

## **HOW TO DEFINE REAL ESTATE: 2D OR 3D? LEGAL VIEW, CONDITIONS AND EXPERIENCES IN THE CZECH REPUBLIC**

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### **ABSTRACT**

Cadastral professionals have now discussed unambiguous determination of cadastral subjects as a phenomenon describing a matter of legal relation to real estate. Till the present time 2D geometrical definition has mainly been adopted almost all over the world. In case of non-typical building complexes, this 2D determination could be not efficient. For this reason, 3D expression has been rather taken into account in order to have a better way to ensure owner's rights.

Submitted paper discusses two main examples having entirely different solution. The question if 3D determination of a cadastral subject is necessary or is not will be mentioned as well. The problem how to define real estate, especially buildings, is very closely related to the contemporary legal frame of every individual country. The following text shows the possibility how the situation is in the Czech Republic looks like.

### **INTRODUCTION**

Every state administration should have to ensure an undisturbed performance of the owner's rights to real estate. The ability to fulfil this task shows how well the society has organized its legal base in this area.

Firstly, the subject of legal relations must be exactly defined not only in the Civil Code but also in land law as well.

In many countries of the European Community, the proper principle „superficies solo cedit“ has been applied dealing with real estate. Using this principle in a legal practice make all procedures more simply. Unfortunately, in our country, this proven principle was cancelled at the beginning of a communist government in 1950. It generally means that building is not a part of a land parcel where a building is standing. That is why a special regime of land registration has to be adopted. So, land parcel and buildings are individually registered and for both groups the owner's rights are separately considered and also registered. Sometimes, we can see that building and corresponding land parcel have a different owner.

Land parcels and buildings are subjects of legal relations to real estate in accordance with our Civil Code because just these subjects are defined here. As a subject of legal relations registered in cadastre of real estate a land parcel or residential building has to be clearly, understandable and exactly determined. In conformity with the Cadastral Act No.344/1992, flats and non-residential units inside a building are additional elements, which could be registered in the cadastre. Moreover, these additional elements and buildings can be in a process of construction as well.

In the following text, both buildings and flats will be discussed from technical and legal point of view.

### FLAT AS THE SUBJECT OF LEGAL RELATIONS

In the Czech Republic the following approach has been used to solve the issue of flats or non-residential units. Quite generally, every individual flat (or non-residential unit) must be unambiguously identified. The amendment Act No.72/1994 lays down rules how such a subject must be determined. This Act sets that a detail plan of building commonly with numbering and precision description of flats has to be delivered as the enclosure of documentation, which is a technical base for the following registration of owner's rights to flats.

Notice that this procedure is only used in case when the owner of building would like to sell one or more flats into ownership of tenants. Here, it is necessary to define exactly location of dwellings in frame of the building. Often this location is expressed in a written form. Sometimes an appropriate chart of every storey completes it. From legal point of view this identification of subjects fits to our needs.

In opinion of the author there is no crucial problem how to define the subject here. An effort to apply the **3D approach does not contribute** to the better geometrical determination **in this case**. Besides, the Act 72/1994 does not require a definition of a flat by 3D geometrical determination.

This approach is very similar to the analogous legislation not only in many European countries but also in many countries all over the world.

## **BUILDINGS AS THE SUBJECT OF LEGAL RELATIONS**

Looking at the second basic subjects (buildings), a justification to use a 3D geometrical definition is more obvious. There are some important questions to be solved: Is our contemporary cadastre recognized as real land information system with all important characteristics? Does it mean that the conceptual model of the cadastre is able to solve the problem how to work with spatial data

### **„Pseudo“ 3D solution**

Now, let us pay attention towards cadastre, which can only handle data in 2D space. This is a case almost of all European cadastral systems because these systems were first of all considered as a technical background of land registration. From this viewpoint, 2D determination of buildings is quite sufficient for needed legal activities regarding these subjects. This assertion has a full validity when an arrangement of individual buildings is rather simple.

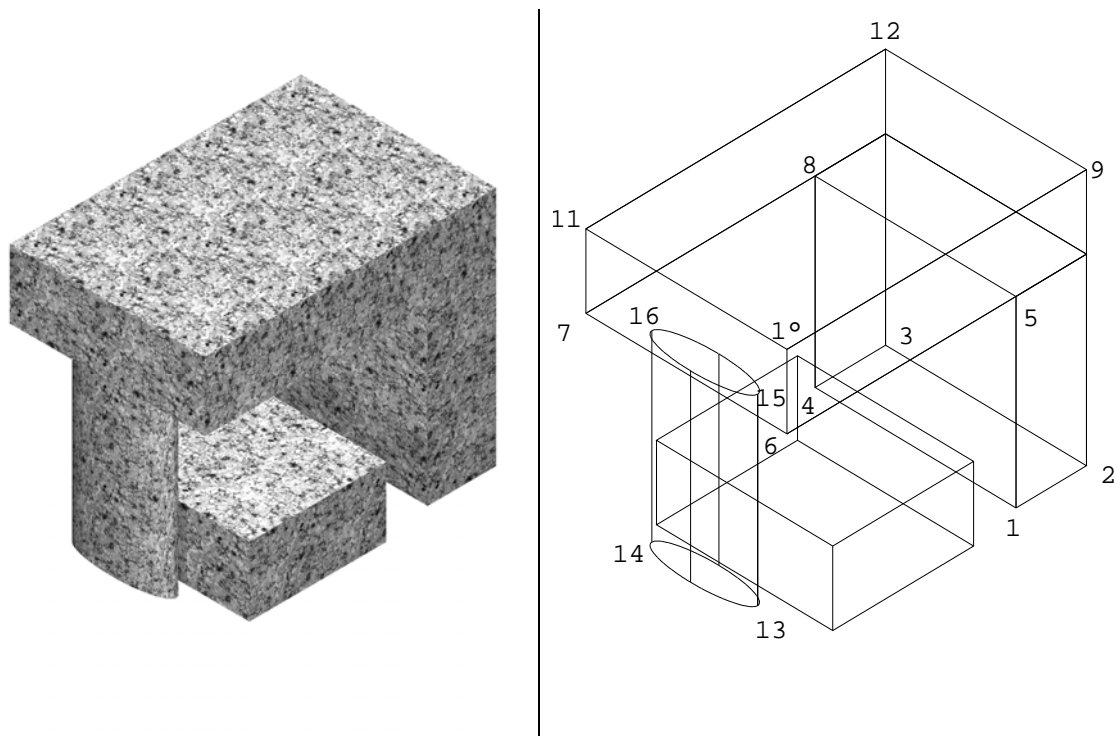
On the other hand, there are such building's complexes with a different mutual vertical position of buildings. So, looking from the bird's perspective, we are not able clearly identify single buildings. A similar problem occurs when we try to express the ground plan building's complex in 2D geometry. Sometimes, it is very hard to distinguish what are one-subject boundaries and what are second- or third-subject boundaries on the cadastral map.

Because of weakness of 2D geometrical definition of the subject, a verbal description or other geo coding elements have been added to define this kind of real estate. As geo coding element, the parcel number, the building identifier and/or a registration number and/or a code of manner of its using has always be applied.

But now, we have to find out proper solution for the contemporary 2D-cadastre, which fulfils requests for perfect geometrical determination of a building as the subject of a legal relation.

Suggested solution goes out from the valid Civil Code and the Cadastral Act No.344/1992. Taking into account corresponding paragraphs, no solution containing 3D geometrical determination is supposed in the cadastral documents. Therefore, let's put all needed data into so called "collection of deeds", which contains all basic materials serving to the land registration process (recording of owner's and other's rights in rem) within the our cadastre. When the new owner wants to establish a property right for a newly originated building (or land parcel), the deed of conveyance completed by a geometrical plan has to be delivered to the Cadastral office. And just into the above-mentioned geometrical plan, we can put the enclosure showing a space arrangement of buildings.

Figure 1 shows an example how the enclosure can look. A content of this enclosure satisfactory define considered property by the both, graphical and numerical expression.



Point	Y	X	H	Comment
1	711324.14	1039548.59	263.64	Ground
2	711316.39	1039549.72	263.99	Ground
3	711315.97	1039538.83	263.73	Ground
4	711324.96	1093538.27	263.33	Ground
5	711324.14	1039548.59	275.64	Sub view
6	711744.21	1039547.95	275.64	Sub view
7	711744.21	1039538.67	275.64	Sub view
8	711324.96	1093538.28	275.65	Sub view
9	711316.39	1039549.72	284.14	Roof
10	711744.22	1039547.95	284.15	Roof
11	711744.22	1039539.66	284.15	Roof
12	711315.96	1039538.83	284.15	Roof
13	711739.58	1039545.55	262.84	Pillar
14	711739.33	1039543.05	262.58	Pillar
15	711739.57	1039545.55	275.65	Pillar
16	711739.34	1039543.05	275.65	Pillar

Figure 1: Example of the enclosure to a deed of conveyance.

### 3D – Solution

The second solution goes out from 3D-conceptual model of a cadastral system. This model has to fulfil the requirements of the cadastral law not only from legal aspects but also from aspects of geometrical needs in order to exactly define the subject of legal relations. In the Czech Cadastral Act No.344/1992, there is no demand to define a building in 3D space, as mentioned in previous subtitle 2.1. For illustration, no underground buildings (garages, stocks, basins, tanks and so on) are registered in cadastral documents. Similarly, not even bridges are registered as an individual subject of legal relations. They are, of course, drawn in cadastral maps but only as the other elements of a map.

At the same time, the legal status of a new building is ensured by the approbation of the state organ of land planning. This approbation must be a part of the document delivered on cadastral office in order to record the owner's right to this building. New identification number of a building is one of results of performed approbation and latter it is added to cadastral data.

Note, entire documentation of building must contain construction parameters and an overall space arrangement. In conformity with the Cadastral Act, this identification and definition by 2D drawing in cadastral maps is suitable.

When we would like to handle spatial data describing buildings, it is possible to apply technology frequently used in GIS area. Solution of this problem can be divided into two basic aspects. The first aspect is a legal base and the second one concerns with geometrical and topological parameters of building objects.

As regards geometrical parameters, there is not a big technical problem, here. Determination of the third dimension could be perform by some of known methods (levelling, trigonometric determination, hydrostatic or barometric levelling, GPS method, photogrammetry). Issues connected with topological relations (connectivity, orientation, adjacency, containment) could be solved in both the vector and raster form. All activities about 3D tasks have to be performed within a large database system with an advanced software and hardware support. Only professionals on such database systems are able to exactly tell what is necessary to reach efficient and effective results.

### CONCLUSIONS

An answer on the question „how to define real estate – 2D or 3D“ depends on entire conception of the cadastral system. Because all these systems must reflect the valid legal base (mainly Civil Code) and related acts (cadastral act, building act, land planning act), the answer would be clear from this

viewpoint. 2D determination of buildings is suitable. But on the other hand, modern cadastral systems should be realized as a well-defined land or geographic information systems (LIS/GIS) being able to cooperate with other related LIS/GIS. Idea of a direct connection to other LIS/GIS or registers has been many times emphasized in proposals of the newly created cadastral systems. There is one serious obstacle making troubles to work in 3D space. A lack of three-dimensional data represents this obstacle in many GIS projects. In case of cadastral systems, there are no 3D data because they were not needed till now.

In my opinion, the biggest problem appears by a process of data capture. This is not technical issue but it is a question of financial support. Nobody will be able to ensure such a financial flow, necessary for the completion of the third dimension in case of residential or non-residential buildings.

On the end, the issue of 3D cadastre should be solved because we can assume step-by-step database filling. But once again, I affirm that the primary task of both the geometrical determination and presentation is exact and unambiguous definition of the subject as a matter of legal relation to real estate.

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