



Institut Agronomique et Vétérinaire Hassan II
FORMATION EN SCIENCES GÉOMATIQUES ET INGÉNIERIE TOPOGRAPHIQUE



**State of the Art of 2D Cadastre and
Reflection on a Future 3D cadastre
Case of Morocco**

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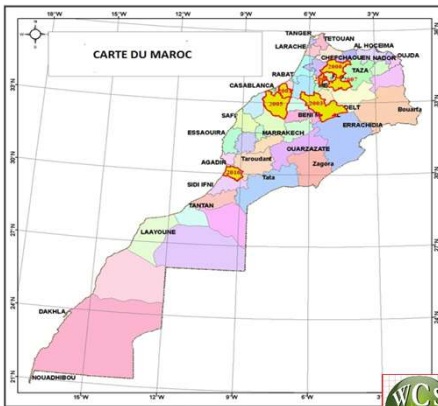
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INTRODUCTION

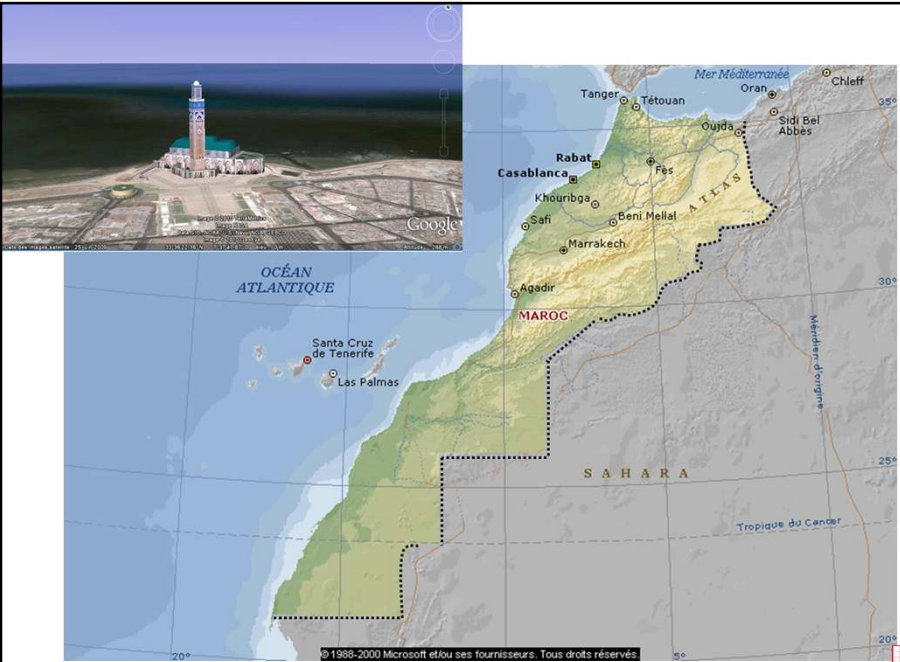
- Geographic position: 21° to 36°N, 17° to 1°W
- Population: 33,8 Mi (60,4% urban, 39,6% rural)
- Casablanca: 3 359 818
- Marrakech: 980548
- Tangier: 1 005 041
- Fès: 1 129 768
- Agadir: 600 599
- Rabat: 577 827



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INTRODUCTION

3D information has become important because:



- the evolution of data acquisition, software products supporting the third dimension.
- 3D great success and rapid development; (GIS)
- GIS can integrate three-dimensional data in the fields of urban planning, simulation of future projects and integration into the landscape, etc.
- Consequently, the 3D data has become an interactive data of great importance.
urban planning, cadastre.....

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INTRODUCTION

In 2D cadastre, information is represented using only 2D topographic plans.



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BUT These plans do not allow a faithful presentation of reality, (the case of buildings with complex geometry containing apartments belonging to several owners)



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INTRODUCTION

The objective

- Present the state of the art of the 2D cadastre
- Present a reflection on a 3D cadastre based on previous international experiences, while maintaining the positive aspects of 2D cadastre.
- Simple application to exploit 2D plan to move to 3D

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THE 2D CADASTRE IN MOROCCO

- It Is a legal cadastre
- THE ADMINISTRATION RESPONSIBLE FOR THE CADASTRE
- The cadastre provides the following data:
 - ▣ information on owners and their land properties,
 - ▣ information about the rights and charges
 - ▣ any technical data on the parcels and their geographical repartition.



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THE 2D CADASTRE IN MOROCCO

- Land titling and land registration.
- Geometric description of land parcels and land register so as to provide security of tenure.
- The basic elements of 2D Moroccan cadastre are **cadastral maps, cadastral plans, Titles, and requisitions.**
- Concerning buildings, the dimensional information is provided by the co-ownership (co-properties).

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THE 2D CADASTRE IN MOROCCO

- Law - co-ownership
- building parts: private and common.
 - owner
 - apartments,
 - exclusive rights of ownership
 - certain restrictions
 - respect the framework collective life
 - requirements for the management and maintenance of collective parts.

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THE 2D CADASTRE IN MOROCCO

cadastrial map

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THE 2D CADASTRE IN MOROCCO

| Niveau | Superficie Construite (en m ²) | Désignation et Superficie des autres équipements | Observations |
|------------------------|--|--|---|
| Sous-sol | 128 | | |
| RDC | 128 | | |
| 1 ^{er} étage | 139 | | Cour = 12m ² |
| 2 ^{ème} étage | 142 | | |
| Terrasse (CE+Dcse+WC) | 55 | | Dont dépendances =44m ² et dort WC=9m ² |
| Total | 592 | | |

Cadastral Plan
Describes the limits of property
And coordinates of the boundaries

Propriété dite : Smara 35
Etat : Municipalité de Smara, Lotissement Smara, 35
Titre : 21103/38

Contenance: 01^h 28^{ca}, 2a, 2a

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the plan of co-ownership for a floor

DIVISION PAR APPARTEMENTS
Plan du 5^{ème} Etage
de la zone 0101 à la zone 0104

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Description of a memorandum of co-ownership

- Name, title, situation : city, district
- Name of the engineer
- Name of requérants ,,,,

Description of Subdivisions:


- Basement description:
- Ground floor descrsiption:
- First floor
- Second floor
- Third floor.....
- Terrace description



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THE INSUFFICIENCIES OF THE CO-OWNERSHIP


- information about co-ownership is described by 2D topographical plans,
- 2D plans do not allow a global view of the entire property (make search manually).
- difficult to know the vertical extent of servitudes.



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THE INSUFFICIENCIES OF THE CO-OWNERSHIP


- we cannot consult several apartments at a time,
- manually search the title in the archive
- difficult to represent all the parts constituting a co-ownership using only a 2D cadastral plan.
- solution to enable the representation of the physical 3D reality.


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USEFULNESS OF 3D CADASTRE

- The case of a road, a bridge and a building one over the other, all with different owners,
- Street under building, the 2D cadastre is no longer able to give a complete and sufficient description of the rights. Consequently, a 3D cadastre becomes indispensable





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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO

- Establish 3D cadastre only in the situation where 2D is not able to respond to some queries (preserve the existing data, and exploit the benefits of 2D cadastre) some cases :
- building containing several apartments belonging to several owners that share common parts within the building.
- A home is built upon a public road.
- Some companies need to know their rights on the use of tunnels.




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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO

Concepts About Future 3D Cadastre Components

- In order to conserve the functioning of the existing Moroccan legislation, land registration and cadastre,
- it is recommended that the 2D plans kept the basis
- The public domain rights can be represented in 3D, like the rights of the public domain on private property such as runways, trails, drainage and irrigation canals.
- Servitudes can be represented by 3D.




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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO

In the case of urban areas:

- use the 3D representation in the urban areas where the geographical space is not spacious,
- There are complex buildings with several floors: there is a large number of properties.



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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO



Concepts About Future 3D Cadastre Components

In the case of urban areas:

- Apartments are characterized by small areas and are grouped together on condensed areas with high population density.
- In some cases we can also find overlays between public properties such as roads, bridges, buildings, and private properties.




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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO
Concepts About Future 3D Cadastre Components

for rural areas:


- Rural areas are characterized by scattered parcels and habitats.
- Overlays don't exist and private ownership is dominant.
- In this case, a 2D representation is satisfactory because of additional financial resources

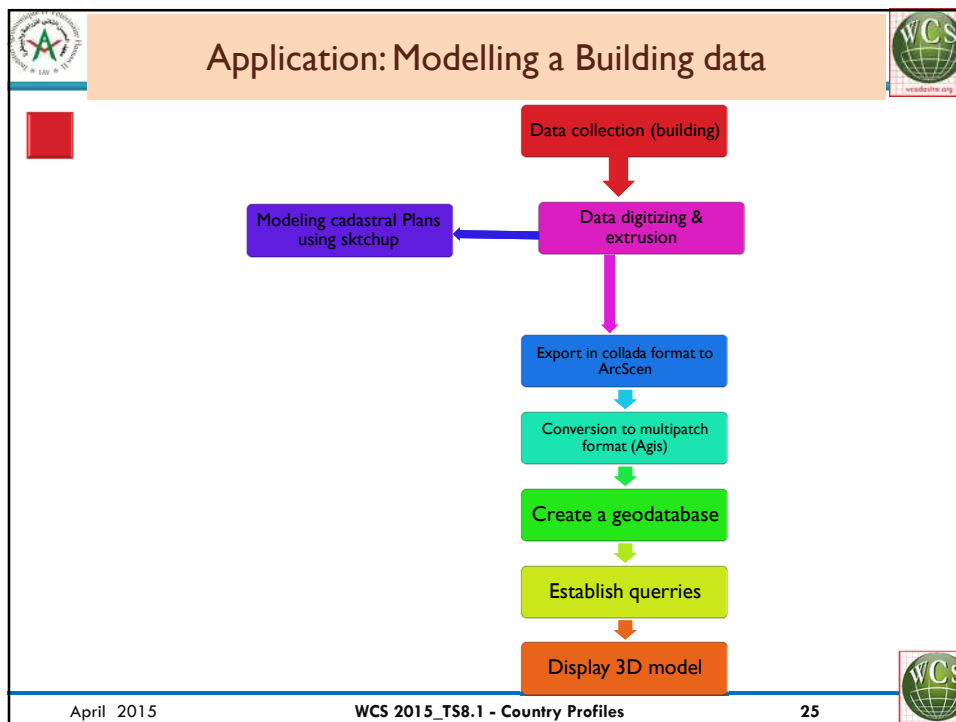
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REFLECTION ON A FUTURE 3D CADASTRE IN MOROCCO
Basic Strategies To Move To 3D Cadastre

- The first step is to make a 3D support for areas with high buildings.
- the case for big towns such as the city of Rabat (districts of Agdal and Ryad),
- the city of Casablanca metropolis, the cities of Tangier, Marrakech, Fès and Agadir.
- In these towns, the existing 2D database can be used and completed by 3D data.
- it is very useful to provide users with the information on the extent of land ownership and the rights attached to it.

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Data collection (ex. building)

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| ID_Divise | Consistance | Surface_dans_titre | Surface_avec_hors_titre | quote_part_ter |
|-----------|--|--------------------|-------------------------|----------------|
| 27-27a | appartement à usage d'habitation (Me à F 27a- | 96 | 4 | 4 |
| 28-28a | appartement à usage d'habitation (Me à) | 53 | 12 | 12 |
| 29-29a | appartement à usage d'habitation | 80 | 10 | 10 |
| 30-30a | appartement à usage d'habitation | 80 | 5 | 5 |
| 31-31a | appartement à usage d'habitation (Me à) | 90 | 10 | 10 |
| 32-32a | appt à usage d'habitation à 32a-32a au (Étage) | 86 | 3 | 3 |
| 33-33a | appartement à usage d'habitation | 134 | 10 | 10 |
| 34-34a | appartement à usage d'habitation | 60 | 16 | 16 |
| 35-35a | appartement à usage d'habitation | 104 | 6 | 6 |


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CONCLUSION

Database of 3D cadastre can be a useful tool for a large number of users:


- urban planning
- telecommunications field for example to determine the good sites for telecommunication networks.
- terrain analysis, mission planning
- infrastructure management as well as in the field of real estate.

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CONCLUSION

- Unfortunately, the implementation of a 3D cadastre in Morocco is subject to **several constraints**
- **technical, legislative, scientific, and human and material resources constraints.**

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CONCLUSION

- pursue developments in 3D acquisition techniques
- data processing,
- establish an adequate 3D platform for 3D objects
- database which supports the 3D

Technical

- problems concerning the registration of 3D property
- The legal concepts should be developed
- Develop New law texts concerning 3D data

legislative

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CONCLUSION

- professionals should provide adequate scientific equipment (hardware, processors, 3D cards, software)
- follow the evolution of software products supporting the 3D.
- limited budgets

Material R

- trainings for HR to understand 3D technology
- Application of 3D concepts to the technical staff

Human R

- clarify to professionals and managers the advantages and qualities of 3D representation.
- Introduce 3D concepts to decision makers

scientific

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Thank you for your Attention



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