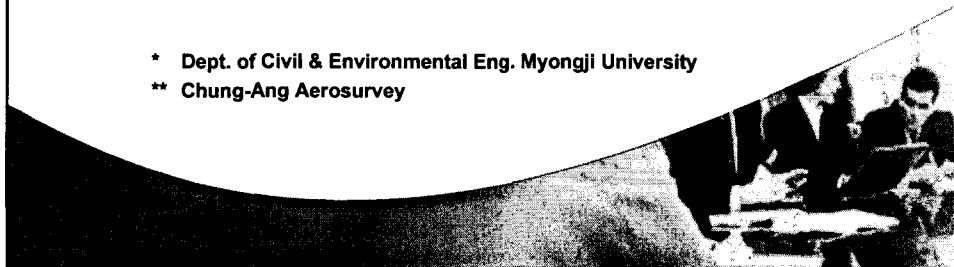# Conversion of Cadastral Data for Physical Planning

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Objectives

- Developing a prototype to provide real time information for detailed physical planning
- Designing a federated database system between Cadastre and Urban Planning database systems.
- Prerequisites are the complete resolution of the semantic heterogeneity between the two domains.

the Prototype

- Developing a conversion mechanism of semantics (semantic translator)
- Embedding the translator into the federated schema.

Cadastral Map

Digital Topo Map

Control Network

Composite overlay
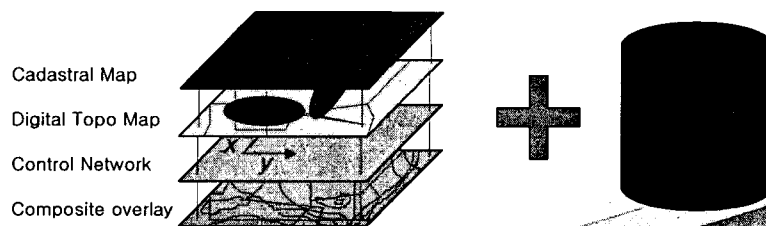
the Domains

- Extraction of land use situation is provided by
  - Parcel Based Land Information System for cadastral information (graphic and textual)
  - Digital topographic maps of 1:1,000 scale for graphic building information
  - Building Register System for textual building information

Physical planning

- The hierarchy of Korean physical plan
  - National Comprehensive Plan
    an overall view that the future Korean territory
    the guidelines and directions for hypo-plans
  - Provincial Plan
  - Municipal Plan
 - Inter-provincial Plan
  - Inter-municipal plan

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Means for land use planning

- Top-down approach
  - Most plans regardless of the level and scale
  - Convenient and time saving
  - Use of rough information about localities
- Bottom-up approach
  - Use of the information for setting up a plan from the smallest planning
  - Use of detailed and deliberated information about localities: census, economic statistics, environmental information, land use situation
 - Aggregation of smallest unit plans

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Zone Unit Plan

- A bottom-up methodology
- A tract of land assigned to a homogeneous land use in urban areas
- To construct environment-friendly cities and to facilitate sustainable development
- For intensively developed or expected to be developed
- Buildings and public facilities are strictly restricted in shape, colour, height, building coverage/land ratio and volume/land ratio to improve the function and appearance
- The residents enjoy sufficient civilised and environmental services.

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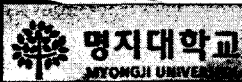
Cadastral Information

- Registers : maps and books
- Cadastral map delineates legal parcel boundaries
- Cadastral book contains attribute data: parcel-id, address, acreage, land use, owner-related information, tax grade

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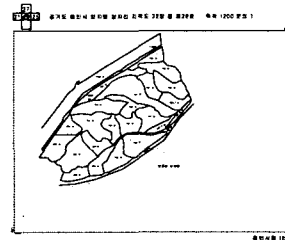
Building Register

- Textual information
- Building Act binds every building to be registered by the completion time of construction.
- The building register contains textual information such as building identifier, building area, zoning information, structure, main use, use per floor, number of car parks and lifts.

Building Register

일반건축물 대장

Acquisition of Graphic Data

- Digital topographic maps contain building s shapes as spaghetti model
- polygon topology requires to process the building layer
- Linking the created building polygons to the textual data of Building Register System
- overlaying the building layer on the cadastral map for assigning building-id to each polygon

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Development of a Prototype

- **Creation of Graphic Building DB**
    1) Extraction of the building layer from the digital topographic map
    2) Retouch of the building layer to ensure building lines enclosed
    3) Transformation of spaghetti to topological to create building polygons
    4) Overlay of the building layer on the cadastral map to assign a parcel-id to each building
    5) Revision of the assigned parcel-ids to form building ids
    6) Elimination of cadastral data invaded with overlay process from the database for reducing the data quantity handled by Building Register system
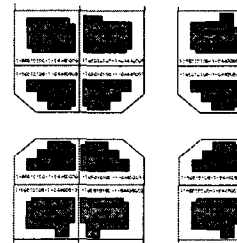
Development of a Prototype

- **Federation with Building Register DB**
  - Graphic building occurrences link to the textual database of Building Register System
  - The user interface locates at the side of graphic database connected to Building Register System through network.

Building Map Database		Building Register Database

Building-Id	1165010100-0-0445-0006
Location	bangbae, seocho, seoul
Parcel no.	445-6
Parcel area	517.1 m²
Building area	285.06 m²
Building/parcel ratio	55.13 %
Net floor area	1298.86 m²
Planned use	commercial
Zone unit	neighborhood service
Main Structure	reinforced concrete
Ceiling	reinforced concrete
Main Building Use	neighborhood service
Height	14.22 m
Floors	5
Annexes	
Car Packs	indoor 0, outdoor 5
Lifts	0
Sewage Treat	N/A
Date Building Permit	1984. 03. 08
Date Completion	1985. 08. 22
Beginning of Use	1985. 08. 22
Changes	
Others	

Development of a Prototype

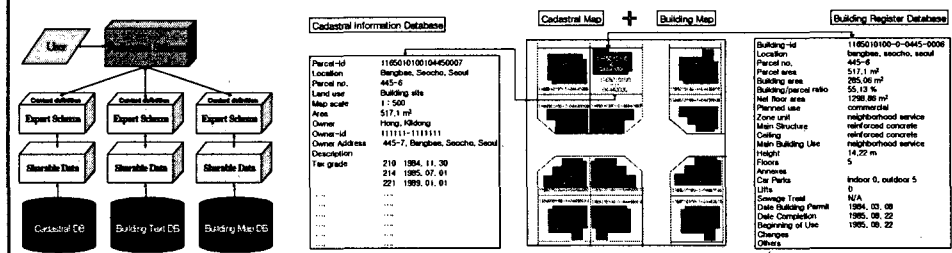- **Federation with Cadastral DB**
  - Cadastral information system supplies parcel-wise data, which is the largest scale among the presently available spatial datasets.
  - Land use, owner, value, products, geography of a parcel provides a good basis where bottom-up planning technique is applied.

Cadastral Information Database		Cadastral Map + Building Map		Building Register Database

Parcel-Id	11650101001045007
Location	Bangbae, Seocho, Seoul
Parcel no.	445-6
Land use	Building site
Map scale	1 : 500
Area	517.1 m²
Owner	Hong, Kildong
Owner-id	111111-1111111
Owner Address	445-7, Bangbae, Seocho, Seoul
Description	
Tax grade	210 1984. 11. 30
	214 1985. 07. 01
	221 1989. 01. 01

Building-Id	1165010100-0-0445-0006
Location	bangbae, seocho, seoul
Parcel no.	445-6
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Others	

Conclusions

- Data sharing to provide physical planning with land use information by applying federated database techniques
- The federated schema
    - direct queries to the cadastral database to acquire parcel information
    - queries to Building Register Database to get building information
    - map data of buildings are imported from topographic maps and processed to have topology
    - building identifier is assigned to each building polygon by overlaying of cadastral maps upon building maps
    - textual data of Building Register System are linked to the building polygon of Building Map Database
    - cadastral information system participates in the database federation using parcel and building identifiers.
    - Users can access the federation through the export schema

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Further Research

- Diverse resources enriches the federation to make users can choose adoption or rejection, which leads accurate decisions in the selective data source environment.

- Deliberation of coupling other information systems with the proposed database federation such as census data, environmental, transportation and other infrastructure information