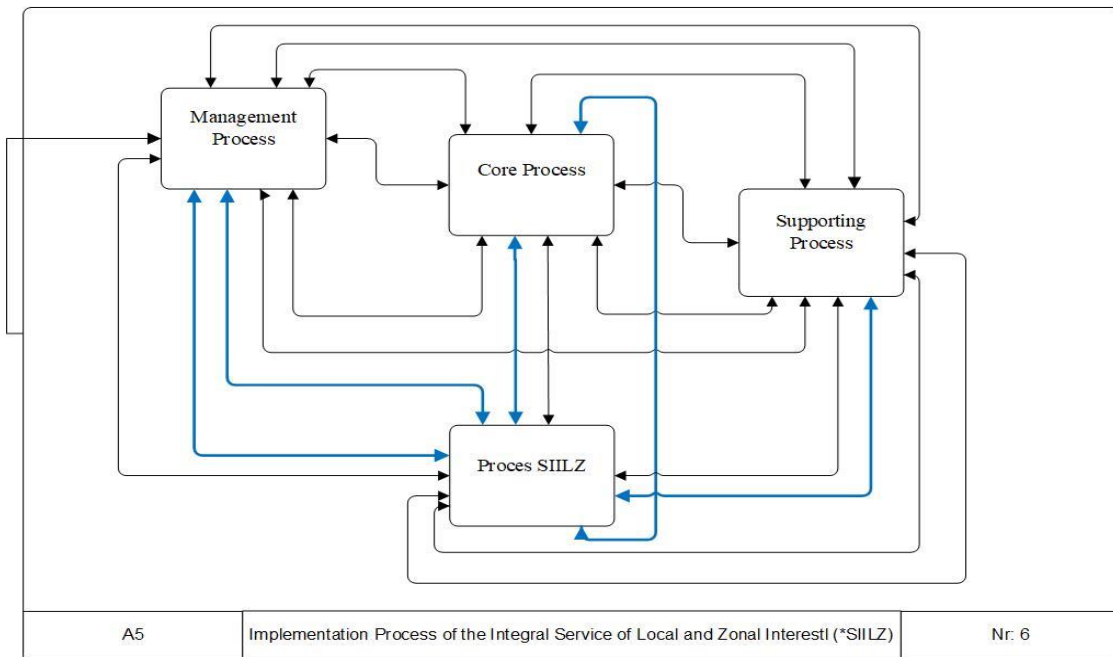


Fig. 7.10. SIILZ implementation process

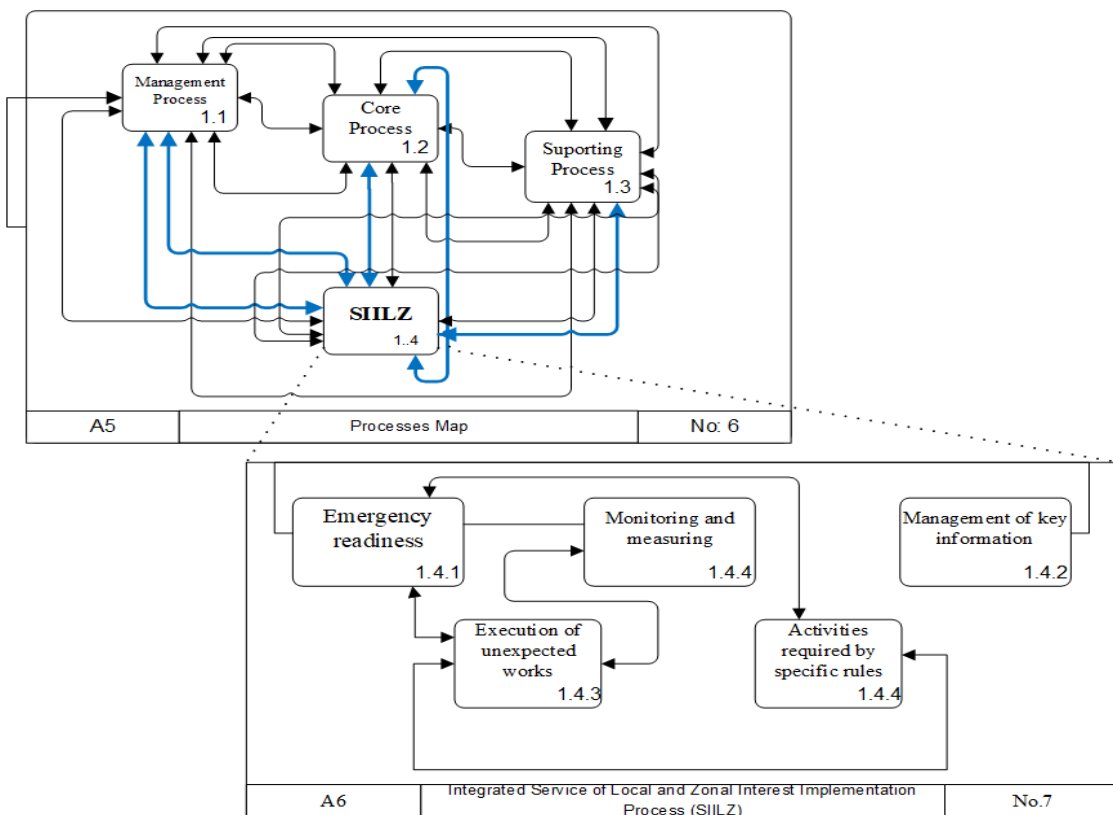


Fig. 7.11. SIILZ by processes

The new service is divided into 5 processes shown in Fig. 7.11:

- a) Emergency Preparedness Process;
- b) Process Essential Information Management;
- c) Process Execution of planned works;
- d) Process Manage activities required by specific regulations;
- e) Process Monitoring and measuring environmental aspects.

The identification of the 5 processes was based on the analysis of the organization's activity over a 10-year period of time, during 2 terms of management, under which distinct conditions regarding the shareholders' expectations of the organization's economic performance.

Each management system standard, starting with ISO 9001, emphasizes process monitoring, data collection and analysis, and decision making for improvement, which is the basis of quality management. With this standard, monitoring, measuring, analyzing, and evaluating data must be more detailed and clearer than before. The standard does not dictate what, how or when to measure; this is at the discretion of management:

- monitoring: parameters that are relevant to the organization's activity: quality, finances, productivity, level of services, operating/repair costs of equipment, resource consumption, staff performance, supplier performance, etc.
- monitoring and measurement: based on the strategies developed in the previous chapter. optimal method of measurement: consideration of indicators;
- measurement: - Establish intervals for measurement so that sufficient data are available to see the status and evolution of indicators. If done too infrequently, data collection, and centralization becomes difficult, delaying decision making. The ideal interval varies by indicator, process, and personal preference.

After the development and presentation of the new service and its component processes, the flow of operational data, illustrated in Figure 7.4. is developed, as shown in Figure 7.15, the flow of activities becomes stable and more efficient, and activities are monitored, evaluated, and measurable.

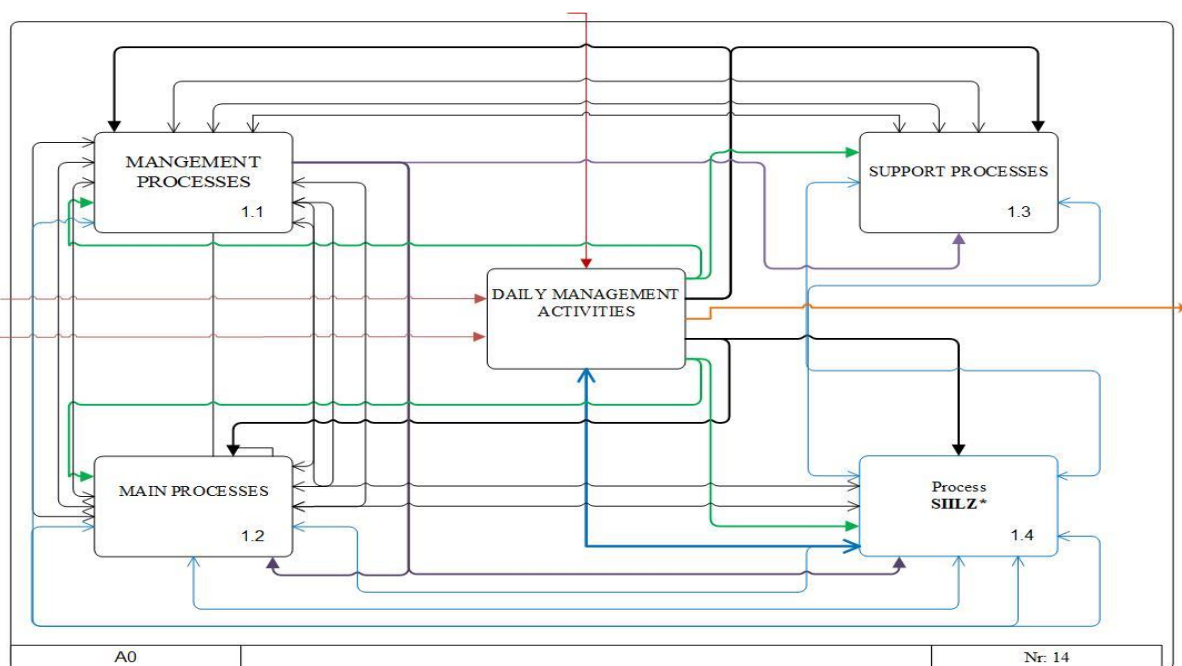


Fig. 7.15. Detailed flow of activities in the organization provided by SIILZ

It is considered that an important benefit of modeling through IDEF0 methodology is represented by the possibility of analysis and control of the activities in the proposed process, which will allow the determination and measurement of quantitative, qualitative, and performance indicators of the activities. At the same time the identified constraints, weaknesses, and vulnerabilities will be more visible.

The concrete simplification measures concerned both the intervention area as a whole and the sub-areas within it, depending on the choice of the responsible institution, based on the analysis of the following factors:

- a) the complexity of the intervention area;
- b) the extent to which the sub-domains within the field of intervention are interrelated and interlinked
- c) intervention;
- d) the administrative capacity of the responsible institution and/or of the organizations subordinated/coordinated/authorized by it;
- e) the need to link with other previous or ongoing interventions.

Throughout this chapter, we have demonstrated and identified the need for quality assurance and proposed a formula for the administrative structuring of the organization. In the text of the paper, however, analysis, and comments will be made only on the selected processes, for reasons related to the purpose of the paper, namely to treat the processes from the perspective of integration at the horizontal level in organizations that intervene or influence the quality of service of local and area interest. This is a new approach, to interpret the organization's policies and strategy beyond the technical-productive side, to present the advantages of the learning organization and to create the transition towards the organization based on the knowledge in the organization's track record, not only in the personal "experience" of some employees who have given their interest to make the processes work. In this way, the way of dissemination and highlighting of strategic thinking on the principles of modern organization aiming at performance and improvement possibilities will be redesigned.

Database design steps

Conceptual design

Regardless of any physical considerations, the process of developing a model of the information used in a particular domain of interest falls within the remit of conceptual design.

The first step in database design is to determine the data requirements:

- categories of system information;
- domain-specific rules;
- applied constraints;
- types of reports generated;
- the main objective of all information;
- the required level of security;
- information to be expanded.

The building of a database is not separate from the development of other systems; rather, it is usually just part of a larger process of developing other systems. System design will extend the procedures that will affect the data, and database design will focus on designing the mechanism that will store the data. Another step in this process involves not only determining the goals of the domain, but also gathering information from the many different sources that will utilize the database. In summary, the conceptual data model delineates the behavior of the system, a collection of

domain-specific principles and data requirements. This perspective is independent of any physical data storage considerations (DBMS, operating system, etc.) and is graphically illustrated with the assistance of tools. Starting from the IDEF0 modeling, an input message interpretation flow has been set up as shown in Figure 7.19.

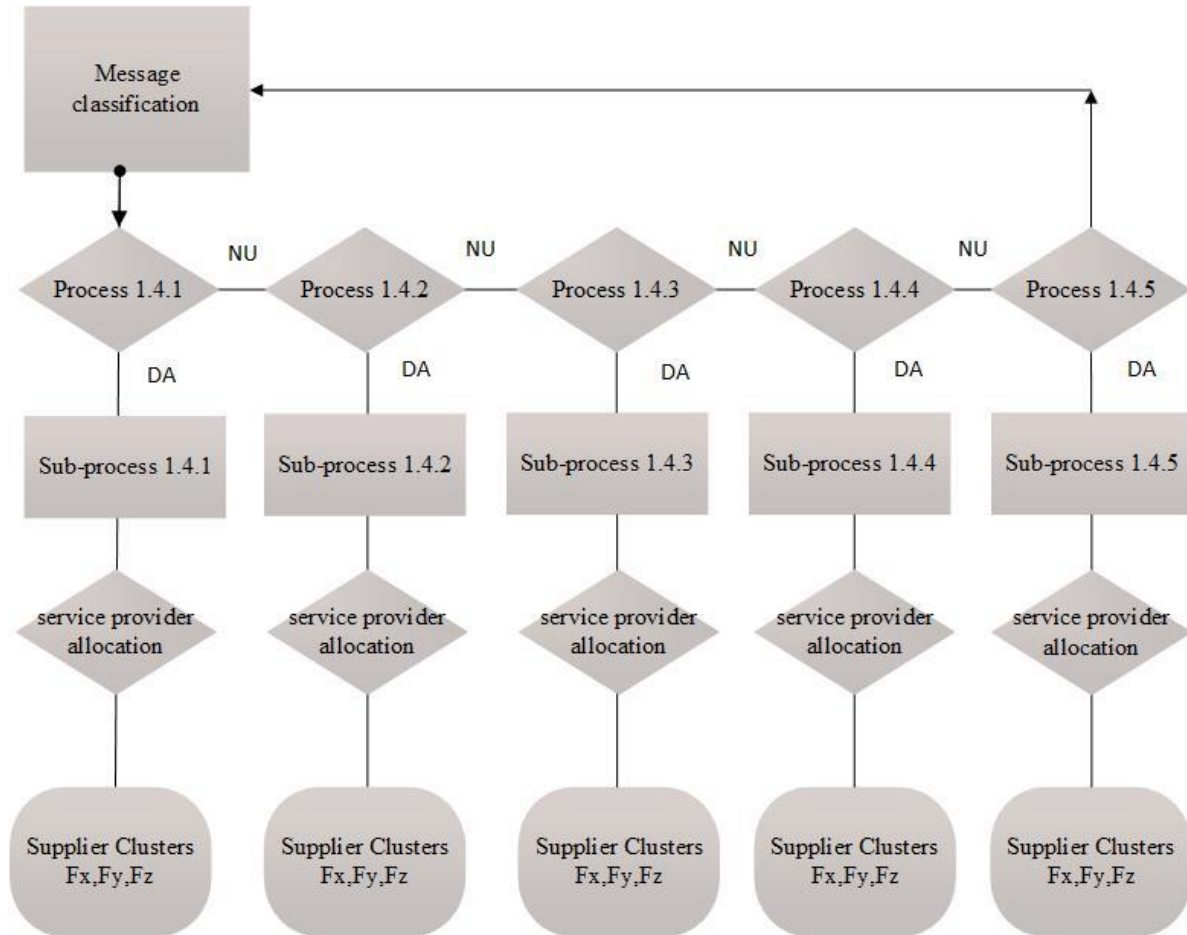


Fig. 7.19. Input message interpretation flow (author's conception)

In the IDEF0 modeling, the first categories of works or activities identified as the most common in the SIILZ were defined as sub-processes. Their centralization is presented in Table 7.4.

CHAPTER 8. CONTRIBUTIONS ON THE DEFINITION OF INDICATORS USED IN THE EVALUATION AND MONITORING OF THE INTEGRATED SERVICE OF LOCAL AND AREA INTEREST

Please note that the graphs, tables and figures are numbered as in the full doctoral thesis. The public sector, sometimes known as the public economy, consists mainly of governments and the public administrations (central or local) on which they rely for support. According to the conventional view, the primary function of government is to satisfy the requirements of its subjects to the maximum extent possible. To fulfill this function, public services tailored to the needs of the population must be available.

Based on these statements, we emphasize that the transfer of powers to the local level from the central level was not accompanied by adequate financial resources. This led to problems and sometimes significant financial losses, which meant that local authorities did not have enough money to modernize. As a result, over time, many of them went bankrupt, the service could no longer be provided and some local authorities simply abandoned it. In areas where the service was maintained, the cost was borne by local governments, adding to the pressure already put on municipal finances during the pandemic.

Based on this reasoning, the notion of "Integrated Service of Local and Zonal Interest" is defined as a component of services provided in the public interest, by providers with intellectual competence and material capacity proven by documentation, procurement documents, etc. The level at which SIILZ can be constituted is shown in Figure 8.2, below:

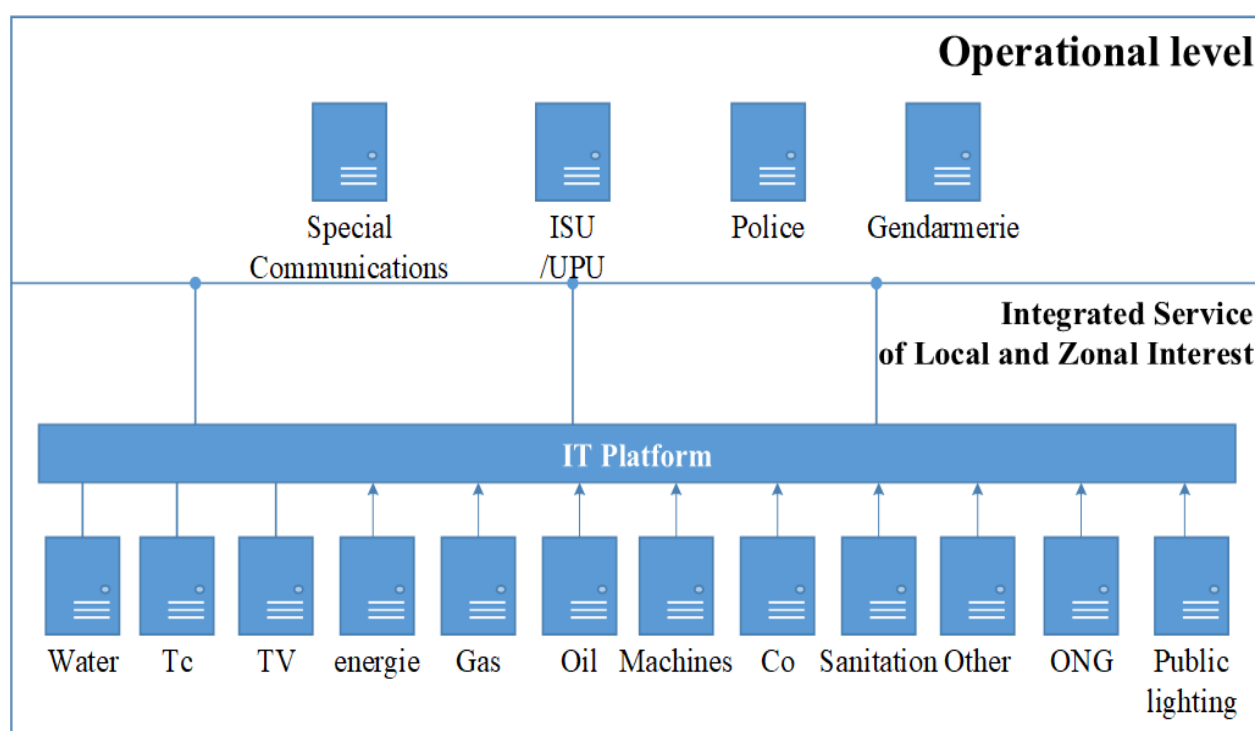


Fig. 8.2 SIILZ - relationship diagram by competence level (author's contribution)

8.2. Indicators for monitoring and evaluating the quality of public services

The inputs for the Integrated Service of Local and Zonal Interest have been in the form of lists of indicators, and these lists have been included in performance standards, specific local regulations and other such documents, Figure 8.3.

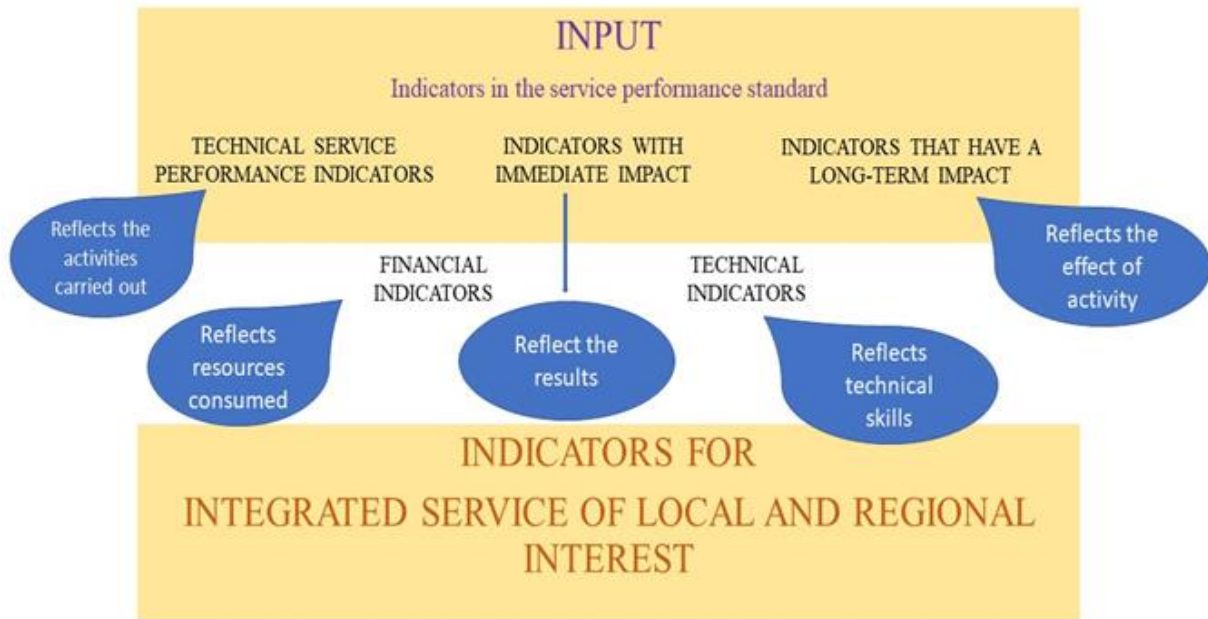


Fig. 8.3 Methodology for setting SIILZ indicators (author's conception)

The financial indicators will not be analyzed separately; rather, they will be highlighted in the same way as they appear in the statistical statements provided by the providers. In Research Report No. 4, the processes proposed to be carried out through the Integrated Service of Local and Zonal Interest (SIILZ) have been defined, identified and modeled through the processes shown in Figure 8.5.

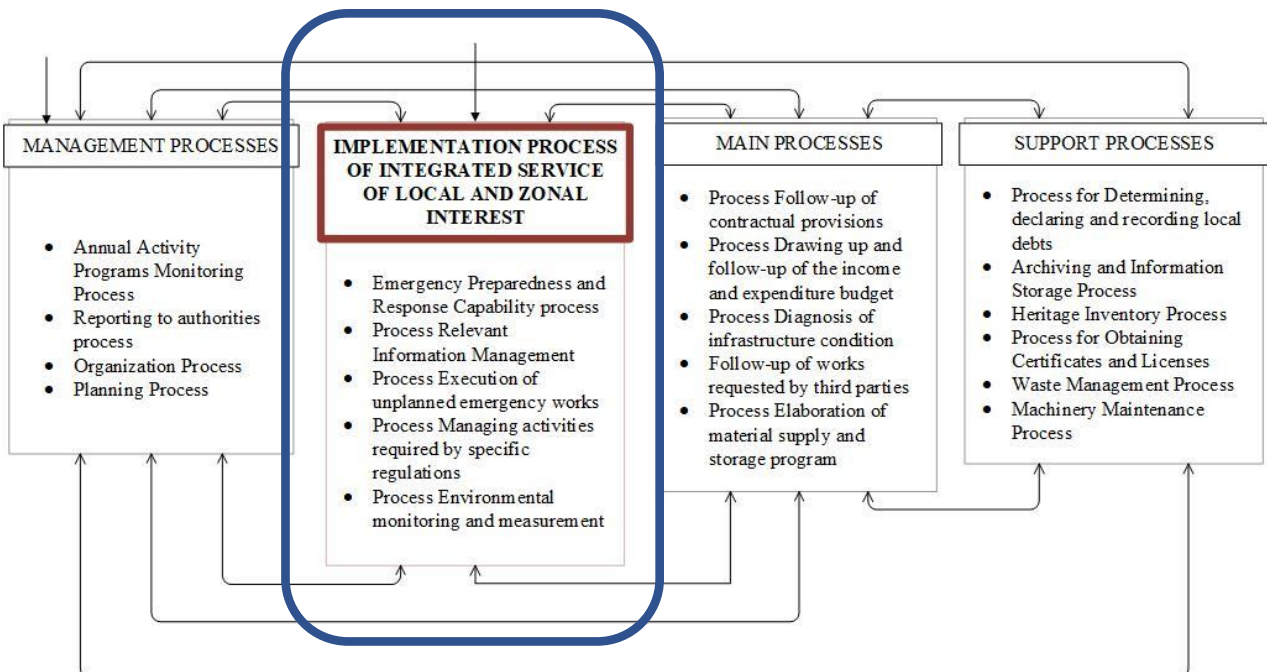


Fig. 8.5 SIILZ component processes (author's conception)

For each process the main functions have been described in Report No. 4. Based on these considerations a mechanism of indicators mapped to the 5 initial processes was developed, shown in Figure 8.6.

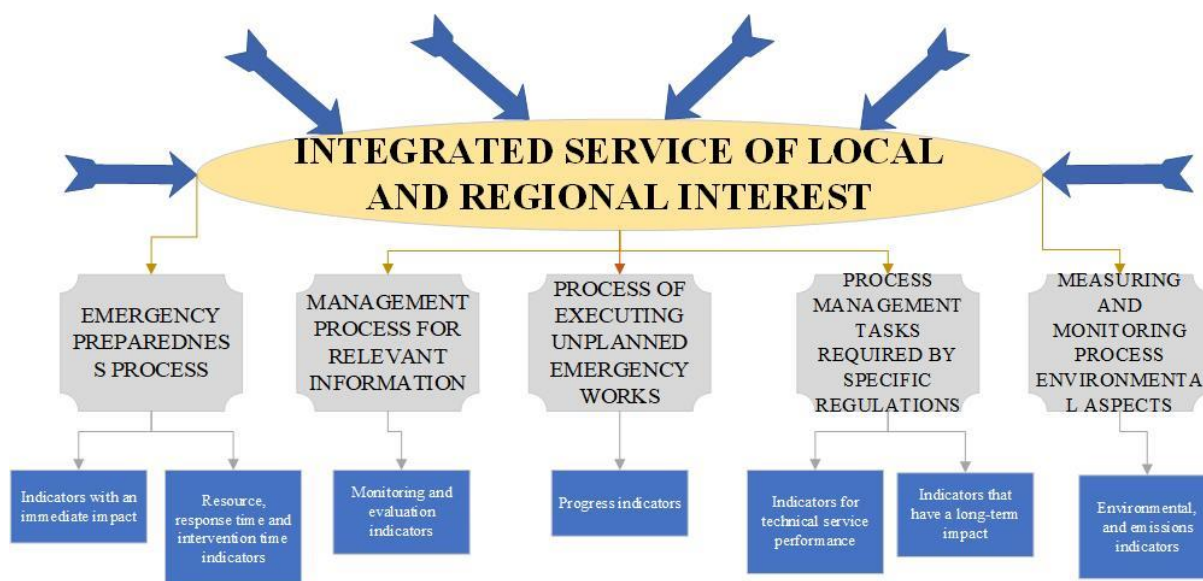


Fig. 8.6. Grouping of indicators by component processes of SIILZ (author's conception)

This stage aimed to focus the assignments on the specifics of the solution provided in each process. Since the definition of the indicators aimed at measuring objectives and its consequences, referring to more specific terms or refining the formulas will not change the way the indicators have been categorized.

CHAPTER 9. RESEARCH ON THE TAKE-UP OF COMMUNITY MEASURES ON SERVICES OF LOCAL AND AREA-WIDE INTEREST

The overall objective of the project is to raise the awareness of the public and representatives of providers of services of public interest about the institutional framework and principles contained in the EU White Charter on Services of General Interest. The specific objectives of the research are the following:

- raising the awareness of the public and public service providers about the existence of professional standards and quality indicators for the provision of services of general interest;
- to reduce negative public perception of the level of crisis management;
- Raising public awareness of the need to carry out activities with environmental impact;
- promoting the Roads and Bridges mission;
- increasing trust in organizations responsible for delivering services of interest to the population.

The opinion survey is a questionnaire survey. Based on the particular objectives of the research and the dimensions that were provided, a questionnaire structured in 5 sections was developed:

- a) The fundamental principles of public service, as set out in the EU White Charter;
- b) Organizational elements;
- c) Events with negative and/or economic effects;
- d) Stress management;
- e) Organization management.

In a very broad context, the questions that were also aimed at the validation process of the questionnaire and were not only intended to confirm and indicate what the future of the designed processes should look like; they were also intended to invalidate and clarify the way forward. Thinking about what the future might look like for our organization and, in particular, about scaling the impact of SIILZ, it is very important to note whether there are any reasons for invalidation.

CHAPTER 10. FINAL CONCLUSIONS, ORIGINAL CONTRIBUTIONS AND FURTHER RESEARCH DIRECTIONS

The fundamental aim of the PhD thesis was to research the field of public service in order to find solutions to ensure favorable outcomes for knowledge-based organizations that provide services in the public sector, characterized by continuity and quality. The need was identified after some bad weather events flooded the access roads to the locality in the north of Sibiu County. The organization in charge of road infrastructure management mobilized all available resources but nevertheless, the locality was isolated for several days, even though there would have been intervention means in the area that could not be connected to these events. For the proposed purpose, the general objective consisted of research, analysis and proposal of a methodology for the substantiation of the integration of specialized information systems, data consolidation, algorithm and rules for data mining, conducting experiments, solution study, determination of technical-economic efficiency indicators, for the efficiency of quality management. Throughout the research we followed the opinion that it is particularly important for organizations working with public administration to find out what their customers want, need and expect, so that they can develop excellent plans and policies that meet these desires and needs.

For the public sector, I propose four quality requirements that can be used for both local and area-based services:

- a) the community should generally receive the best possible service when using public services;
- b) when it comes to the obligations and needs of citizens using public services, the professional imperative shows that the organization is dedicated to meeting them and learns from how to address the obligations in a skilled and organized way. In general, this means that there are high standards and requirements for the level of services that are provided;
- c) In today's world, public sector organizations often have to compete with private sector firms in certain areas. Thus, for public institutions to remain competitive, they must pay attention to quality. A lot of people often go to private sector organizations, even though they charge much more for their services, because they are dissatisfied with the way they are treated or with the quality of services offered by public institutions of different types;
- d) Since all public institutions are part of social life, they must be accountable to different groups of citizens as well as to the community as a whole.

Based on the principles of standardization of the quality of public services of local and zonal interest extracted from Community regulations and recommendations, a series of original contributions have been made:

- 7 hypotheses concerning the management of an organization operating in the public service sector;
- analysis of the level of knowledge of the Community recommendations at the level of the administration and organizations providing services of local and regional interest;
- development of a new concept, called Integrated Service of Local and Zonal Interest in which 5 main processes have been elaborated, which can be determined or newly developed in organizations providing services of public interest, thus introducing the concept of knowledge or knowledge in the work of organizations;
- Modeling with IDEF0 methodology of SIILZ component processes and designed five levels on which the organization should transform;
- Methodology for developing a set of performance indicators, valid for the integrated service of local and zonal interest;
- Case studies for quality improvement for an activity relevant to the organization under review;
- the realization of a validation questionnaire both for the newly designed concept and for the methodology, calculation formulas and applicability of the quality indicators of the integrated service of local and zonal interest.

Despite the fact that the study presented in the thesis was conducted with the intention of being representative of the period in which it was conducted, there are prospective directions that have the potential to bring major new findings and contributions.

In this regard, creating an IT platform that is compatible with mobile devices and all their operating systems is a first step that should be taken to serve the entire community population.

In order to be able to develop both the scope and the needs of citizens, as well as to be able to develop further, it would be useful to carry out primary research looking at citizen satisfaction and outcomes over a longer period of time, possibly between two legislatures.

At the same time, the proposed new service should include a representative number of organizations that provide services of interest to both the local and regional community. Depending on the level of demand and requirements, the idea could be extended to cover the whole county.

The conclusions that have been presented and the results that have been obtained from this research contain particularly useful information that can be useful for those responsible for developing performance criteria for the management and administration of organizations providing services of local and area interest in order to develop and promote policies for the public service sector in line with the expectations and needs of the community.

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