

# Revisiting the Concept of Boundary on 3D Cadastre in Indonesia

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**Key words:** 3D Cadastre, Boundary and Indonesia

## SUMMARY

The scarcity of vacant land in mega cities in Indonesia has led to the intensification of the use of the space. Such development has raised issues regarding the provision of legal assurance on the utilisation of space. In order to legally ensure the employment of particularly apartment unit, the Government of Indonesia (GoI) enacted Act no. 16 year 1985 regarding Apartment Unit, which was followed by the promulgation of the Governmental Decree no. 4 year 1988 as the derivative regulation of the formerly mentioned regulation. The Governmental Decree no. 4 year 1988 regulates the technical details on the implementation of the Apartment Unit Act.

Of the issues arose due to the latest space employment is the boundary of 3D object. Principally, the boundary definitions stated in the above mentioned regulations provide the easiness to identify the boundary physically. However, the representation of 3D object within the cadastral system would be problematic. As at the moment the 2D land registration with 3D tag is still employed within the registration of the apartment unit, it would even be more problematic to acquire the accurate representation of 3D object, as well as its link to the common properties.

In this paper, the proposed 3D object boundary concept is illustrated. Before defining the boundary concept itself, the concept of Spatial Unit Administration, which acts as the basis of the proposed boundary concept, is depicted. Moreover, the proposed 3D object boundary concept is portrayed further in this section. Last but not least, the advantages and disadvantages of the application of the proposed 3D object boundary concept in Indonesia are described.

# Revisiting the Concept of Boundary on 3D Cadastre in Indonesia

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## 1. INTRODUCTION

The scarcity of vacant land in mega cities in Indonesia has led to the intensification of the use of the space. The development of vertical constructions has not only allowed the utilisation of the Earth's surface but also the space above and/or beneath it.

Such development has raised issues regarding the provision of legal assurance on the utilisation of space. In order to legally ensure the employment of particularly apartment unit, the Government of Indonesia (GoI) enacted Act no. 16 year 1985 regarding Apartment Unit, which was followed by the promulgation of the Governmental Decree no. 4 year 1988 as the derivative regulation of the formerly mentioned regulation. The Governmental Decree no. 4 year 1988 regulates the technical details on the implementation of the Apartment Unit Act.

Moreover, the employment of the space in mega cities in Indonesia has gone beyond the scope of the Apartment Unit Act and its derivative regulation. Having lacked of the technical capability on the registration of 3D object, the registration of apartment unit in Indonesia has been applying the principles of 2D registration with 3D tag (Aditya *et. al.*, 2009: 1). This is particularly due to the application of the standard 2D land registration supplemented by the floor plan or blueprint of the apartment and the value of the unit in question, as stated in Article 38, 39, 40 and 41 of the above mentioned governmental decree.

Of the issues arose due to the latest space employment is the boundary of 3D object. These issues were arisen due to the definition of the right to apartment unit, which is further called Strata Title in this paper, as stated in Article 41.1 of Apartment Unit Governmental Decree, which states that each Strata Title is a bundle of rights comprises of right to possess individual apartment unit as well as rights to common properties such as parts of constructions, goods and land. The further technical definition of the boundary of the apartment unit, which is stated in Article 41.2, 41.3, 41.4 and 41.5 of Apartment Unit Governmental Decree, could lead to the violation of the right to personal and/or common properties. This violation could further lead to the insecurity of access to apartment unit, either from the legal point of view or implementation level.

In this paper, the concept of boundary within the implementation of 3D Cadastre concept in Indonesia is described and reviewed. The employed concept of boundary of 3D object and its consequences are portrayed in the next section. The alternate concept of boundary of 3D object and its consequences, which is offered by this paper within the scope of the enhancement of the 3D cadastral system of Indonesia, is illustrated in the 3<sup>rd</sup> section. Last but not least, in the 4<sup>th</sup> section further, the discussion on the future of 3D object boundary concept is depicted.

## **2. RECENT 3D OBJECT BOUNDARY CONCEPT**

### **2.1 Apartment Unit Boundary Definition**

As according to Article 41 of Apartment Unit Governmental Decree, there are three types of 3D object that is recognised by this decree. The mentioned article allows the registration of the apartment unit that is entirely bounded by walls, partially bounded by walls or completely bounded by imaginary planes.

As regulated by Article 41.3 of Apartment Unit Governmental Decree, the boundaries of the apartment unit that is entirely bounded by walls are the inner surface of the wall separating a unit with another unit, the lower surface of the ceiling of the unit and the upper surface of the floor of the structure. On the other hand, the apartment unit that is partially bounded by walls would be bounded by the previously mentioned objects and the imaginary plane that acts as the projection of the outer part of the wall within the section in question, as stated in Article 41.4 of Apartment Unit Governmental Decree. Finally, for the unit that is completely bounded by imaginary planes, the imaginary planes are the vertical projections of the lines that are agreed to be the boundary of the unit.

Principally, the above definitions provide the easiness to identify the boundary physically. However, the representation of 3D object within the cadastral system would be problematic. As at the moment the 2D land registration with 3D tag is still employed within the registration of the apartment unit, it would even be more problematic to acquire the accurate representation of 3D object, as well as its link to the common properties. The above mentioned statement is further explained in the next sub-section.

### **2.2 Impact of Apartment Unit Boundary Definition**

This sub-section illustrates the consequences of the above mentioned boundary definition. Due to the existence of different definitions on different types of apartment unit, different impacts of the mentioned definitions could be identified.

The definition of the apartment unit, which is completely bounded by walls, is mainly affected the possible actions that could be taken within the domain of the private and common property. As the boundaries of the unit are the inner surface of the walls, the lower surface of the ceiling and the upper surface of the floor, every action taken beyond these boundaries is considered to be done on the common property. Nonetheless, the wall itself is not defined as the common property. The regulation on the possible action that could be taken over such property is therefore not yet defined. Consequently, for particularly the unit that is directly linked to the well-defined common property, the violation of the individual right to apartment unit could be in place.

Article 41.4 of Apartment Unit Governmental Decree basically exposes the inconsistencies within the definition of the boundary of apartment unit, particularly which is partially bounded by walls. In the latter mentioned article it is mentioned that the boundary of such unit

include the vertical projection of the outer surface of the wall, which is directly linked to open space. The same article does not state the boundary of such unit that is not directly linked to open space. This leads to the assumption that the definition of boundary of unit, which is not directly linked to open space, would employ the definition of the boundary of unit that is completely bounded by walls. The application of two different definitions in this type of unit acts as the basis for such inconsistency. Nevertheless, as the thickness of the wall is mostly defined in blueprint or floor plan, the detailed spatial representation of 3D object with such inconsistent boundary definition could hardly be acquired.

Moreover, the definition of boundary of unit that is entirely bounded by imaginary planes indeed provides the flexibility on defining the boundary of apartment unit but, on the other hand, creates inconsistency within the definition of the boundary of such unit. As mentioned in Article 41.5 of Apartment Unit Governmental Decree, the boundary of such unit is defined based on the vertical projection of the agreed boundary line in accordance to the use of the unit. Principally, the blueprint or floor plan should be able to provide detailed information regarding the boundary line of such unit, both vertically and horizontally, as stated in Article 9 of Apartment Unit Governmental Decree. Nonetheless, the decision to employ the term of agreed boundary line rather than the boundary line defined in blueprint or floor plan tends to raise the conflict regarding the boundary of unit that is bounded by imaginary planes, particularly due to the unclear standard on the definition of the boundary.

### **3. THE PROPOSED 3D OBJECT BOUNDARY CONCEPT**

As highlighted in the Section 2, the recently employed 3D object boundary concept in Indonesia could provide with the easiness to physically identify the boundary of the apartment unit. On the other hand, the employed concept could also lead to the inconsistency on the application of the boundary concept, as well as the difficulties to represent 3D object in detailed within the 3D cadastral system. Moreover, even though the detailed representation of 3D object in the recent 3D cadastral system of Indonesia is not really necessary, the system however should further be enhanced in order to be able to represent the legal boundary of apartment unit on such system.

In this section, the proposed 3D object boundary concept is illustrated. Before defining the boundary concept itself, the concept of Spatial Unit Administration, which acts as the basis of the proposed boundary concept, is depicted. Finally, the proposed 3D object boundary concept is portrayed further in this section.

#### **3.1 Spatial Unit Administration Concept**

The Spatial Unit Administration Concept was developed based on the existing concepts on the management and the administration of the land, marine and space unit. For adjoining the administration of land, marine and space unit, it is argued that 3D Spatial Unit could act as the basis. 3D Spatial Unit, which would further be called as Spatial Unit, is a 3D unit that is wholly enclosed by either physical or imaginary surface(s), which is located partly or completely on, above and/or beneath the surface of the earth and sea. Basically, the notion on

Spatial Unit has been at least partially applied within the existing administration systems. Dale and McLaughlin (1999: 1) define land as a physical thing that encompasses the surface of the earth and all things attached to it both above and beneath. The mentioned definition reflects a direct relationship between land and space, even though the space itself is not restricted by its volume. Furthermore, the employment of Spatial Unit in marine and waters cadastre is even more obvious as, in some extent, the 3D representation of rights is enormously important for controlling and regulating marine activities, as well as facilitating ocean governance (Ng'ang'a *et. al.* 2004: 447).

Alike the Spatial Unit term, the concept of Spatial Unit Administration was developed based on the existing concepts on land, marine and space administration, which was employed for extending the notion on Land Administration of Dale and McLaughlin (*op. cit.*). As summarised by Abdulharis (2006: 29) from Dale and McLaughlin (1999), Enemark (2005), Mulolwa (2002: 8) and Barry (1999: 64), Land Administration is defined as an execution tool of land policy and comprises of public sector activities on tenure, use and value of the land. Based on the above definition, it is clear that Land Administration comprises of three components, namely land tenure, land use and land value, in which, according to Enemark (2005), are interacting to each within the scope of cadastral system and facilitating the operational of Land Administration. Besides the above mentioned components, Enemark (2005) proposes the fourth component of Land Administration, namely land development, to ensure its sustainability. However, Enemark (2005) further explains that, from the point of view of (land) cadastral system, land development, resource management and environmental sustainability aspect are maintained under land use component. Moreover, the establishment and maintenance of (land) cadastral system inquire as well the organisational, legal, financial and technical arrangement (Mulolwa, 2002: 8), as well as the human resources capacity development (Barry 1999: 64).

Based on the above facts, the proposed definition for Spatial Unit Administration is an execution tool of policy regarding unique 3D Spatial Unit comprised of space and resources on, in and below the land, water and space, which encompasses public sector activities on alienation and utilisation of previously mentioned spatial unit within the scope of spatial unit tenure, use and value. All three components of Spatial Unit Administration are interacting to each other within the scope of cadastral system and facilitating the operational of Spatial Unit Administration. See Figure 1 for the hierarchy of Spatial Unit Administration System.

### **3.2 Spatial Unit Administration Boundary Concept**

Based on the description of Spatial Unit from above, the boundary concept of 3D object is proposed. The advantages and disadvantages of the employment of such concept are also depicted in this sub-section.

As previously defined, the Spatial Unit is entirely enclosed by either physical or imaginary surface(s). The boundary of Spatial Unit is therefore comprises of the physical and/or imaginary surface(s). In order to provide the basis for representing the 3D object on the cadastral system, the outer surface(s) of the Spatial Unit is proposed to be the boundary of this

unit. In the case that there is an adjacent Spatial Unit, both Spatial Units share the surface at the same proportion, particularly on its thickness.

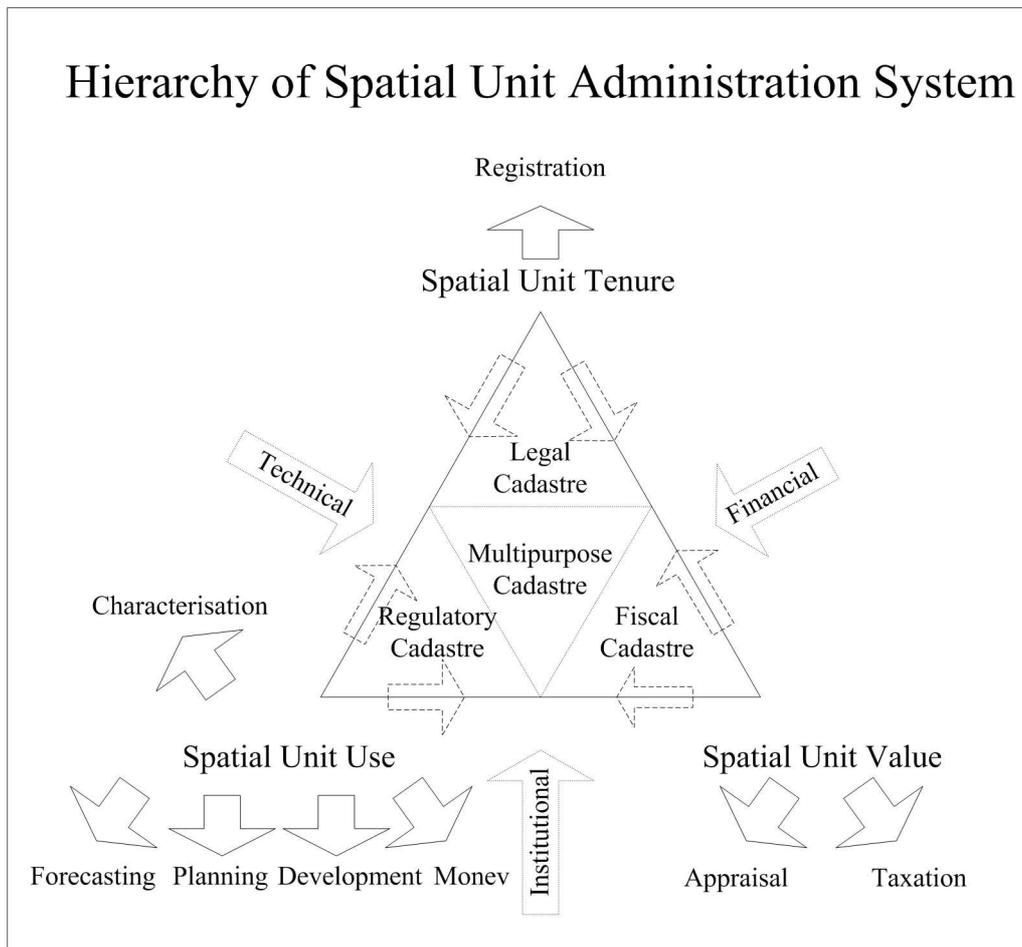


Figure 1 Hierarchy of Spatial Unit Administration System

By defining the outer surface as the boundary of the Spatial Unit, the possibility on the violation of the individual right to Spatial Unit could be lessened. As the outer surface is already considered as the private domain, any action taken by others is prohibited. Another advantage of such definition of Spatial Unit is that the definition could be employed on land, marine and space unit. Moreover, the Spatial Unit could easily be represented within the cadastral system as long as the 3D object or the surface could be represented by the existed 3D object model. Last but not least, high flexibility is offered by the employment of such boundary definition as it also offers the clear definition of the boundary between adjacent Spatial Unit, which would mostly be the case in dense urban area. See Figure 2 for the comparison of the extent of the Spatial Unit defined using the recent and proposed boundary concept.

The disadvantages of the proposed definition of the Spatial Unit boundary concept are related to the virtuality of the boundary of Spatial Unit and the complexity of data that should be

collected. Differing from the recently employed 3D object boundary concept, particularly for the boundary of two adjacent Spatial Units, it could not be physically identified. As the thickness of the surface is shared between two adjacent Spatial Units, the boundary is laid within the surface. Consequently, in order to be able to represent the 3D object accurately, the data collected for the purpose of the modelling of the 3D object is quite complicated, which might include the collection of the information regarding the thickness of the surface between two adjacent Spatial Units, as well as the thickness of the ceiling and the floor of Spatial Unit on top of it.

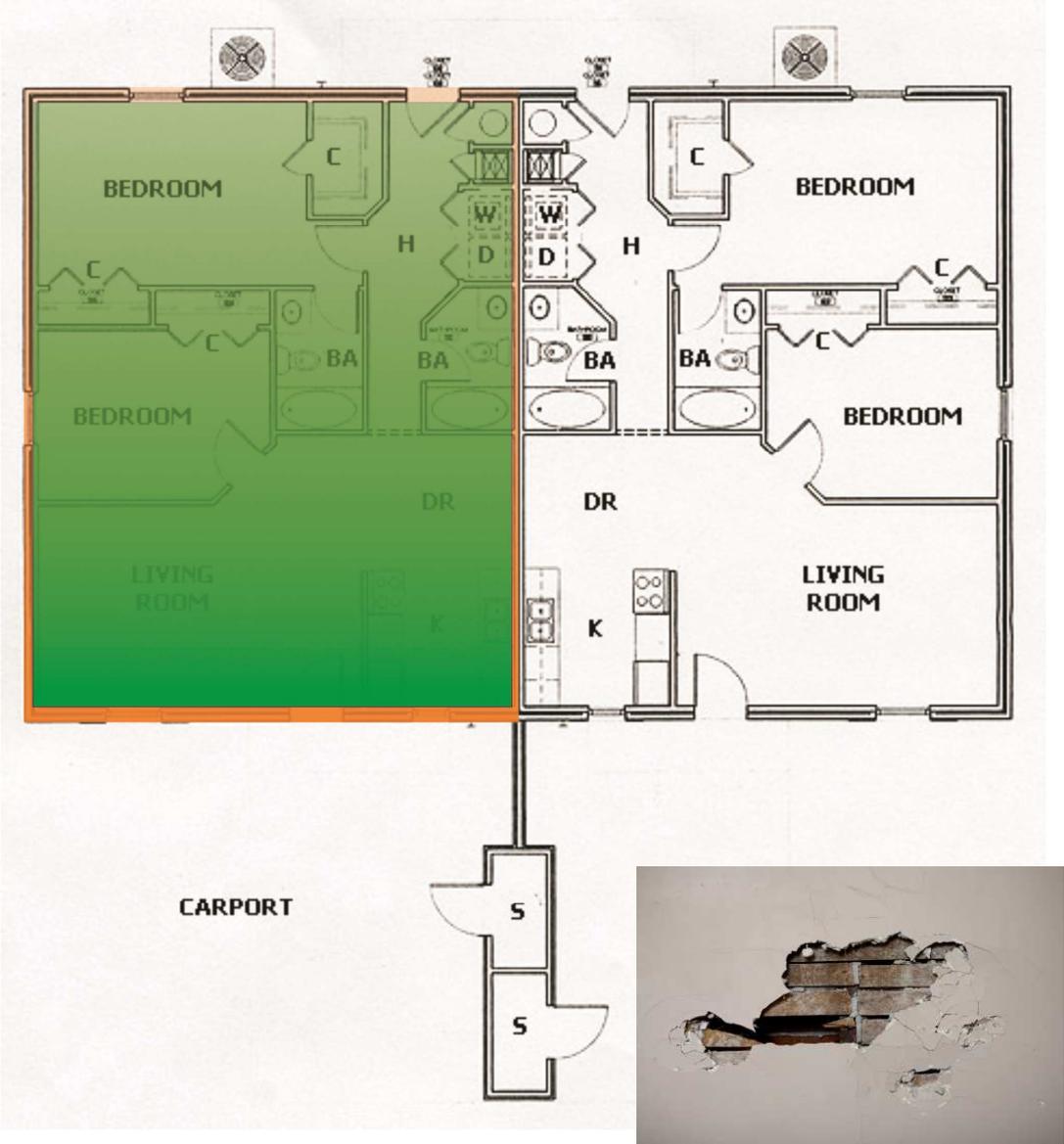


Figure 2 The comparison of extent of Spatial Unit defined using the recent (in green) and the proposed (in orange) Spatial Unit concept (The Blueprint is property of Mauldin Properties). Inset: Action that could not be taken on the employment of recent Spatial Unit boundary concept (Property of Stephanie White)

## 4. DISCUSSIONS

In spite of the disadvantages of the proposed definition of Spatial Unit boundary concept, particularly within the concept's implementation in Indonesia, the application of the proposed definition would basically provide the cadastral system with the fundamentals for accurately representing the Spatial Unit in 3D environment. The adoption of the proposed concept would therefore be followed by the drastic changes on the 3D cadastral system of Indonesia, which would be costly and time consuming.

Alternatively, the proposed Spatial Unit boundary concept could still directly be applied within the recent cadastral system of Indonesia. The application of such concept should be followed by the redefinition of the boundary of the Spatial Unit, particularly which is stated in Article 41 of Apartment Unit Governmental Decree.

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