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Preliminary communication

District Information System

With the establishment of the sovereign and independent Republic of Croatia, its new territorial system, based on municipality, town, district and state, has also been built. In order to facilitate functioning of the territorial units, it is very important to establish an information system. On this plan, very good results have been achieved on the level of state, police, inland revenue office, various funds, holding associations, banks, etc. but on the levels of local government and self-government the activities are, in fact, at the very beginning. So, the primary aim of this work is to point out the importance of building the district information system and its possible conception.

Keywords: district information system, communal information system.

1. Introduction

The arising need for building the municipality, town and district information system was the leading motive for creation of this particular paper. Namely, after establishing the sovereign and independent Republic of Croatia, its new territorial structure was also established. Districts and their towns were formed as units of local government and self-government (ULGS). Likewise, their competence was determined, too. In order to facilitate their efficient functioning, it is necessary to set up an information system (IS). District information (DIS) system is seen as an integral system with town and municipality network systems as subsystems. Town and municipality systems are basically utilities information systems (UIS) in the traditional sense of word.

Building and setting up the IS has a long tradition and is being carried out with an ever growing success. On this plan good results are being achieved on the levels of state (army, police, inland revenue, different funds, economic associations, banks etc.). Foreign and home practical experiences have long been present here on the level of utilities information systems, particularly when it comes to space planning management, as well as collecting rents, electricity bills, utility services and the like. However, the systems are not equally developed in all municipalities or towns, some do not even exist or function when physically separated, so it is necessary to set them up (where not existing already) and integrate them.

Therefore, the major aim of this paper is to point out the importance of DIS building and its possible concept.

2. Problem analysis

2.1. Information system

Building an information system is an extensive and complex¹ job where it is not possible to envisage and plan every single part of it. It has to be built gradually, every suggested solution has to be tested in practice, which means that it has to undergo all the criteria for its implementation in the most sensible solutions leading towards final goal. Solutions should in particular be brought into line with the users demands and needs, in order to support its maintenance and further development.

IS should never be regarded completed, closed and absolutely defined. Functions which manage any human activity can never be fully formalized. This is why IS requires a continual work and an orientation towards supplying users with needed information.

Information system should not be static, but dynamic, adaptable and capable of fast development, organized in such a way as to always be updated, having the possibility for constant extension and improvement.

From the practical point of view, among others, the IS building is influenced by machines, programs, staff and the needs of users for data and information acquisition. The first three elements are becoming less critical and are not considered to be limitation factors, because, generally speaking, today we have at our disposal adequate machines, program solutions and expert staff. However, the users' needs for data and information acquisition are ever present and demands change frequently. This is what makes tackling these issues probably the most delicate part of every information system.

2.2. Territorial structure and information system

The Republic of Croatia is made up of districts which consist of towns and municipalities. A district, within its self-managing domain, coordinates interests and undertakes activities which serve the purpose of its complete and even economic and social development, and development of towns and municipalities within its territory. Towns and municipalities, as the basic units of local self-government, are entities which directly influence the turn of events on its territory (Official Gazette

¹ M. Varga in his paper "Information System Phases" (Infotrend, 43/2/1996) points out that information system designers are "faced with numerous problems, such as vague directing of business system, high degree of business system change, conflict demands upon information system, insufficient management support to information system, fast development of information technology, inability to express what they specifically want an information system to do, for the users' part, i.e. ignorance of the information system utility, difficulties in communication between a designer and a user of an information system, etc."

of the Republic of Croatia, No. 90/93 and 117/93), they are responsible for determination of development guidelines in accordance with its competence and possibilities².

By organizing local government and self-government, it is possible to solve all sorts of questions including development of market economy, rational and efficient use of district, town and municipality demographic, space and production potentials, as well as more complete providing for both material and immaterial needs of citizens, building and establishing both organization and functions of in- district, in-town and in-municipality relations adequate for the activities of market system, questions of urban facilities development, environment protection and the like. In conditions of decentralization, local government and self-government has not only a local political and administrative function, but has ever growing importance in the development of local economy and social activities.

On the level of local self-government some specific questions of development are defined, listing of concrete goals of development is made, but also identification of different instruments of different policies which could enable the realization of these policies.

District, town and municipality structure is extremely complex, open in relation not only to the national but also the broader environment, which is multidimensional and multisectoral. District, town or municipality management problem is further made more complicated due to interweaved systems of horizontal- interdimensional and intersectoral competencies.

The majority of experts who are involved in questions of managing the district, town or municipality development, or are involved in the development itself, prefer the so called integral management concept, which requires the establishment of integral information system (Grčić, B., A. Munitić, 1995).

Optimal solutions are searched for in solving all the problems. Complexity of life situations demands taking into account all the relevant facts and data for decision making. It is unfavorable to carry out analyses, forecasts and make decisions without considering a sufficient number of quality data and information. World experiences lead us to believe that computers can successfully encompass jobs in units of local government and self-government and that they are made efficient and effective by the information systems, because:

- * ULGS communicates with a large number of "clients" in solving operational questions;
- * majority of ULGS services (within one or more levels) operate independent of each others and do not exchange the disposable data or information;

² The district territory "covers" the following: general government, culture and technical culture, media, sport, employment, health care, social welfare, statistics, economy, property- rights affairs, traffic, planning and protection of environment, land registry and surveying office, etc.; towns and municipalities, on the other hand have authority over utility services, certain social activities, space planning management etc.

- * presence of multiple gathering, processing and updating of the same data and information;
- * ULGS always uses data and information that have been gathered, recorded, systematized, processed and published;
- * ULGS disposes with a large number of unprocessed data etc.

The way the present practice of ULGS operates is unjustifiable and irrational, it is too costly and hinders the work. If data and information are gathered, processed, used and stored for one area of government and self-government, then they should be at other services' disposal, too. It is a great work improvement enabled by IS.

3. District Information System

3.1. Aims

The essential aim of DIS is to ensure the effective and efficient functioning of a process which stem from self-government of a municipality, town and district. Municipality and town within self-governmental domain:

1. ensures the conditions for development of economic, social, utility and other activities of importance for the municipality area,
2. ensures the conditions for space development and urban planning as well as protection of human environment, if not stipulated otherwise by the law,
3. takes care of housing estates planning, quality of housing, utility objects, operation of utility and other services, along with the local infrastructure, if not stipulated otherwise by the law,
4. provides for the needs of local residents in the area of childcare, education, public health care (surgeries, community health centres, etc.), medical protection of animals and protection of plants, social welfare, culture, physical culture and sport, unless stipulated otherwise by the law,
5. manages the municipality properties,
6. founds public institutions and other corporate bodies, in accordance with the law, in order to meet certain economic, social and other social interests and needs of the society,
7. regulates other questions in accordance with the law.

Certain jobs can be transferred to the district.

Within its self-governmental scope of activities, a district does the following:

1. coordinates interests and undertakes activities to enable an even economic and social development of municipalities and towns as constituent parts of districts and district as a whole,

2. coordinates the municipality and town views on questions within the state authority in the Republic of Croatia, i.e. coordinates settling of questions of common importance which are within the municipality and town organs authority, being parts of district,
3. coordinates certain conditions of planning and protection of district space, if not otherwise stipulated by the law,
4. coordinates development and network of educational, cultural, health, social, utility and other institutions and objects, infrastructure important for the whole of district, if not otherwise stipulated by the law,
5. does the jobs which municipalities and towns have transferred to the district,
6. founds public institutions and other legal entities, in accordance with the law, with the purpose of reaching common goals for municipalities, towns and district as a whole,
7. settles other issues of a common interest for municipalities, towns and the district as a whole, in accordance with the law (Official Gazette of the Republic of Croatia, No. 90/92).

This means that DIS has to do two basic functions: on the operational level, to ensure efficient dealing with "clients", and provide the bodies of local government³ and self-government with data and information to facilitate the smooth task performance in its scope of activities.

3.2. DIS building and development strategy

Strategists in general, and in this number strategists in building and development of information systems, have at their disposal a number of instruments which can be used in order to present the links between the decisive variables determining strategic choices. In order to systematize these choices TOWS⁴ matrix is recommended: "T" stands for threats, "O" stands for opportunities, "W" for weaknesses and "S" for strengths (Wehrich, H., H. Koonz, 1994). It is a conceptual frame for systematic analysis which facilitates a comparison of external threats and circumstances with internal weaknesses and strengths of organization, which, in this case are the units of local government and self-government where the IS is being set up (figure 1). The factors shown in the TOWS matrix refer to the analysis of the present moment of DIS set up.

SO strategy means maximum use of external opportunities and internal strengths. This could refer to some of our towns and municipalities, particularly larger towns. ST (maxi - mini) strategy could be applied in most towns and municipalities because

³ ULGS are representative as well as executive bodies. Municipal and town council respectively belong to the representative bodies, while municipality head, town mayor and district prefect belong to the executive bodies. Municipality, town and district authorities are responsible for local government and self-government affairs they have been entrusted with. (Off. Gaz. 90/92, pp. 2184-2185).

⁴ More about it in Wehrich, H., H. Koonz (1994): Management, 10th edition, Mate, Zagreb, pp.174-177.

the aforesaid external threats are narrowed, however, to a limited area, particularly with regard to a telecommunications network.

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|--|---|--|
| <p><i>Internal factors</i></p> <p><i>External factors</i></p> | <p><i>Internal strengths (S)</i></p> <p>Awareness of a need. Personnel competence. Motivation.</p> | <p><i>Internal weaknesses (W)</i></p> <p>Finances. Conditions of work. Hierarchical dependency.</p> |
| <p><i>External circumstances (O)</i></p> <p>Area defining. Authority defining. Positive world experiences. Necessity of IS establishment. Information technologies (IT). Personnel competence.</p> | <p><i>SO strategy: maxi-maxi</i></p> <p>Systematically, with competent staff and adequate IT, to set up an IS for effective and efficient performing of all processes stemming from the authority in a certain area, using motivation and positive world experiences.</p> | <p><i>WO strategy: mini-maxi</i></p> <p>With limited finances, spatial conditions of work, hierarchical dependencies, with adequate IT, competent staff and positive world experiences, to set up an IS for effective and efficient performance of certain processes within the authority of a defined area.</p> |
| <p><i>External threats (T)</i></p> <p>Credit (financial) funds. Telecommunications network. Decision making system.</p> | <p><i>ST strategy: maxi-maxi</i></p> <p>Aware of the need, motivated, with competent staff, systematically set up an IS maximally utilizing finances at disposal, respecting limited opportunities of TC network and disadvantages of decision making system.</p> | <p><i>WT strategy: mini-mini</i></p> <p>With financial means and business premises at disposal, having respect for the limitations of TC network and hierarchical dependency with decision making, to set up some part of IS.</p> |

Figure 1. TOWS matrix of DIS

The WO (mini - maxi) strategy could be applied to a part of newly established units of local government and self-government. This seems to be logical, because their introduction in the system requires time and certain funds, so it is possible to approach this process of IS establishing gradually.

Although fewer and fewer, there are still units of local government and self-government which, along with a number of limitations, have to accept the WT strategy (mini - mini). They are loaded with an array of difficulties and a degree of development of a larger area does not seem to be accessible.

3.3. Conception of DIS building

Creation of DIS conception requires solving numerous dilemmas, such as: what sort of IS establishment is desirable, the structure of data and information that should be encompassed, what organizational and technical conditions should be met by certain services, and how to shape IS regarding both organization and technology⁵.

Experience shows that the main condition for IS realization is the thorough work out of its conception, with clear organization characterized by flexibility and phase building.

In accordance with the aforementioned, DIS has to be grounded on the following principles:

- * **COMPREHENSIVNESS.** DIS has to encompass all the business processes in the district, town and municipality.
- * **MODULARITY.** The whole of DIS has to be structured modularly. Each module consisting of a set of program solutions (software), machine and communication equipment (hardware) and corresponding personnel and organizational demands, covers a particular segment and can function independently of other modules. Arranging the modules in accordance with desires, needs or possibilities, we build a unique information system.
- * **QUALITY AND RELIABILITY.** DIS has to provide high quality and reliability of flow, processing, storing, protection and distribution of relevant data and information.
- * **OPENNESS.** DIS has to be open in questions of choice of machinery, communicational and program equipment. This understands the choice of different producers' equipment. Applicational solutions should ensure exchange of data with solutions from other producers.
- * **ADAPTABILITY.** Through parametrization of certain system elements, DIS should enable them to adapt to different types and town and municipality sizes, to different types of their structure. In other words, the system has to be open from the organizational solutions point of view.
- * **OPENNESS TO DEVELOPMENT.** DIS has to have a possibility to be permanently improved and extended, under the influence of organizational, technological and legal changes.
- * **REQUIRED STANDARD.** DIS has to deliver data and information which meet numerous requirements and standards defined by law, decrees, decisions, acts, instructions, recommendations etc.

⁵ Tenders are invited in media to bid for informatization of a town, municipality or a district. E.g. "Glas Istre" of 9th June 1996 stated detailed conditions to be met by tenders for supplying information equipment, operating supplies and services. The following are considered to be services: design and consulting in the area of utility services and geographical information system, different programs, machines etc. In more detail on page 26 of the aforementioned paper.

- * COHERENCE. DIS has to act as a network which links municipality and town information systems into information systems of district bodies, ensuring at the same time their independent activity, work and decision making.
- * ECONOMY. DIS has to be economically justified and its costs should not exceed the total cost of an independent system operation.

Information flows should be regarded as important, just like material, energy, staff and others, due to their influence on management, planning and social development monitoring. Storing the data at the very place of their emergence as well as their linking, reduces the work of certain departments to a great extent, particularly where the data are gathered, updated and stored routinely.

Choosing the methodology of process informatization should be based on one's own as well as others' experience in analysis and design of complex business information systems. This is why it is of particular importance to observe the following viewpoints:

- * The process should be informatized as a whole, not from aspects of certain jobs or procedures.
- * Informatization should not be adapted to an existing organization of an institution in the district, town or municipality. On the contrary, it should be carried out solely as a function of a business process.
- * The users' need of data and information is directly dependent on optimal process functioning and serves as a basis for determining on the degree of informatization.
- * It is necessary to determine and carry out the principles of clear distinction between responsibility to gather, process, store and deliver the data and information.
- * In the informatization process none of users should be favoured (citizen, government, company etc.), only modernization and process improvement should be given a priority, because this is how the requirements of DIS participants are best met.

The aforementioned viewpoints will become more purposeful if all the structures of a district, town or a municipality are involved in DIS building. Their involvement will inevitably facilitate the necessary changes, in accepting the modern technology as well as in avoiding doing the same (or similar) administrative jobs in different units of organization. This approach ensures effective realization of DIS building and development, but also avoids mistakes in DIS design and analysis. For example:

- * insufficient knowledge of aims and processes which help achieve these aims,
- * insufficient involvement of structures outside informatization,
- * deviation from accepted and agreed upon principles, etc.

DIS building is a long term development program which stresses the importance of management, planning, decision making and performing everyday routine jobs on all levels of a district, town or municipality. That is why work coordination of all

participants is a significant premise of DIS functioning as a whole. It provides for its:

- * dynamism,
- * self - organization,
- * complexity,
- * multi-discipline approach (Marić,1986).

DIS conceived in such a way offers the possibility of various combinations in the use of data and information which were obtained and updated through certain services, i.e. every single demand for an information can be fulfilled. The use of information system database conceived in the aforementioned way, is of purely technical nature. However, it is necessary to point out that the suggested conception cannot be literally carried out, because part of the data and information that are used in the information system, refer to an area outside its spatial boundaries. The solution lies in linking DIS into an information system of the state and even outside it (e.g. data about real property holders outside the district).

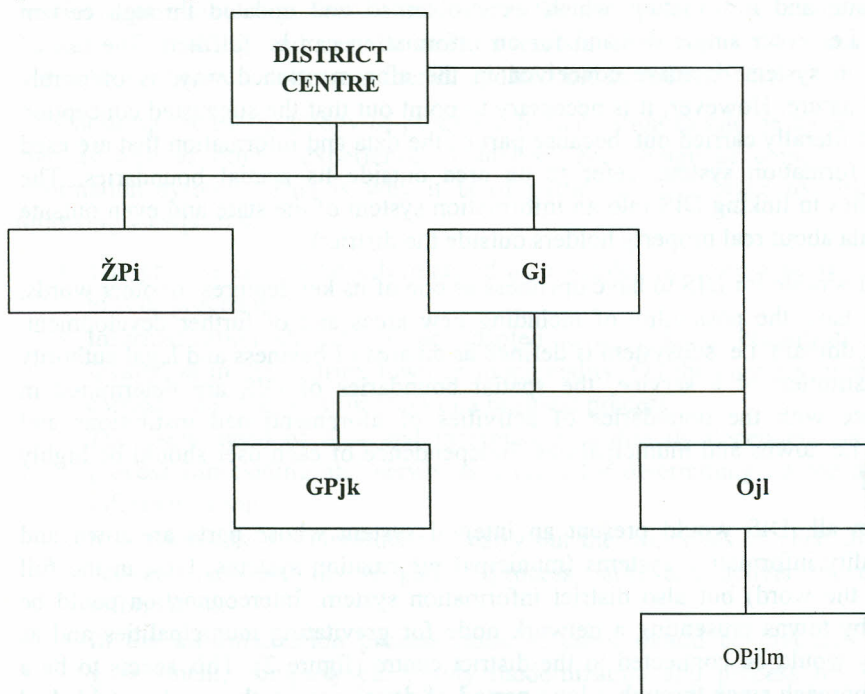
It is desirable for DIS to have openness as one of its key features. In other words, it should have the possibility of including new areas and of further development. Since the domain, i.e. subsystem is defined as an area of business and legal authority of an institution or a service, the spatial boundaries of DIS are determined in accordance with the boundaries of activities of aforementioned institutions and services, i.e. towns and municipalities. Independence of each user should be highly respected.

All in all, DIS would present an integral system whose parts are town and municipality information systems (municipal information systems, UIS, in the full sense of the word) but also district information system. Interconnection could be ensured by towns presenting a network node for gravitating municipalities and as such they would be connected to the district centre (figure 2). This seems to be a logical approach since through a long period of development, the newly established municipalities used to be territorial parts of our present - day towns, and all the roads led into them. A large number of present municipalities have only recently created the minimum of conditions of work so that majority of jobs connected with data and information, are done by their former town centres.

In order to be able to work properly from the very beginning, there has to be a plan for development of DIS as a whole and all its parts (town and municipality UIS). The plan⁶ has to envisage solutions to all the organizational, program, technical and personnel questions.

⁶ M. Pavlič in his article "Shortcut Leads to Abyss" (Infotrend, 43/2/1996) says that "information systems design actually means finding a relevant model of real system. Designed information system model serves as a basis for building the information system. Information system model consists of three important views: data model, process model and resources model. An information system itself consists of data, processes (programs) and resources (equipment, people and organization)".

The conception of most existing information systems is still based on centralized processing with the use of remote terminals (computers). However, in this case, to achieve the aims of DIS, the network seems to be more appropriate. UIS and IS of district bodies create and use their own databases and data files respectively. Through the network the required data and information are placed at disposal of other participants in the system. Thus the set conceptual principles are achieved. Likewise, functional integration⁷ enables reduction of the decision making and problem solving time.



Key:

- ŽPi - Processes in the district centre
- Gj - Town information centre
- GPjk - Town processes
- Ojl - Affiliated municipality information centres
- OPjlk - Municipality processes
- i,j,k l,m = 0, 1, 2, 3, ...

Figure 2. District information system network

End user will be more satisfied because data and service from the system will be at hand: more direct, faster, more reliable. Communication between DIS participants

⁷ V. Strahonja in his article "Information Systems for Town Managing" (Varaždinske vijesti, of 16th Apr. 1997, p. 17) talks about possibilities and importance of functional integration of complex spatial information systems needed for town management.

will be technically solved in such a way that numerous functions will be invisible to them, in order to realize the communication despite the difference in levels of equipment, i.e. programs. In this way, the subsystems, with their terminal stations (computers), become subjects of local information systems, with an array of distributed processing for users. The concept of computer network makes possible the selection of a place for data processing (centralized, decentralized) in accordance with the functions of centrally data processing concept, but also in accordance with the functions of distributed data processing.

As a rule DIS is very comprehensive, so it is necessary at the beginning to define its contents. Analysis has to be carried out, then selection, but also boundaries in all the areas of data processing have to be defined. DIS consists of active and passive systems. Passive system is used for storing data, information and documentation for later use. The function of active system is instant support of work of certain services (institutions). Active information system uses data from an operational level and structural data respectively. What is meant here are various registers, receipts, certificates, decisions, information notes and other.

DIS contains various organizational and program solutions, arranged in such a way that data can be used individually and in groups. DIS has to have at its disposal updated utilities which refer to procedures of system functioning. They can be in the form of catalogues, registers, directories and other. They instruct us about the links which can be established between the systems and give us the codes of all DIS participants. Here we can also find a number of lists of addresses, some data and information, lists of special records, aggregate data as well as a list of program methods which are used in the system.

DIS has to be conceptually built as an entity, but all its subsystems (town and municipality UIS) and interlinking are to be defined. DIS and UIS need to be built modularly i.e. it has to be possible to connect new subsystems at any time, or some of the systems may become subsystem of the other system. Thus DIS becomes a system of communication where organizational units store and put at disposal adequate data and information for certain jobs. In this sense, one IS can be used for each process. Data and information are gathered at places where it is easiest to compile them i.e. at the place where they are originated.

For this reason the following kinds of processing have to be provided within DIS:

- * processing at computer operating system level,
- * distributed processing within computer network,
- * remote interactive data processing.

4. Conclusion

The Republic of Croatia has structured its territory through districts which consist of towns and municipalities. Districts, towns and municipalities as units of local government and self - government have their authorities and obligations. In

order to achieve their effective function, information systems have to be set up as soon as possible.

District information system (DIS) has to be designed as a networking integral system whose constituting components are town and municipality information systems (UIS). This is an open system and it has to be built modularly. DIS and UIS support the processes in its area, ensuring independence of all the subjects in their activity.

The limitation factors which appear in information system set up, are not technical or technological solutions, and neither are the staff. Problems are linked to their organization and decision making about their establishment.

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Received: 1997-08-15

Šehanović J., Žugaj M. Županijski informacijski sustav

Sažetak

Uspostavom suverene nezavisne Republike Hrvatske izgrađen je njen novi teritorijalni ustroj: općina, grad, županija i država. Za funkcioniranje teritorijalnih jedinica vrlo važna je uspostava informacijskih sustava. Na tom planu postižu se dobri rezultati na razini države (vojska, policija, porezna uprava, razni fondovi, gospodarske asocijacije, banke i dr.), ali na razinama lokalne uprave i samouprave ti rezultati su vrlo neujednačeni. Zato je osnovni cilj ovog rada ukazati na važnost izgradnje županijskog informacijskog sustava i njegovom mogućem konceptu.

Ključne riječi: Županijski informacijski sustav, komunalni informacijski sustav.
