

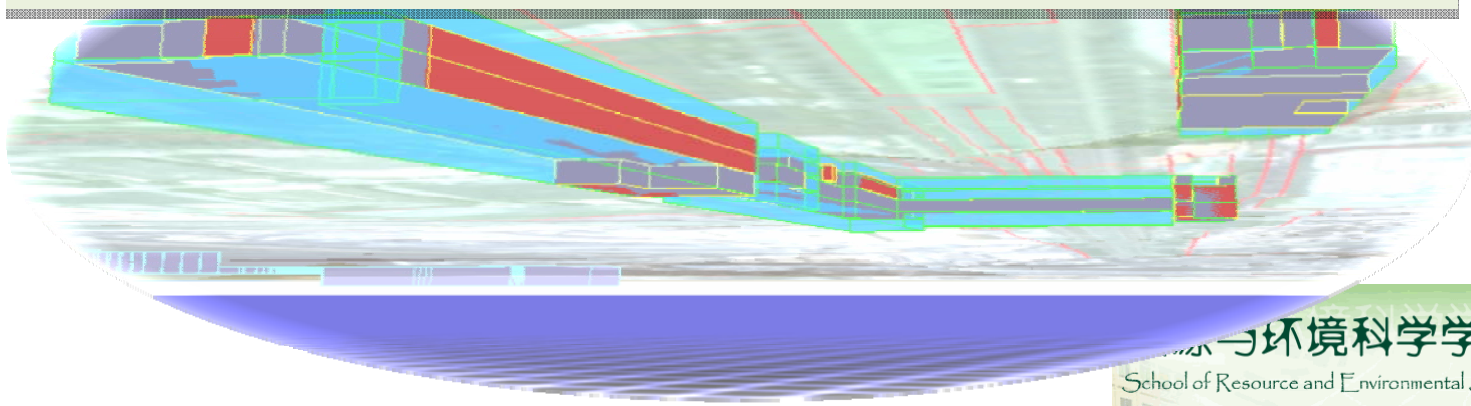


3D cadastre in China--a case study in Shenzhen city

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Outline

1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

5

Conclusions



1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

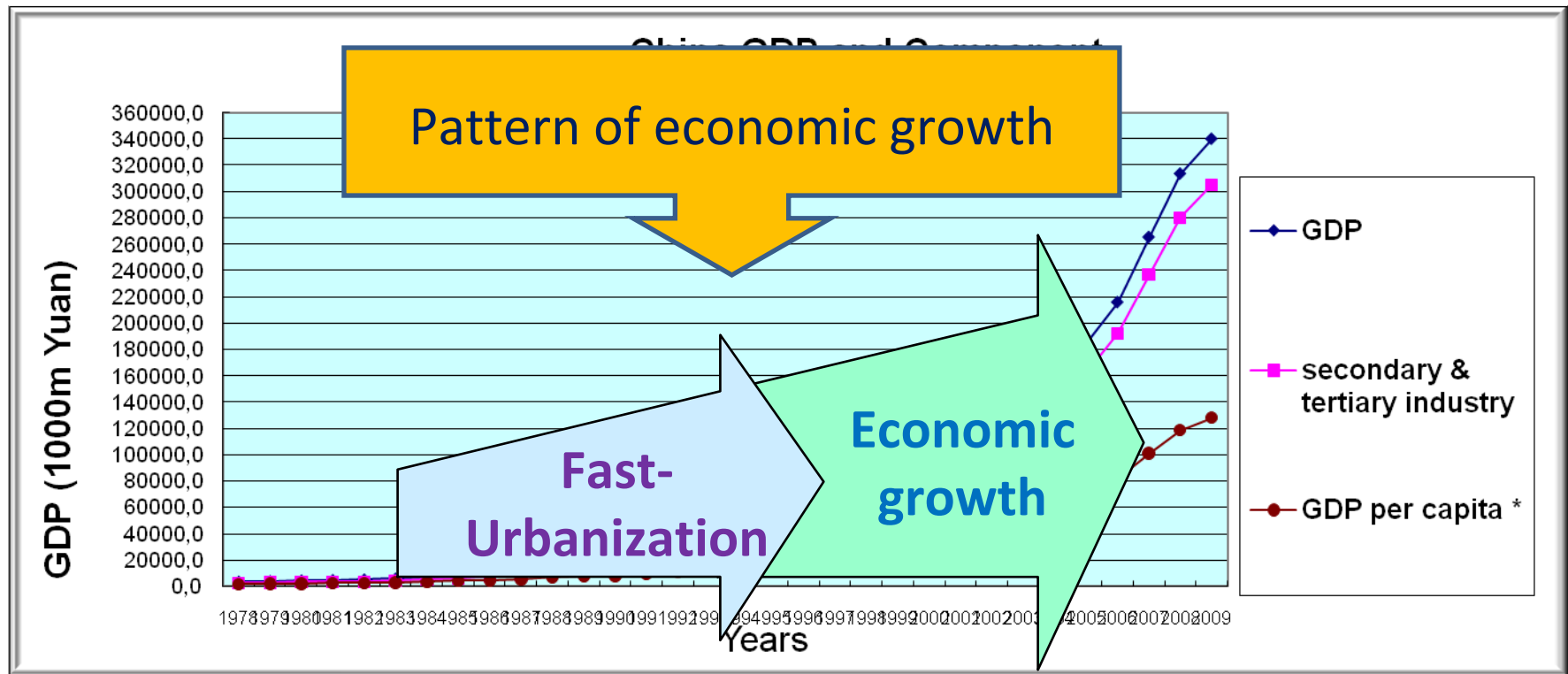
5

Conclusions



1. Introduction

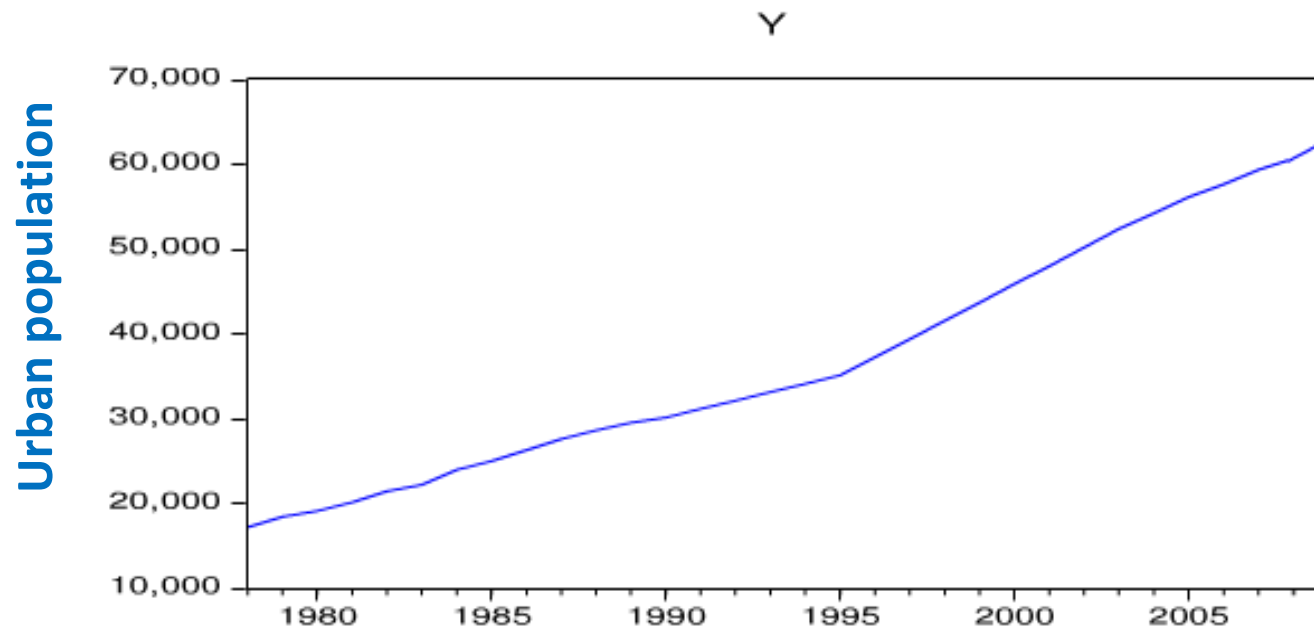
◆ China successful economic growth





1. Introduction (continued)

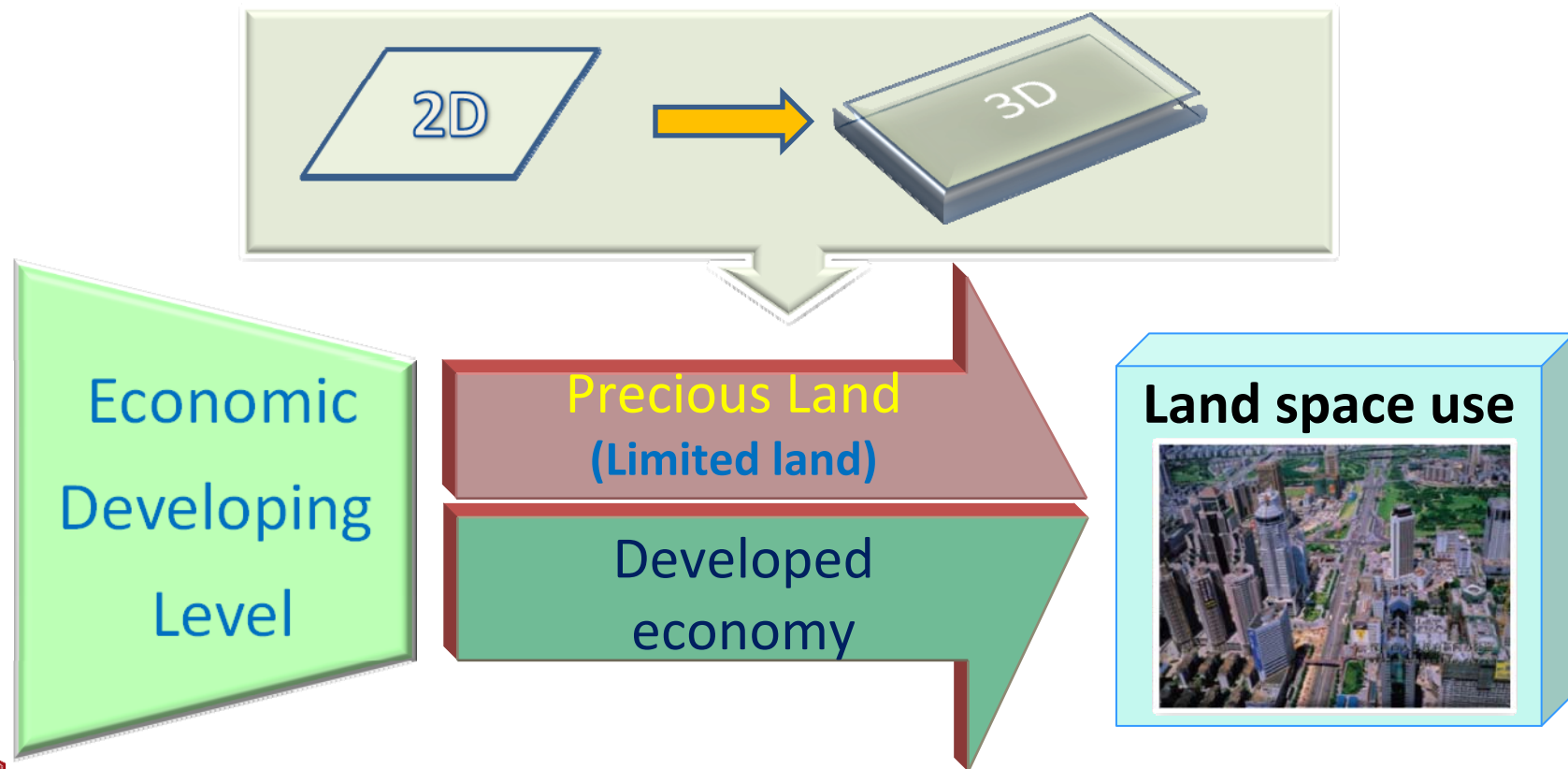
- ◆ China still needs a fast-economic growth
90m poor people ($\leq$ US\$234/year)
- ◆ Thus, a rapid urbanization shall continue in China
622m people live in cities by 2009, forecasting 850m in 2020.





1. Introduction (continued)

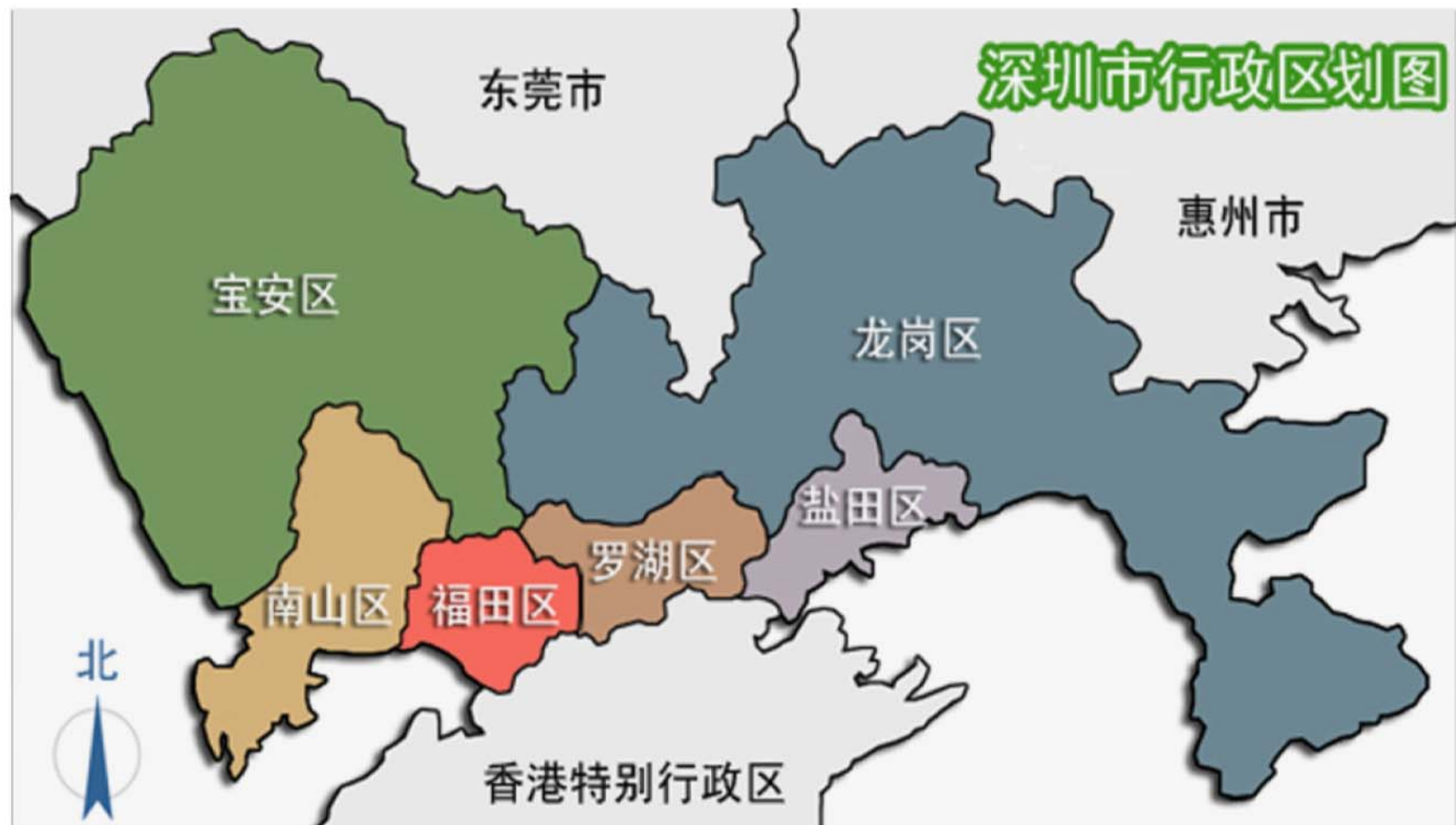
- ◆ Land use policy: protection of arable land, ecological use
- ◆ Urban sprawl could not continue due to limited urban land
->urban land use : from a plane to a space





1. Introduction (continued)

- ◆ Shenzhen is one of the most developed cities in China
population - 8.9m, area - 1991 km².



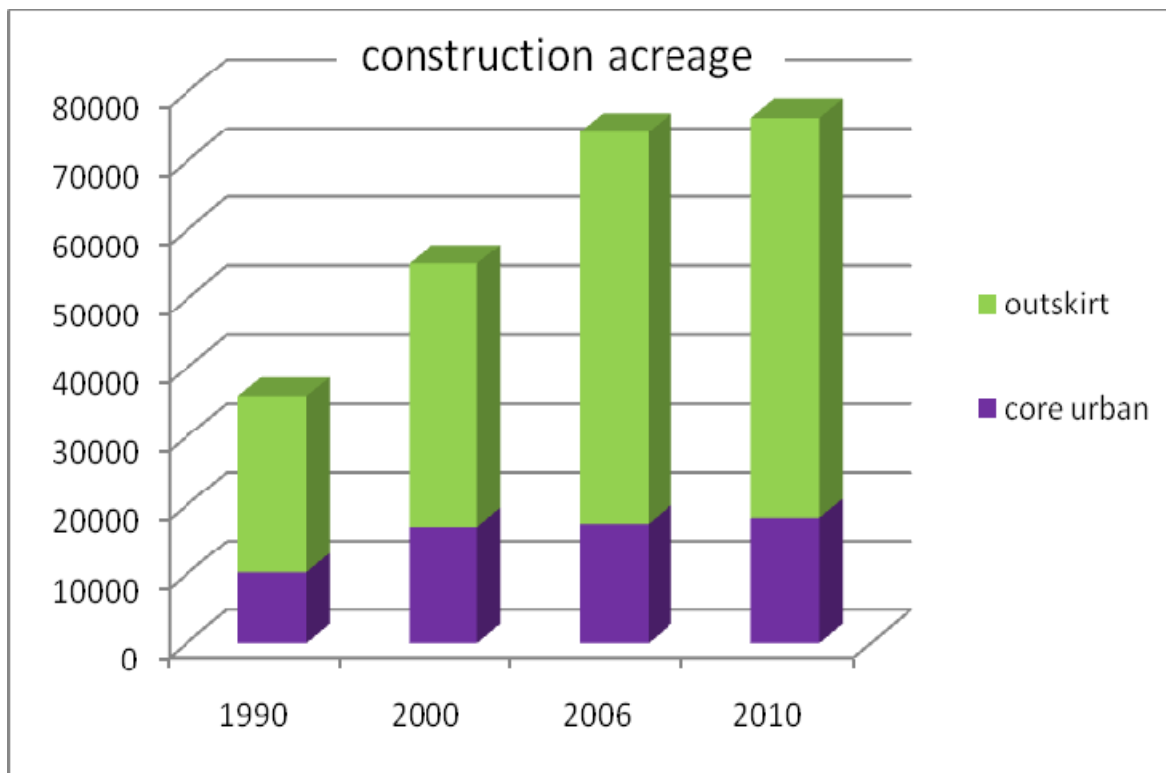


1. Introduction (continued)

◆ Shenzhen economy:

GDP (2009) - US\$1,281b, 3.75 times that (2000)

\$14,495/capita —the highest all over China, 4.3 times average





1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

5

Conclusions



2. Demand for 3D cadastre

◆ 2.1 Examples of land space use

Core urban area (Shenzhen Special Economic Zone) :

- very limited land (surface) resource
- the main business area, high population density

Land use: from a plane to a space

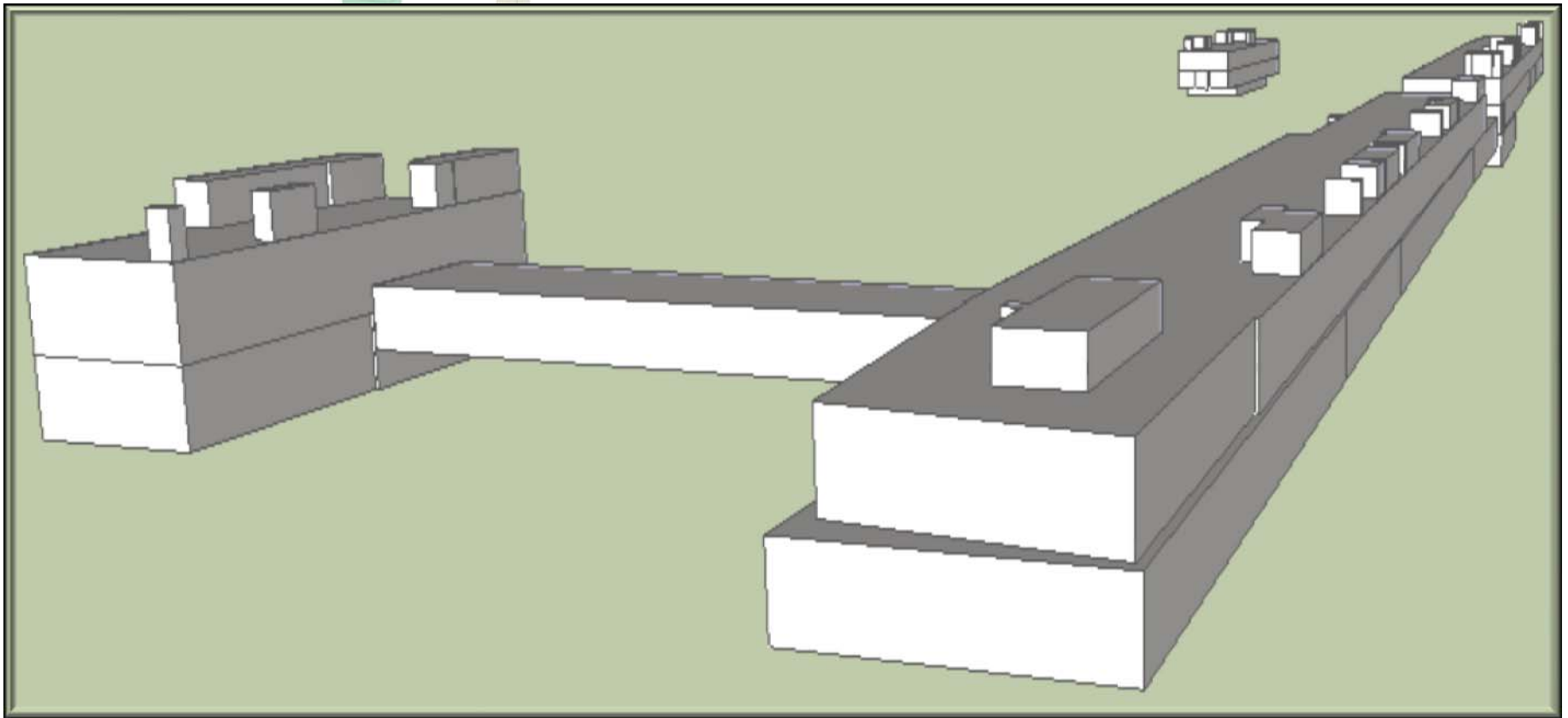
Urban land space use:

underground parking lots, underground commercial bazaar (streets), arch structure, multi-purpose construction



2. Demand for 3D cadastre (continued)

□ Fengshengding (underground bazaar)





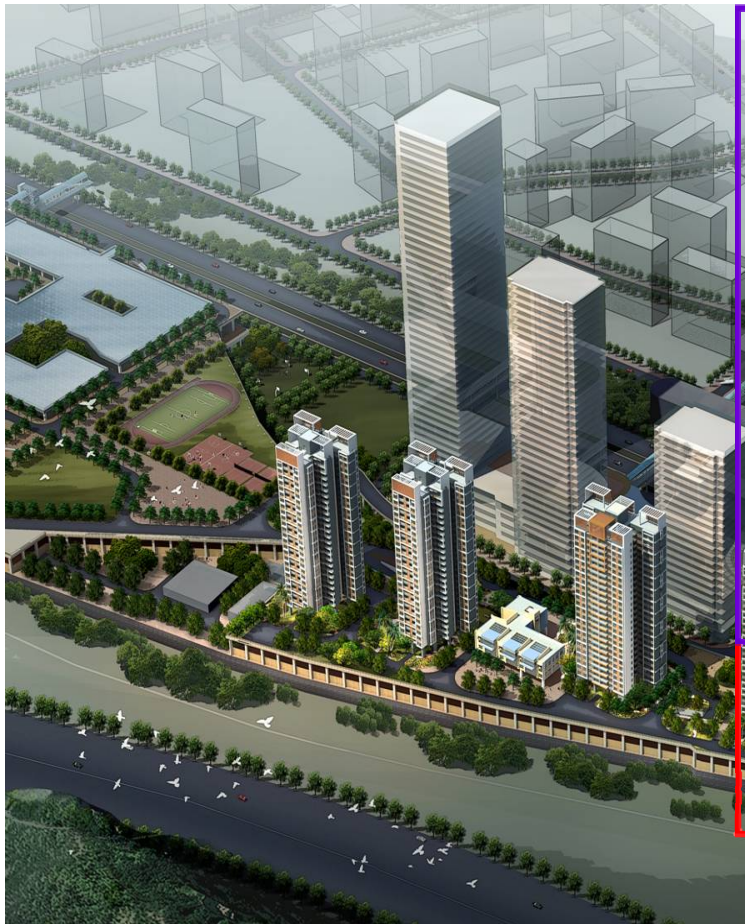
2. Demand for 3D cadastre (continued)





2. Demand for 3D cadastre (continued)

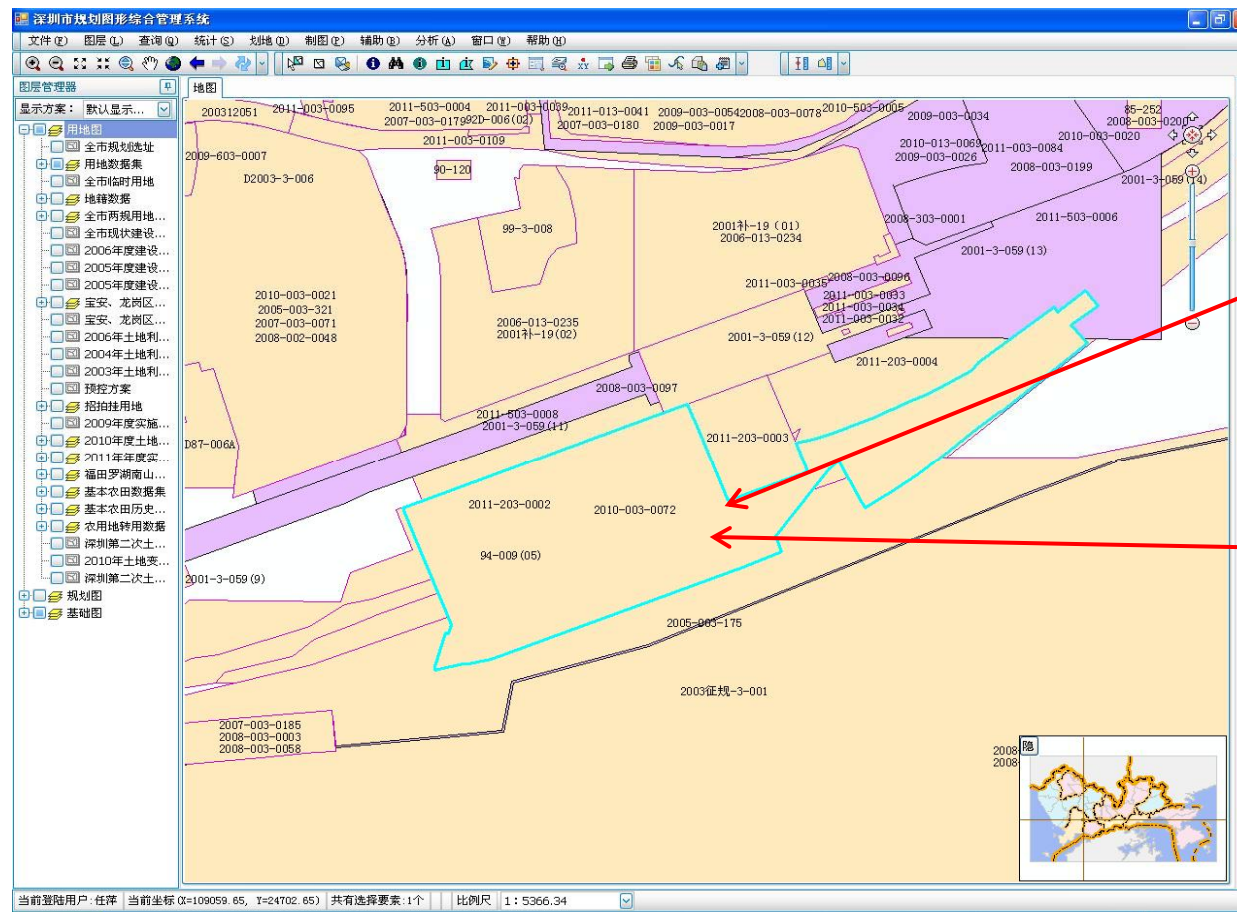
□ Tanglangshan (multi-purpose construction above-ground)



2. Demand for 3D cadastre (continued)

Two proposals of land development at the same land parcel

➤ may lead to incorrect land use data



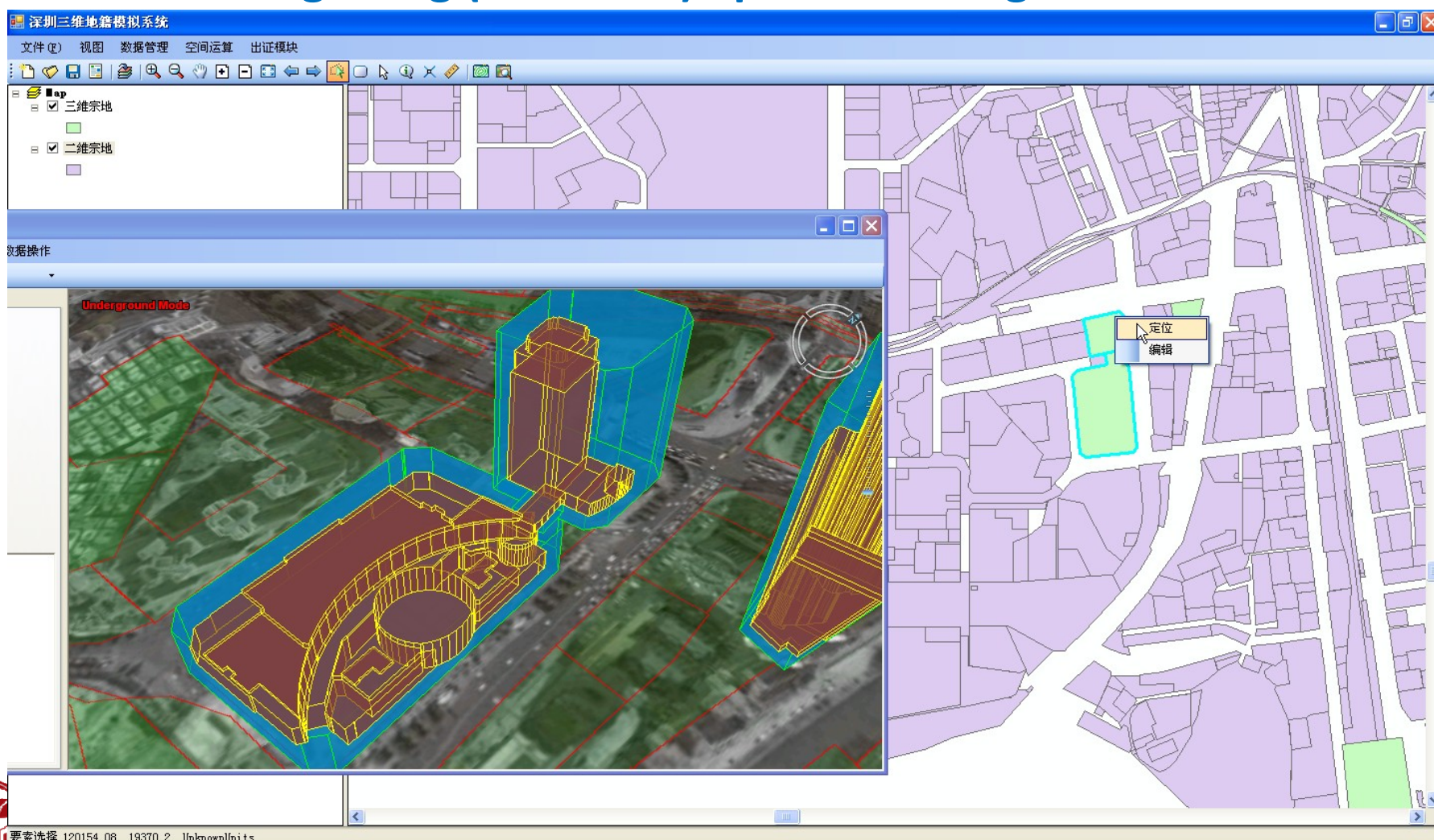
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2. Demand for 3D cadastre (continued)

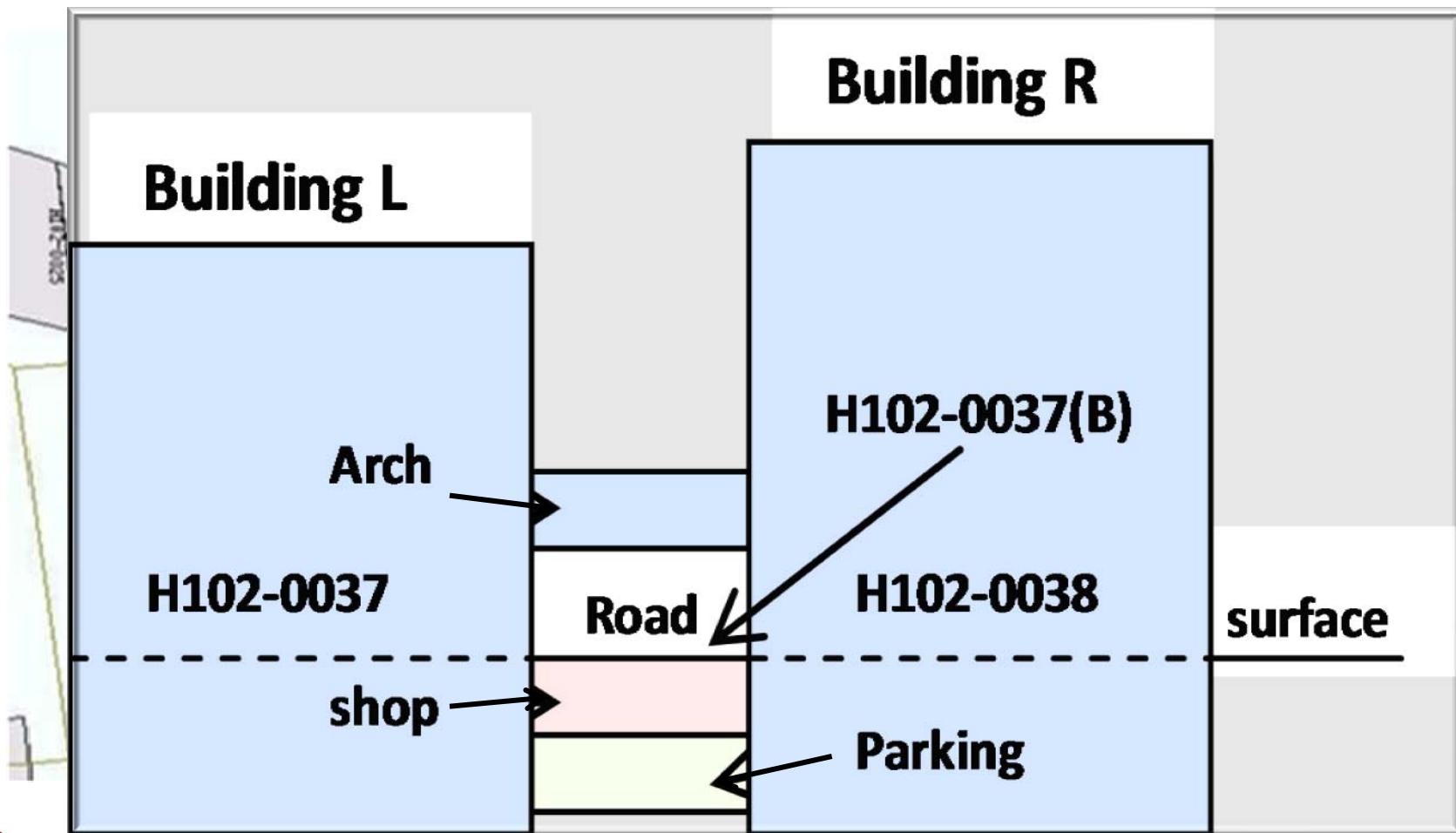
□ Wanxiangcheng (The MixC) –plaza buildings





2. Demand for 3D cadastre (continued)

- breaks spatial homogeneity of a parcel





2. Demand for 3D cadastre (continued)

2.2 Administration of land development

The Current administration procedures justifies a vague description of spatial extent in land development

◆ Institutionally,

- any urban land is owned by the State, other party can only have the right to the use of land for construction.
- There is no clear statement about the spatial extent of a 2D-parcel in laws
- amend the height of construction is allowed in the procedures

◆ Organizationally, two different views of spatial extent

- department of land management
- department of architecture design and construction



2. Demand for 3D cadastre (continued)

2.3 Context of applying 3D cadastre

◆ Legislation

➤ *Real Right Law* : [136] the right to use construction land may be created separately on the surface of or above or under the land.

◆ Administration

➤ No new procedure and regulation is designed for management of such vertical rights.

◆ 3D technology,

- available commercial software for 3D
- not effective for 3D cadastre



1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

5

Conclusions

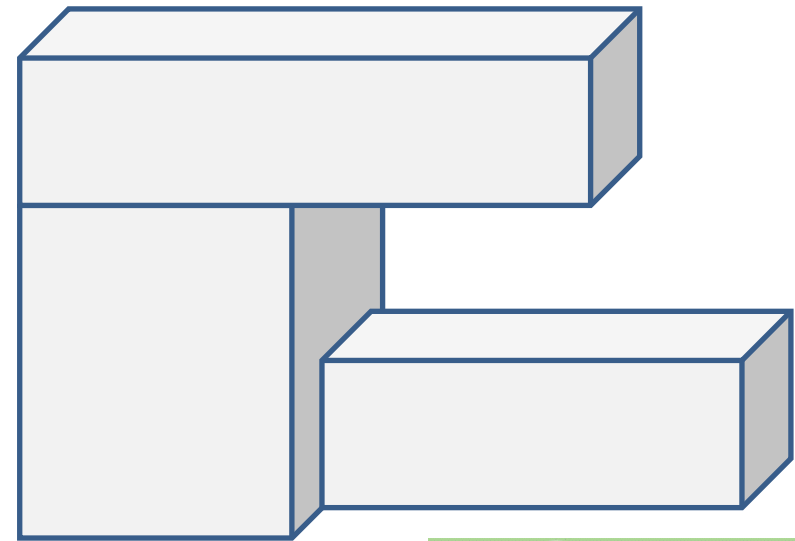
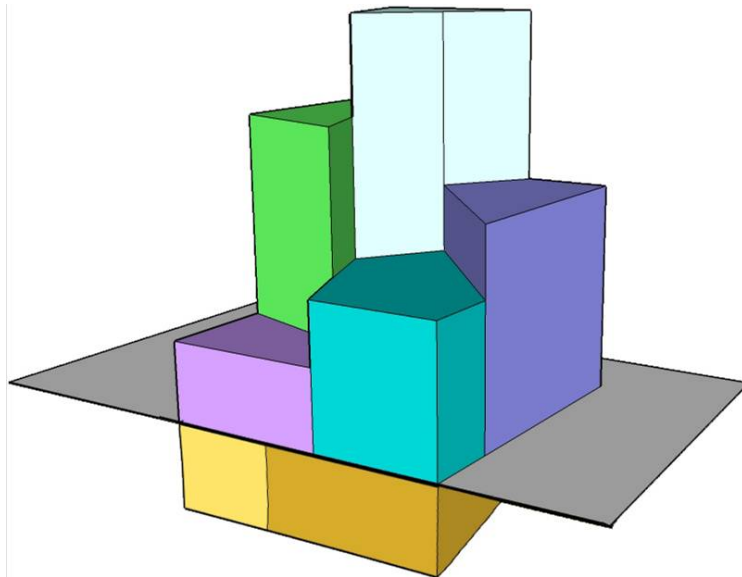


3. Practice of implementing 3D cadastre

3.1 Basic hypotheses

➤ 3D cadastral attributes—2D cadastral attributes

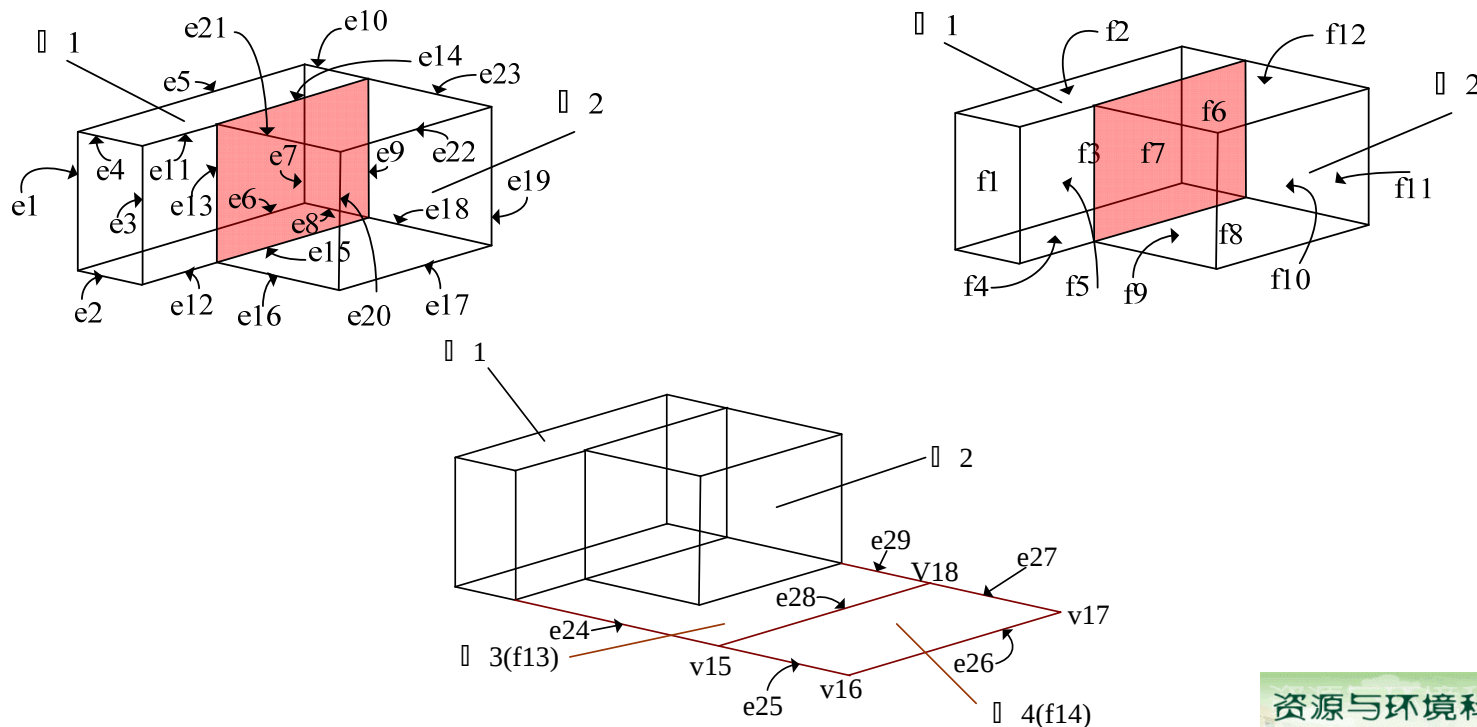
➤ 3D geometry—vertical faces enclosing a space



3. Practice of implementing 3D cadastre (continued)

3.2 Data model

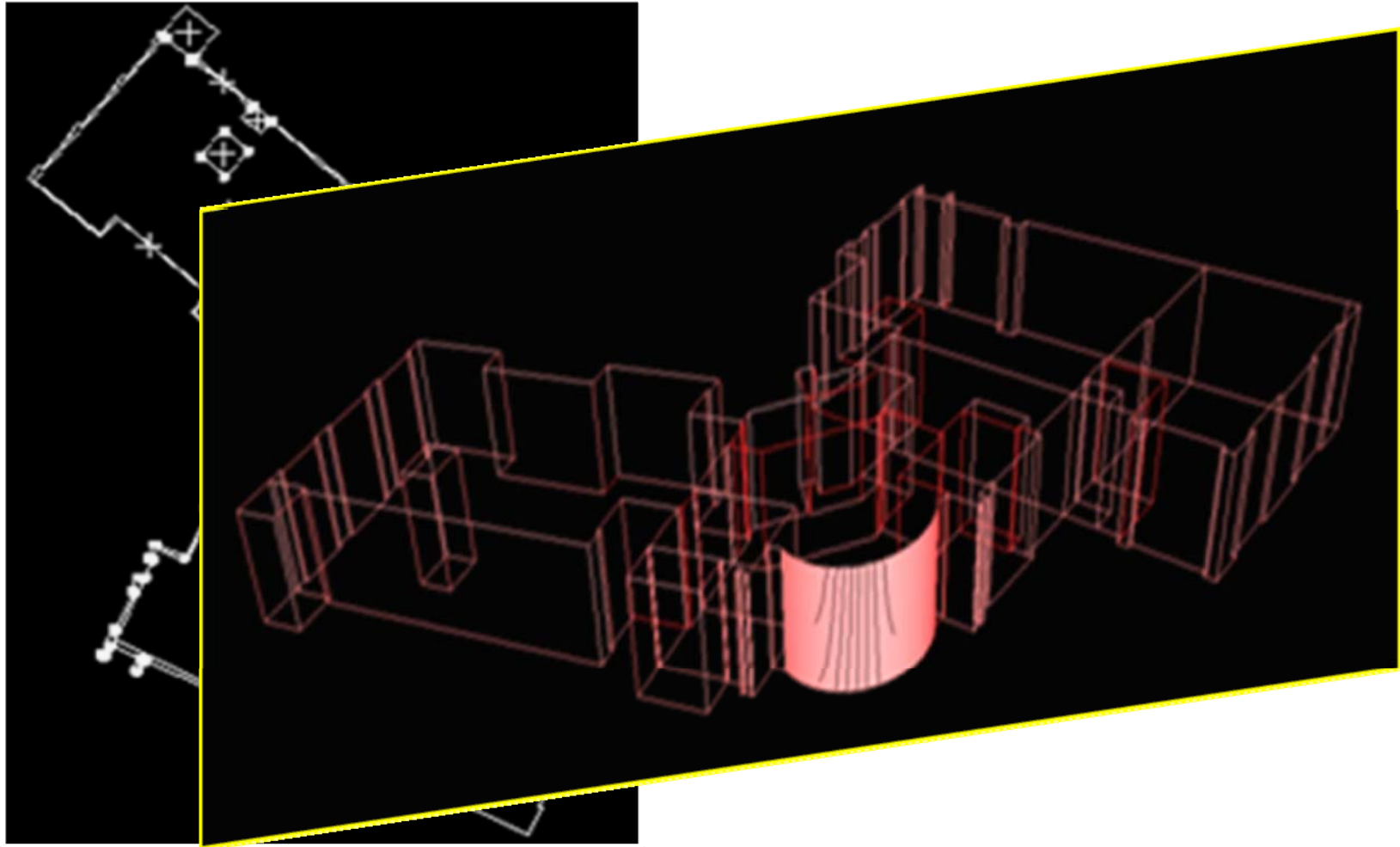
- 3D data model matching well with 2D data model
- 3D data model with a complete topological structure :
volumes, faces, edges, nodes





3. Practice of implementing 3D cadastre (continued)

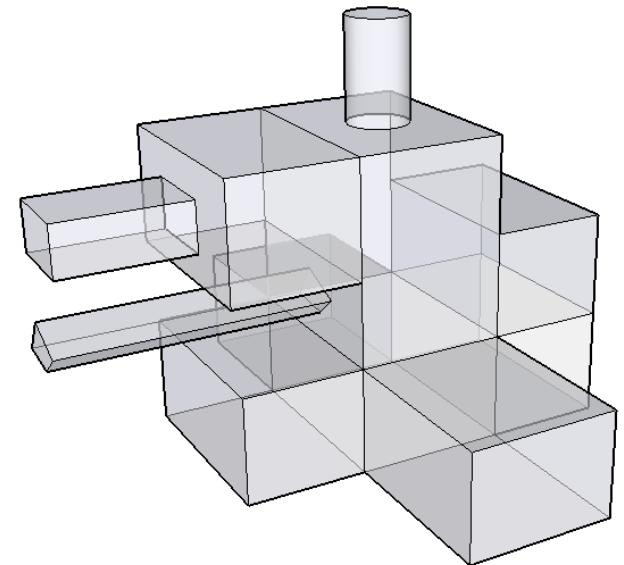
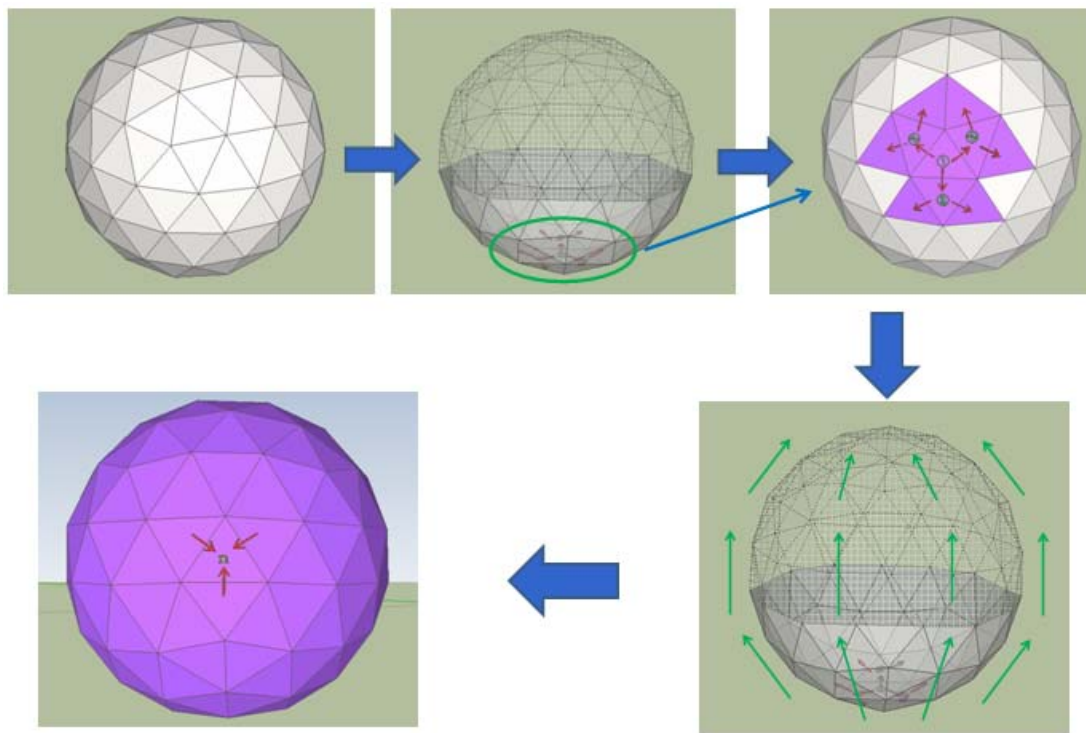
3.3 Generating 3D data from 2D plans



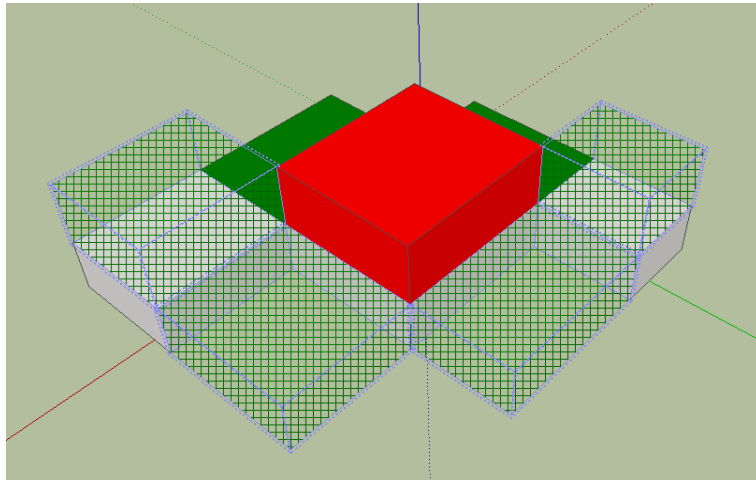


3. Practice of implementing 3D cadastre (continued)

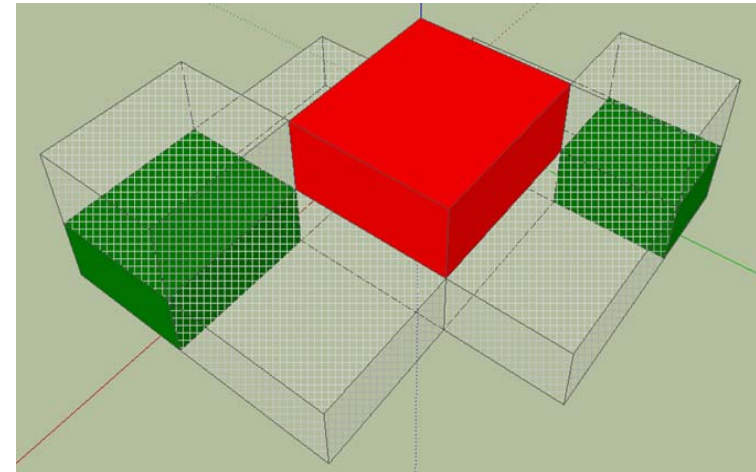
➤ 3D topology-building



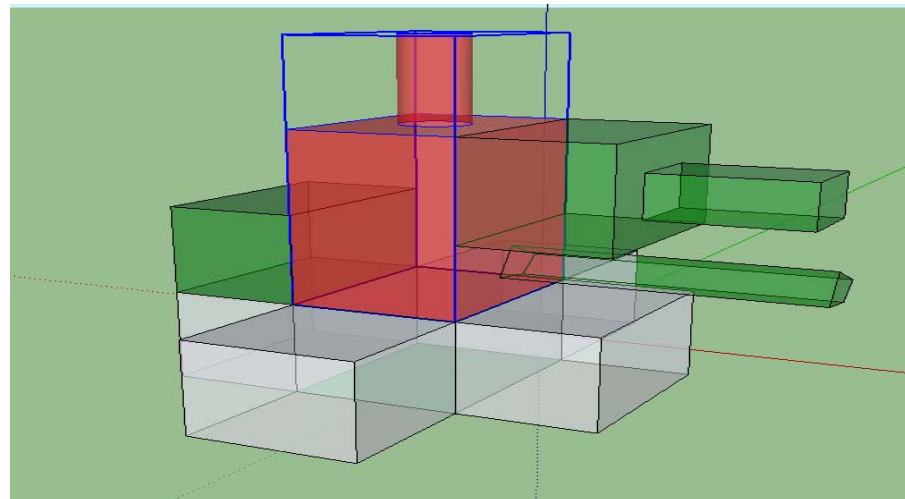
3. Practice of implementing 3D cadastre (continued)



By sharing only edges



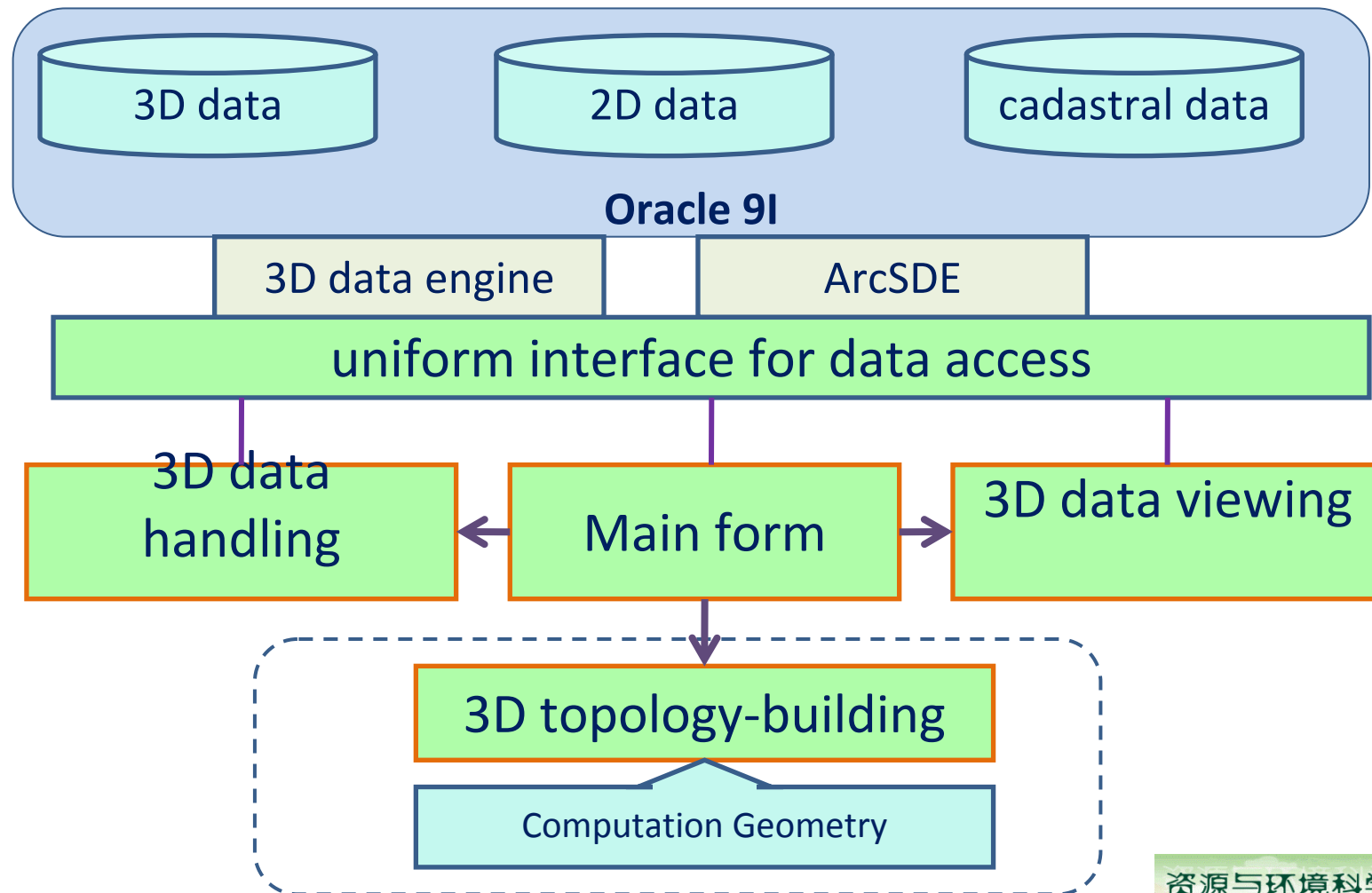
By sharing only nodes





3. Practice of implementing 3D cadastre (continued)

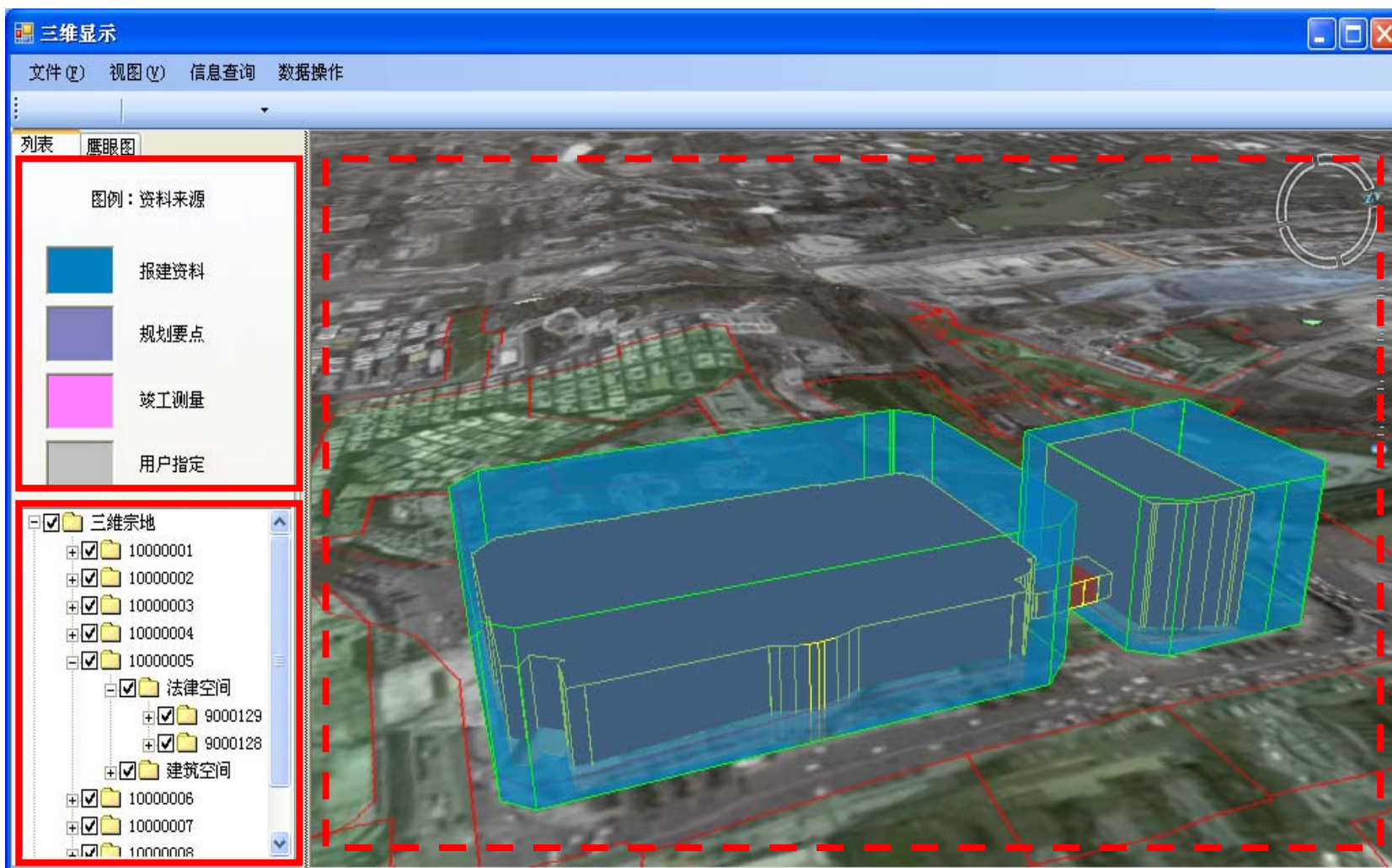
3.4 System development





3. Practice of implementing 3D cadastre (continued)

Main form





1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

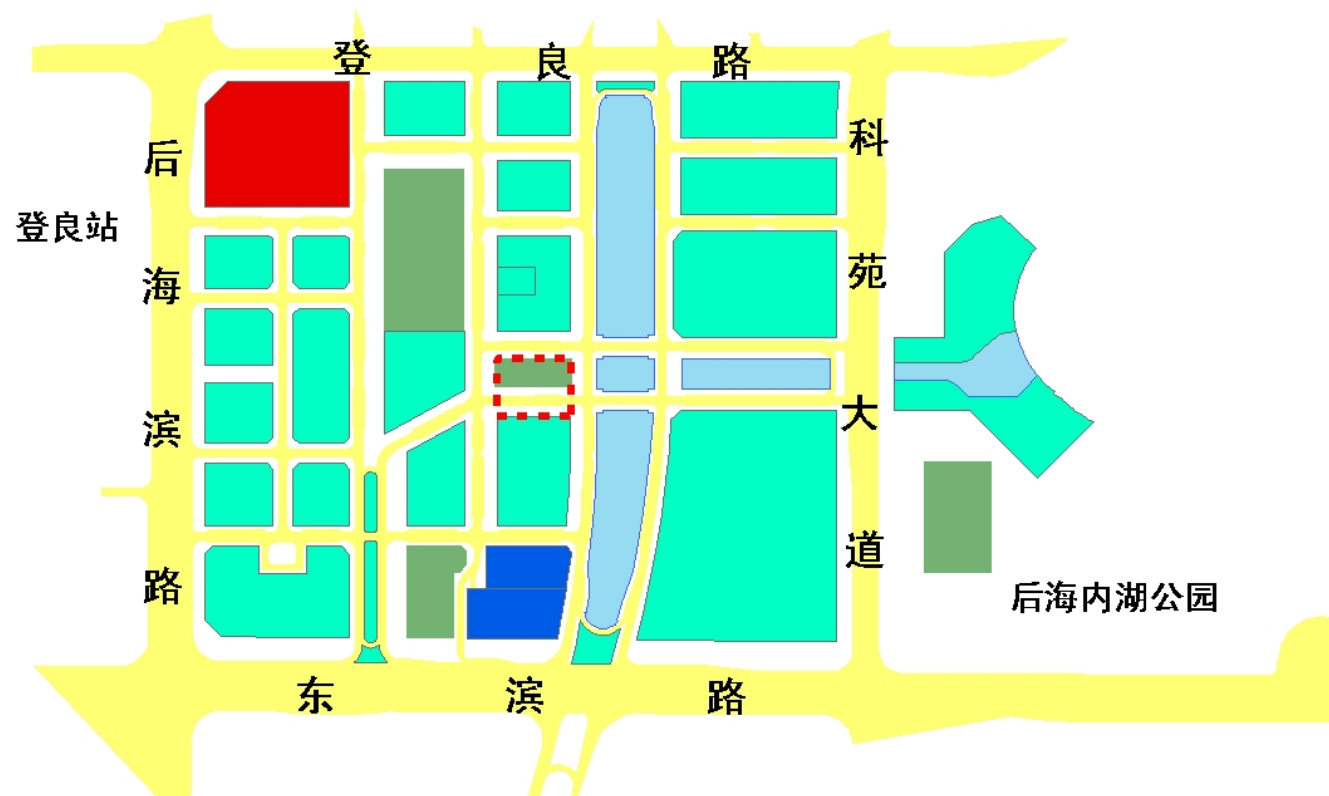
5

Conclusions



4. An example of application

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auctioning a chunk of land –central Houhai , Nanshan district

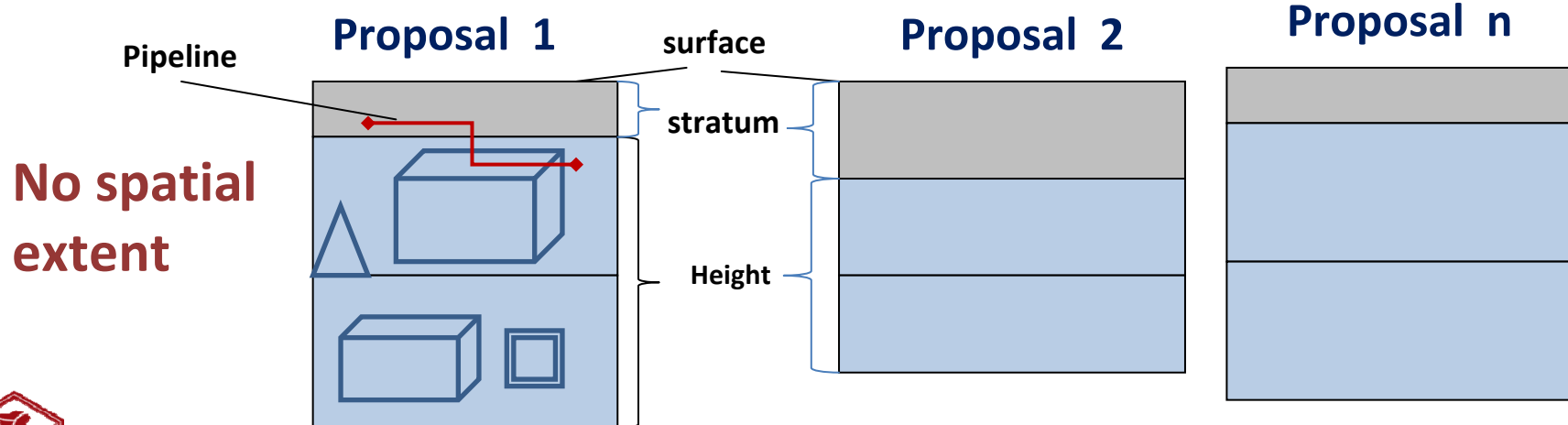




4. An example of application (continued)

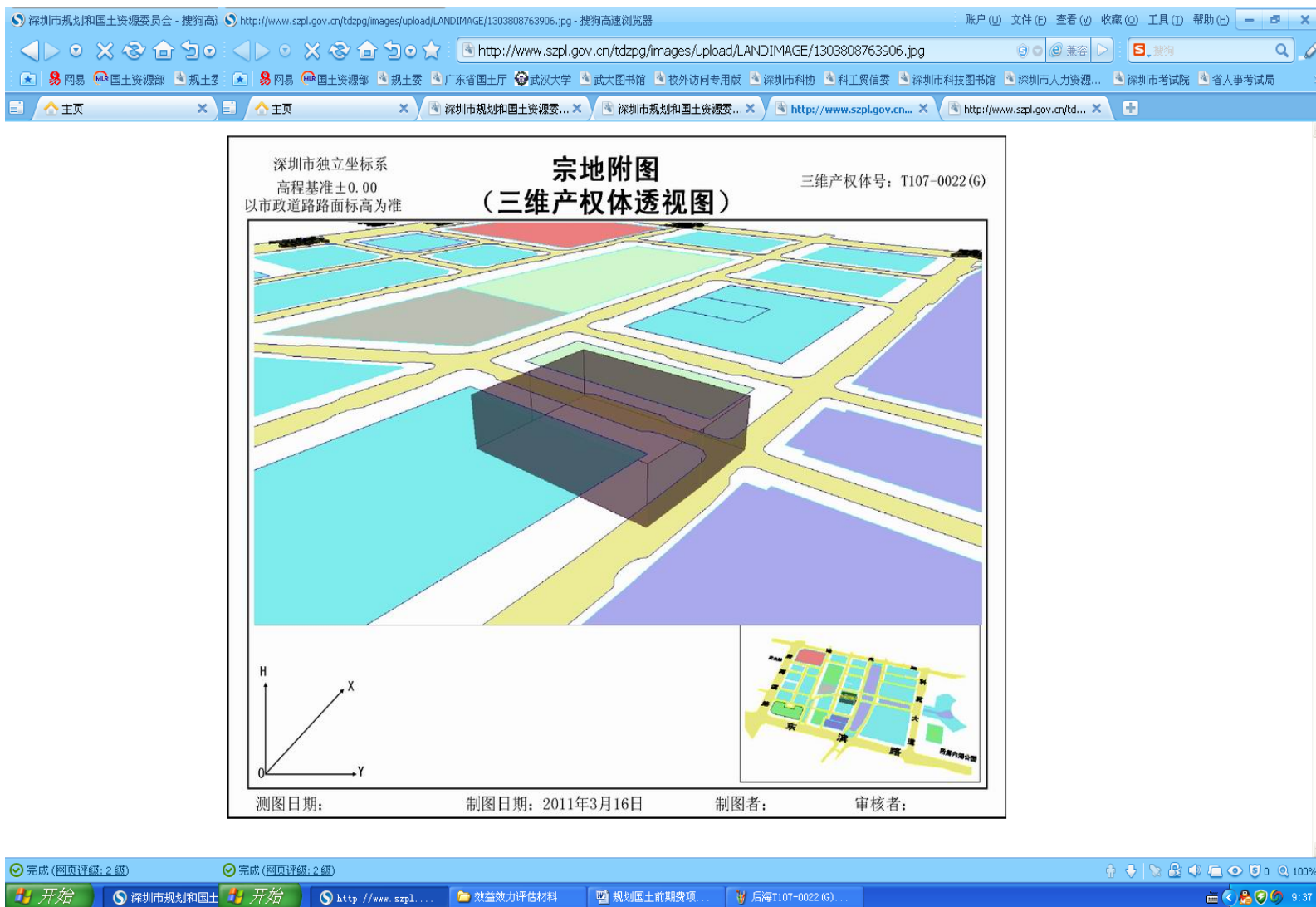
The provisioned attributes: 'land use', 'construction area' and 'requirements of planning and design'

- surface extent (parcel polygon)
- parking lot (underground),
road and green land on the surface
- construction area: 16000m²
- two-layers (stories)





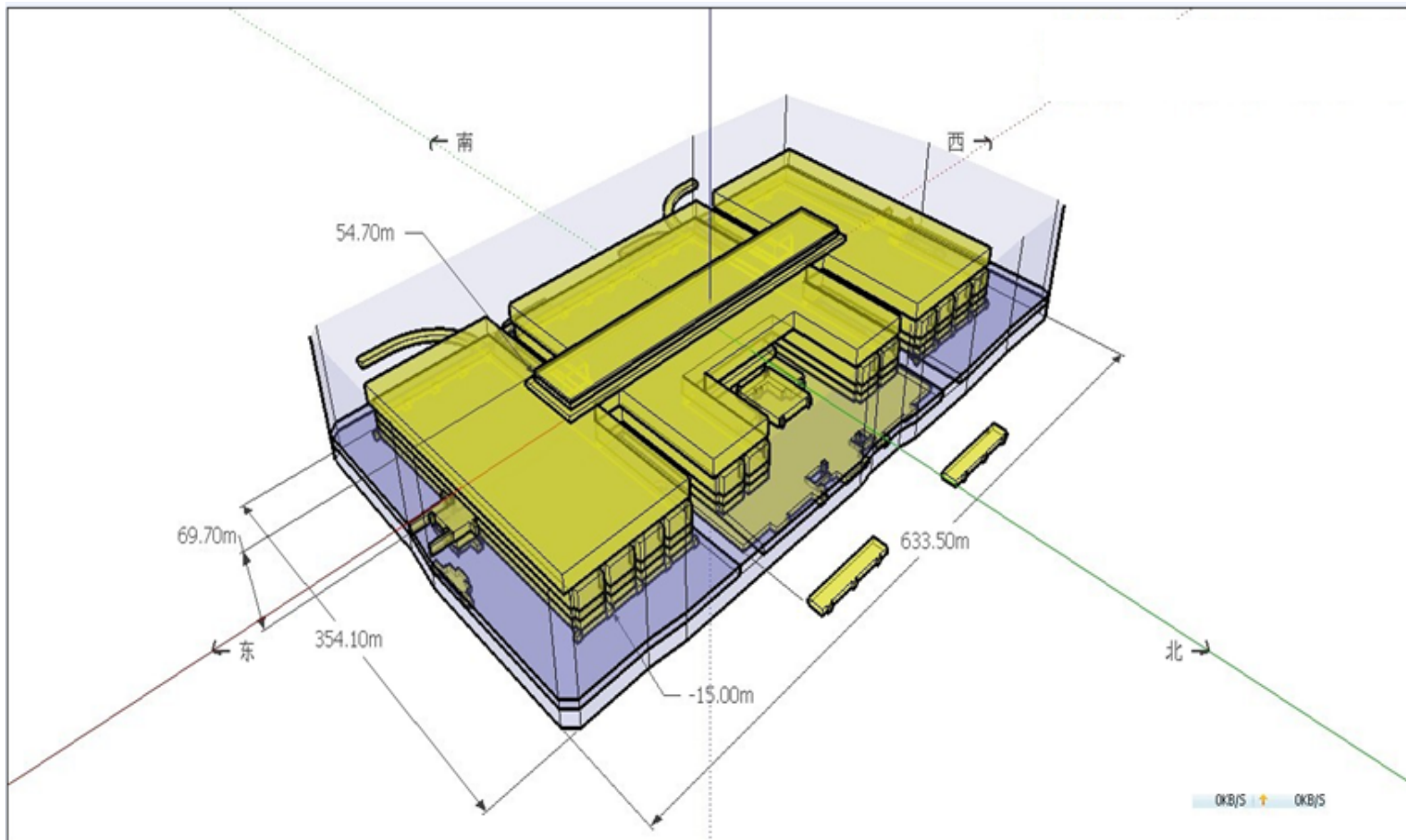
4. An example of application (continued)





4. An example of application (continued)

For registration, 3D representation will be included in the document





1

Introduction

2

Demand for 3D cadastre

3

Practice of implementing 3D cadastre

4

An example of application

5

Conclusions



5. Conclusions

- Law (*Real Right Law*) has given a legal guarantee to development and applications of 3D cadastre
- Local regulations shall be amended for 3D cadastre
- Implementing 3D cadastre is not an easy work in land administration. (reshaping institution and organization)
- Advancing 3D cadastral technology can push applications of 3D cadastre, therefore to promote management of land space use.
- Current 3D software could not fit well applications of 3D cadastre. Techniques should be explored further.
Integrating and geometric computations



Thanks for your attention !

时间匆匆流逝，
留下你清晰的身影，
永远那样鲜活，不会随着光阴飘散在风里.....

