

Referential Information Systems as a Source of Architectural Design Solutions in P.R.S. Method

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The paper presents the work on planning procedures improved with basic information technology mechanisms. These procedures are extended according to P.R.S. method, containing three main elements: planning, references and seminars. The focus is on references to show four different appearances of referential data. Paper snapshots the theoretical background of reference, its methodological implementation with computer techniques support, practical formulation, collecting and composition of reference and finally the impact, references can have on architectural design solutions.

Keywords: *spatial planning, planning methods, GIS, CAD, spatial references*

Theoretical basis of the P.R.S. Method

Architecture and planning are two coexisting domains. Architectural solutions cannot be defined without understanding the spatial context and the harmony of spatial planning cannot be achieved without the quality of every single design made in selected area. However it is often observed that these mentioned domains go separate ways and discordance appears when investments results are confronted with planner's assumptions.

Under the P.R.S. method, the planning procedure is composed of three principal themes, i.e. the P, R and S elements. The "P" content is the procedure and the process of planning itself. It is intended to be enhanced by GIS technology, CAD referential material and spatial visualization. The "R" for references points out the field where terrain information is gained also with the aid of digital tools. It consists of spatial structure analysis, architectural typology examination, landscape studies and others. The "S" is for seminars, which become additional source of information gained from inhabitants and involved institutions. The inquiries, as one of these, are acquired and processed in according to gain data (Barelkowski, Fryndt, Halaburdzin and Ratajczak, 2000).

The structure of the method also assumes that the method will be implemented in three stages. The assumed stages constitute a conceptual design of the plan, comprising supplementary activities (stage 1), the analytical phase including proposals for spatial solutions (stage 2), and the final recording of the plan including any corrections and additional reports (stage 3).

P.R.S. (plans+references+seminars) method has been implemented as in several planning procedures in order to bring architecture and planning back together. Several aims have been determined to achieve through this approach to planning process. It was invented to improve that process as well as planning procedures while current legislative regulations (in Poland) seem to be insufficient and unsatisfactory. The method includes additional referential research to recognize the specificity of planned area as well as other locations that are in context of the subject. This is combined with multidisciplinary analysis of environmental, social and economical trends in the location to approach the best planning solution that may ensure sustainable development. The more, the method serves as a platform to recognize inhabitants expectations,

preferences and to educate and convince local society on importance of spatial development.

An essential problem is to be solved to get practical results – limited funds that may be spent by local governments (e.g. county council and board) for spatial planning and spatial management purposes. While it is necessary to use computer aided architectural design and planning tools, it often appears to be too expensive to build complete spatial information system (SIS) for local tasks. Therefore P.R.S. method was developed using basic and simple software solutions. To secure the inflow of information that is crucial to maintain spatial database actual and to conform to the conditions, that many participants and users of the system still are unable to use information technology (IT) properly, P.R.S. allows involving non-digital ways of collecting land data as well. Of course, its full potential can be benefited only when using advanced IT solutions.

Whole research program concerning the method was focused on its effectiveness and ability to be implemented easily in practice.

References in P.R.S. Method

When plan and its concept determine the parameters of spatial management of an area and seminars play the role of dialogue platform between the designer and his consultants (including local society) the references become the basis for all analytic questions. The work on references is proceeded different ways – through collecting data from the site photographic, cartographic, environmental, by inquiry (that corresponds also to seminars, namely their results), collecting civilization and historic information from the area as well as from the region, analyzing existing information on nature, fauna and flora, recognizing the existing potential of an area in the terms of economic and social activities, finally through compiling all this data and pre-designing synthesis. It is done according to what Battle and McCarthy say on working with all civilization and natural elements present in the planning area (1997).

One of wide range of important aspects is focusing on architectural form. This form as a permanent element of spatial environment, its quality is well known to influence strongly human life conditions, including social and psychic comfort. To receive adequate parameters of space through planning process one must involve detailed research on spatial and architectural typology of an area. The intention of P.R.S. method is to create spatial background for human activity (Barelkowski, 2001), not only legislative regulation to issue administrative decisions on local investments. Multidisciplinary character of referential database offers good possibility of understanding spatial transformations in local environment and the meaning of quality, especially as it comes for administration personnel, responsible for control, executing spatial law regulations and issuing official decisions.

Table 1 shows a comparison between common basic planning tools and basic IT mechanisms used in P.R.S. method. All steps specified in the right column refer to, what was said above, simplified computer support of spatial planning and management.

Every referential element plays its role in process of improving both planning solution and architectural solution (which often follows the first one, but sometimes after large span of time). It appears to be necessary to use those references in order to understand and create sustainable environment of human life as Peski (1999) comments.

References in practice of planning process

Current law regulations state that the plan consists of its text or legislative part (an act of local law) and of its graphical representation – a drawing – as annex. The common composition of text disables the possibility to update the plan easily according to structural and functional changes in an area. It often precludes (in Poland) the process of execution good quality of architecture.

First implementation of P.R.S. method was realized during planning procedures in small village

Go to contents 17

Table 1. The comparison of selected references in common and P.R.S. planning procedure using basic IT mechanisms

Planning procedure content	Basic tools (non-digital)	Extended tools (partially digital)
<i>Stage 1</i>		
Spatial analysis of contextual areas	<ol style="list-style-type: none"> 1. Photographic documentation of important contextual locations 2. Analyzing and/or acquiring existing various area documentation (e.g. infrastructure, environmental plans etc.) 3. Visits to the area 	<ol style="list-style-type: none"> 1. Acquiring digital maps for GIS platform 2. Analyzing and/or acquiring existing various area documentation (e.g. infrastructure, environmental plans etc.) – preferably digital 3. Digital photography – raster image database of locations, buildings, details etc. 4. Satellite or aerial photo documentation (raster images) 5. Visits to the area
Analysis of economic trends in planning area	<ol style="list-style-type: none"> 1. Statistic and informal acquiring of information 2. Important budget or economic decisions that influence or may influence planning area – analysis 	<ol style="list-style-type: none"> 1. GIS analyses 2. Important budget or economic decisions that influence or may influence planning area – analysis 3. GIS platform spatial simulations
Analysis of Analiza trendów dominuj_cych	<ol style="list-style-type: none"> 1. Demographic information (e.g. migrations, social profiles etc.), environmental data, area access information, accesses to functions and their possible locations from administration resources 	<ol style="list-style-type: none"> 1. Demographic information (e.g. migrations, social profiles etc.), environmental data, area access information, accesses to functions and their possible locations from administration resources in form of a database or database reports, queries etc. 2. Social and environmental trend simulations
<i>Stage 2</i>		
Typology analysis	Drawing and photo documentation – the typology of buildings with various functions	CAD drawings, digital photography – the typology of buildings with various functions
Referential database	Text/graphic documentation	Relational database with graphic additions or registers (raster or/and vector files)
Traditional and regional architecture definition (in context of planning area)	–	–
Consultations	–	The exchange of data on selected software platform
<i>Stage 3</i>		
Referential database expanding	Methods of updating text/graphic documentation	Ev. converting into more advanced relational database

Rakownia, county Murowana Goslina. Current population is over 300 inhabitants. The village is situated in the limits of protected landscape park – Zielonka Forest complex that became very attractive and is now under immense pressure of settling

processes. New spatial regulations had to take into account extended number of inhabitants (over 1200). Precious environmental resources had to be preserved and the future expansion of built-up area directed, preferably towards the local center, Murowana Goslina town.



Figure 2. Typical traditional building from early XX century and its simplified 2D CAD representation.

architectural form stripped from everything, what could be connected to tradition, 1990-present, when variety of formal solutions had been realized. A representative selection of buildings from every phase was measured and recreated in 2D form in CAD application (AutoCAD was chosen as the most popular CAD platform in Poland) (fig 2).

This data is compiled in a database, which becomes a source of spatial information for county and district administration (who are issuing individual decisions for investments), for clients and investors,

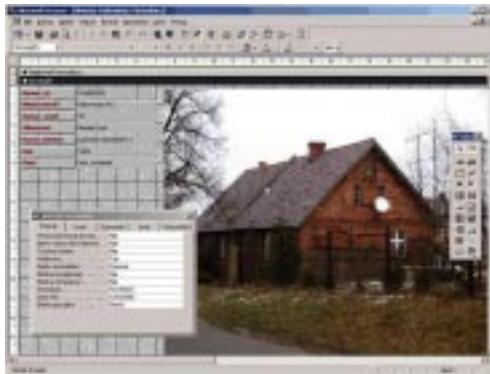


Figure 3 (left). Exemplary record of selected building.

for designers. It becomes as well a source of supervision. Database contains all crucial information on plots, buildings, environmental questions, even it may serve as a source of information on energy consumption, type of economical activity if applicable etc (figs 3 & 4).

Reports are generated to determine the average parameters of different types of buildings and to create the preferred typology for spatial clusters and architectural objects. The tables and simple proportional drawings are added as a design guideline accompanying administrative acts and decisions. This game of architectural forms can be possibly identified as a result of similar analyses presented by Mitchell (1990).

Case study – architectural design process based on references in practice

The influence of referential resources has been verified in first small-scale investments. Detailed background prepared during planning process and open to public (also for architects, to whom these additional documents are addressed particularly)

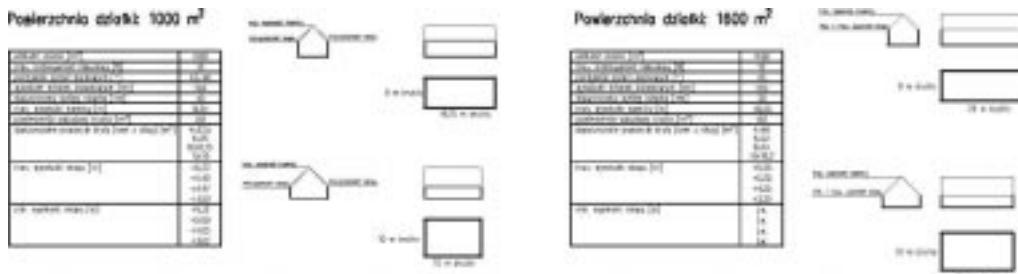


Figure 4. Fragment of one of *.dxf files with 2D definitions of spatial parameters.

creates new designing conditions and new standards in the meaning of social expectations.

In order to verify efficiency of the P.R.S. method several design processes were initiated. According to regulations and specification included in references, exemplary design of farm complex has been issued.

The plot was 0,78ha, with formulated program of three main volumes: house, technical building and small stable. The task was to combine these volumes according to traditional farm structure, to fill vacant plot with contextually well fitted buildings and to design combination of old and new architectural details. In order to fulfill both expectations of investor and determined spatial conditions a series of researches and design approaches have been taken. First, the spatial typology of street-type village has been examined and the location of three buildings stated. Second, relationship between volumes was defined, basing on descriptive parts of planning references as well as photographic documentation. Finally the volumes were decided, following strictly the intentions and instructions of planners.

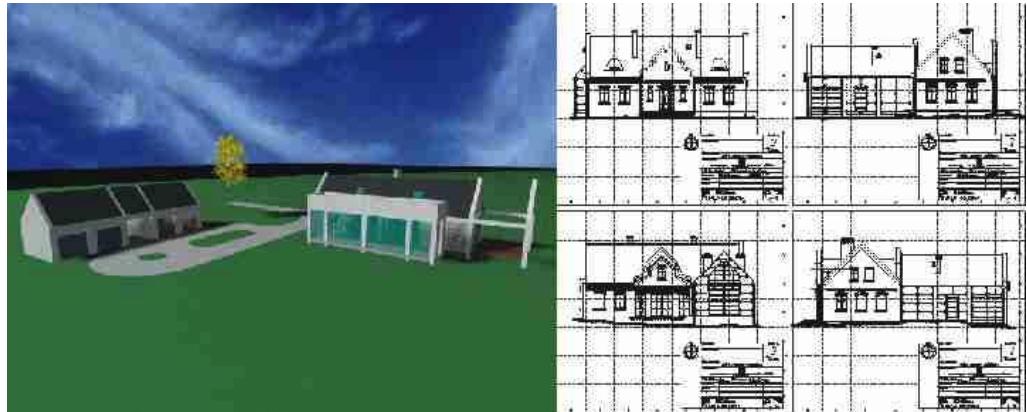
The composition of architectural form and farm structure has been based on 2D material (*.dwg CAD files) that provided the guideline to insert new investment properly in the environment. Then the formal design used rendering techniques to examine alternatives and formulate final solution. The concept

assumed that the house will be divided in two parts, first in old, conservative manner, similar to typical, regional building with masonry details, second also in traditional volume, however in modern material, contrasting proportions of windows and doors (fig 5).

Conclusions

Remarks presented above are just glimpses of larger research done while working on the P.R.S. method. They illuminate four different scales of problem of references, starting from theoretical and ideological premises, through conceptual construction of mechanisms, practical introduction of referential data in planning work and finally the effect references can have on architectural design. The authors of P.R.S. method are conscious of great gap between professional GIS implementations with their positive impact on spatial management and “improvised” quasi-digital data processing system. However facing few problems – limited administration funds for applying GIS, level and quality of human education in IT, costs of digitizing maps, ability to use both platforms CAD and GIS professionally – they were led to propose the initial step in developing spatial planning and management information systems. It seems to be apparent that references and all documentation prepared while working on the P.R.S. had great influence on architectural shape of most buildings

Figure 5. Preliminary concept for farm complex and final design solution for house.



[Go to contents 17](#)

designed meanwhile, after the plan was initiated as law regulation. It may become a great chance for countries similar to Poland, where planning problems are still underestimated.

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