



Spatial Data Infrastructure Research Group
INSTITUTE FOR GEOSPATIAL SCIENCE AND TECHNOLOGY

GEOSPATIAL DATA INFRASTRUCTURE: CONCEPTS AND APPLICATIONS

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MaCGDI, 19 February 2004, Kuala Lumpur



Presentation Outline

- ☐ Definition of GDI
- ☐ Nature and Hierarchy of GDIs
- ☐ Issues on GDI
- ☐ GDI Applications

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Geospatial Data

WHAT IS GEOSPATIAL DATA?

Geospatial Data or Information tells one something about a location on earth.

WHY GEOSPATIAL DATA?

Spatial data/information is one of the most critical elements underpinning decision making for many disciplines.

An estimated 90% of all information used by government has spatial characteristics or attributes.

70 - 80% cost of GIS project spends for data collection, maintenance.....

The same data sets will be collected by different agencies again and again.

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What is GIS?

In the past spatial information was mostly presented in the form of paper maps, with which most people are familiar.

Increasingly today, spatial data (or geographic information) is being captured in digital form and used through a Geographical Information System (GIS). This change has changed the conception of what Geographic Information (GI) is and has introduced new challenges in handling GI.

WHAT IS GIS?

GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically reference information. Practitioners often refer to the "total GIS" as including operating personnel and the data that go into the system.

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Advantages of Digital Datasets

The way in which the DIGITAL GEOGRAPHIC DATA are structured makes it possible to use a GIS to perform complex analysis.

The advantage of having a DIGITAL GEOGRAPHIC DATA are:

- Easy storage
- Easy dissemination
- The facilitation of data exchange/sharing
- Faster and easier updating and correcting information
- The ability to integrate data from multiple sources
- The customization of products and services

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Some Factors about Spatial Data

There are times when one might encounter a push to create a centralized one-size-fits-all spatial database or "databank", to "solve" all the information needs of a country. To counter this it may be helpful to point out that the existence of spatial data and information does not alone ensure that it is used in decision making and rational choices regarding the allocation of resources.

SEVERAL FACTORS COME IN TO PLAY, IF INFORMATION IS TO BE USED AND REUSED:

- To be used, people need to **know that the data exist**, and **where to obtain it**.
- Then, they need to be **permitted to access and use** the data.
- Further, they need to know something of the **history of the data capture**, in order to **interpret** it correctly, **trust** it and be able to **integrate** it meaningfully with data from other sources
- One may even depend on certain **other data sets**, in order to make sense of the data e.g. the listing of the population of various municipalities will be of limited use, unless one also knows where the municipal boundaries are.

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What is GDI?

Also Called:

- Spatial Data Infrastructure
- Geographic Data Infrastructure

The Definition:

There are numerous definitions available for GDI. Some of these definition emphasizes on:-

The various
components of
GDI

The purpose of
developing
GDI

The gist of all these definitions of GDI, comes down to the fact that SDI is the framework of elements/factors that are needed by the community, in order to make effective use of spatial data

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Spatial Data Infrastructure?

WHAT IS INFRASTRUCTURE?

The basic systems and services, such as transport and power supplies, that a country or organization uses in order to work effectively.

HEALTH
Infrastructure

EDUCATION
Infrastructure

TELECOMMUNICATION
Infrastructure

GEOSPATIAL DATA INFRASTRUCTURE

can be seen as an infrastructure in the same sense: just as the ability to access and use the road network is necessary for undertaking a variety of economic activities, so too is the ability to access and use spatial information necessary to plan and work effectively.

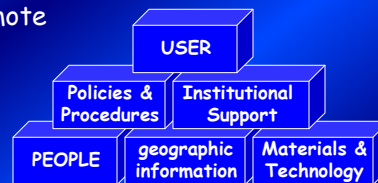
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Component of GDI

Several factors determine a country's (or region's) ability to make effective use of available spatial or geographic information:

- Clearly defined **core (or base) spatial data sets**
- The adherence of geographic datasets to known and accepted **standard**.
- Accessible documentation about existing geo-information (**metadata**)
- **Policies and practices** which promote the exchange and reuse of information, as well
- Adequate **human and technical resources** to collect, maintain, manipulate and distribute geo-information



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Core (or base) Data Sets

DATA SETS which may be used for many different purposes and in many different applications, are often referred to as **BASE data**, **CORE data**, **FUNDAMENTAL data** or **REFERENCE data**. Example of Fundamental or Core datasets are:

- Geodetic control database
- Topographic database/DEM
- Digital imagery and image maps
- Administrative boundaries data
- Cadastral database
- Transportation (roads, inland water ways, railways, etc) data
- Hydrographic (river, lakes, etc.) data
- Land use/land cover data
- Geological database
- Demographic database

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Data Standards

The way in which the data is stored, which may be software dependent, is no longer a major stumbling block to the sharing and integration of geographic data. More important is having an understanding of **WHAT** the data represents, and **HOW** it does it.

- **Geographic referencing** - in order to be able to bring together different datasets.
- **Data Content** - what feature are included in the dataset, how are these defined, and what is the relationship between them?
- **Data Dictionary** - which accompanies a dataset, which ensure that the data is correctly understood.
- **Resolution or Scale** of the geographic data, in general, only datasets of comparable scale or resolution may be combined for the purpose of analysis
- **Metadata** or data about data - for ease of understanding and comparability, this information is recorded.

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Metadata

WHY IS METADATA NEEDED?

The recording of Metadata, or data about data, serves a number of purposes. Information about dataset may be necessary in order to:

- locate appropriate data
- evaluate whether the dataset meets one's requirements
- extract the relevant data
- actually make full use of the data in an application

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Nature of GDI Components



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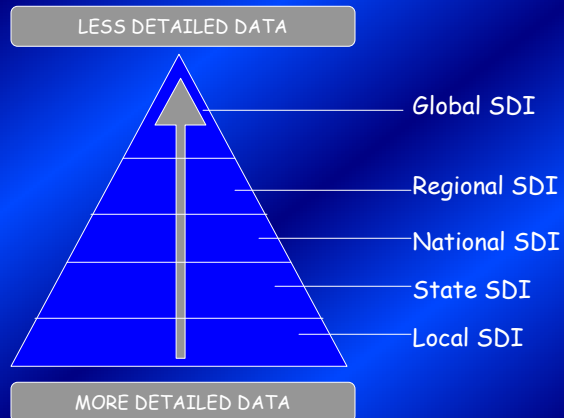
Significance of GDI

- Support integrated decision making for substantial and sustainable development in both the developed and developing countries.
- Reduce duplication - cost and efforts.
- Provide better data for decision-making.
- Support new business process/create new business opportunities in geospatial information industry

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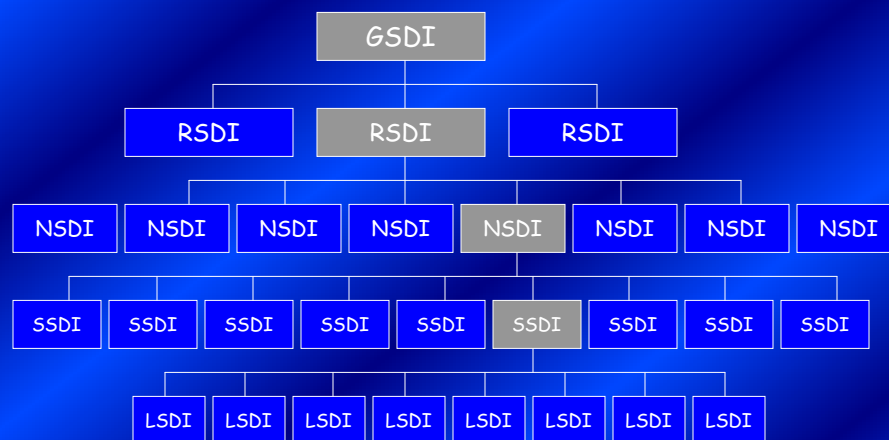
Hierarchy of GDI



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Different View of Hierarchy of GDI



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Current GDI Initiative

GLOBAL LEVEL

GSDI ---- 1996

REGIONAL LEVEL

Asia Pacific Spatial Data Infrastructure (APSDI) - 1995

European Geospatial Information Infrastructure (EGII) - 1995

African SDI - 2000

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Current GDI Initiative

NATIONAL LEVEL

Australia ASDI 1986
USA NSDI 1990
Qatar NGIS 1990
Netherlands NGII 1992
Indonesia NGIS 1993
Iran NGIS 1995
Malaysia NaLIS 1994
Japan NSDI 1995
Canada CGDI 1996
Britain NGDI 1996

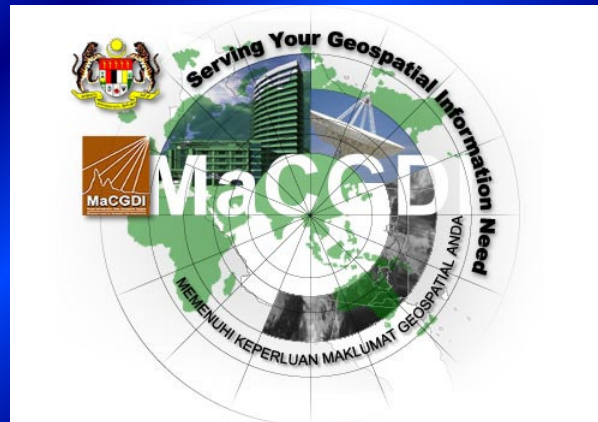
MyGDI ←

STATE LEVEL: Victoria Geospatial Environment

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Malaysia Centre for Geospatial Data Infrastructure



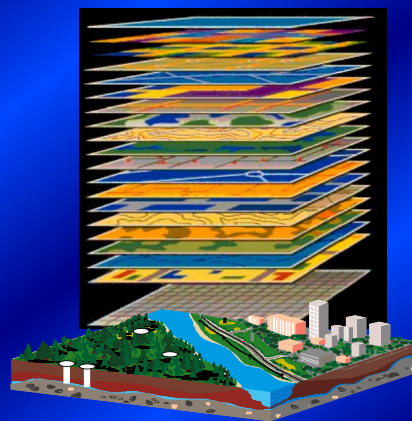
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MyGDI Data Themes:

MyGDI Data Themes:

- Built Environment
- Demarcation
- Hydrography
- Geology
- Hypsography
- Soil
- Transportation
- Utility
- Vegetation
- General

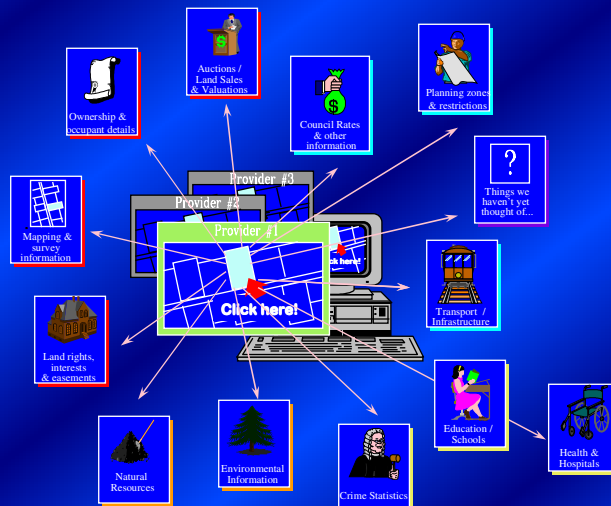


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GDI 'Point and Click' Vision

Customers will be able to point to a piece of land on an electronic map, and have all the information relevant to that piece of land at their fingertips.



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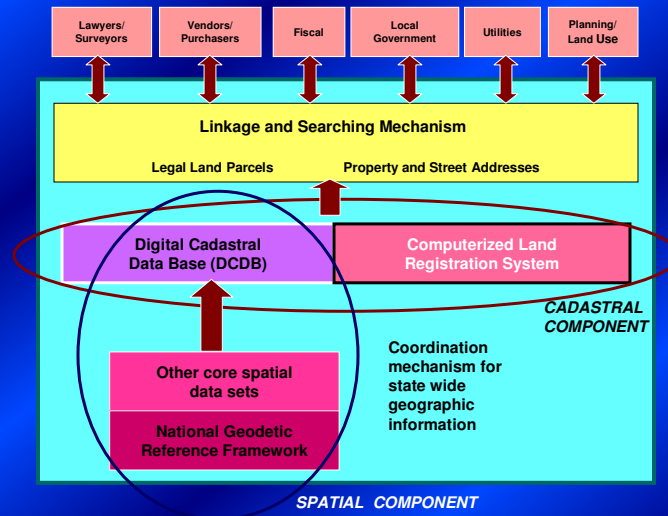
GDI APPLICATIONS:

- Local Authority
- Facilities Management
- Environmental
- Geology
- Park Management
- Flood Mitigation
- Public Utilities
- Health Care
- Emergency Respond
- Real Estate
- Public Election

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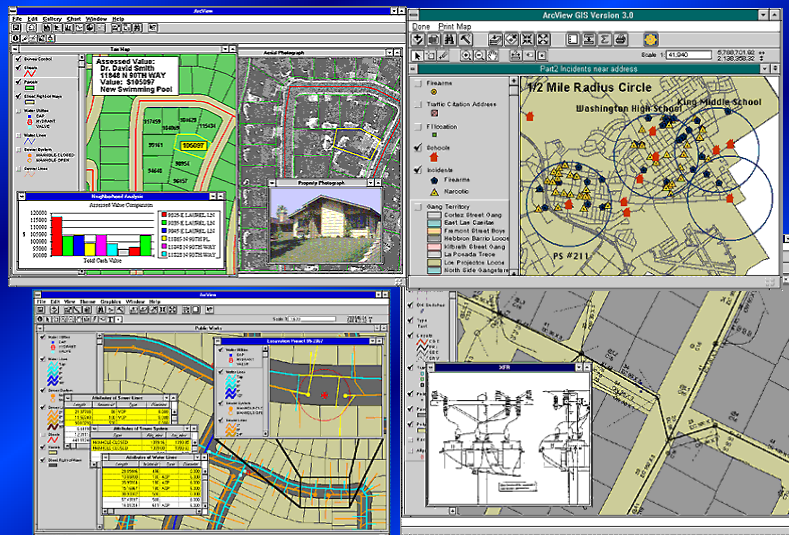
SDI In Local Authority Application



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Facilities Management Application (Town Planning)

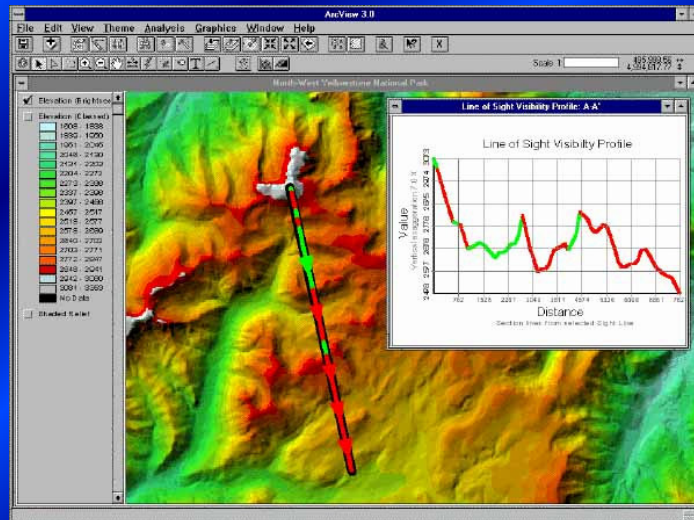


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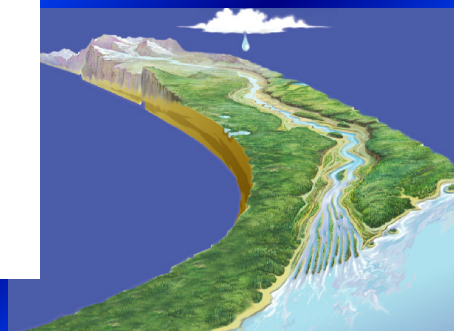
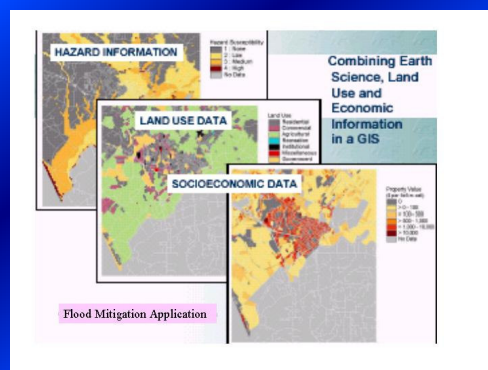
Park Management Application



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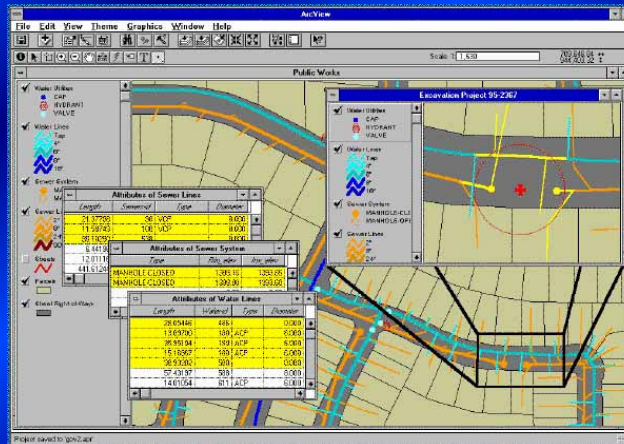
Flood Mitigation Application



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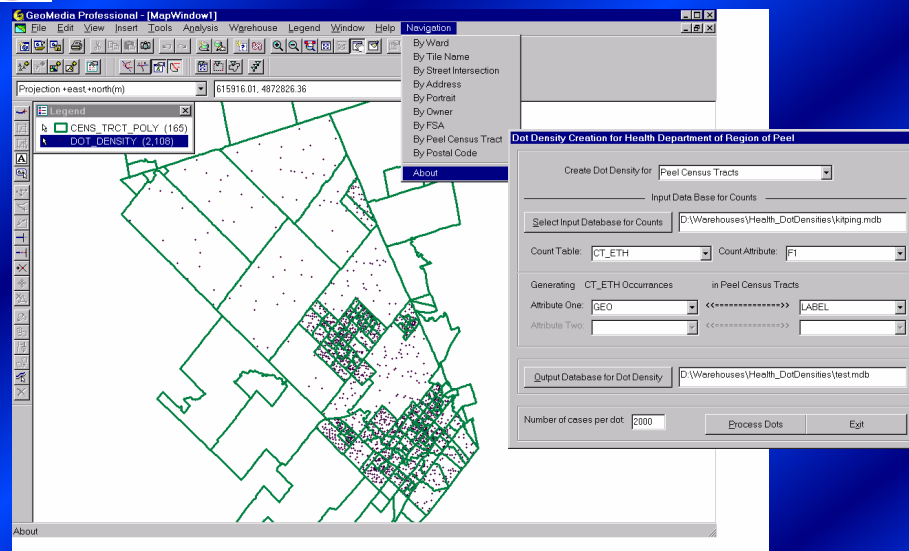
Public Utilities Application



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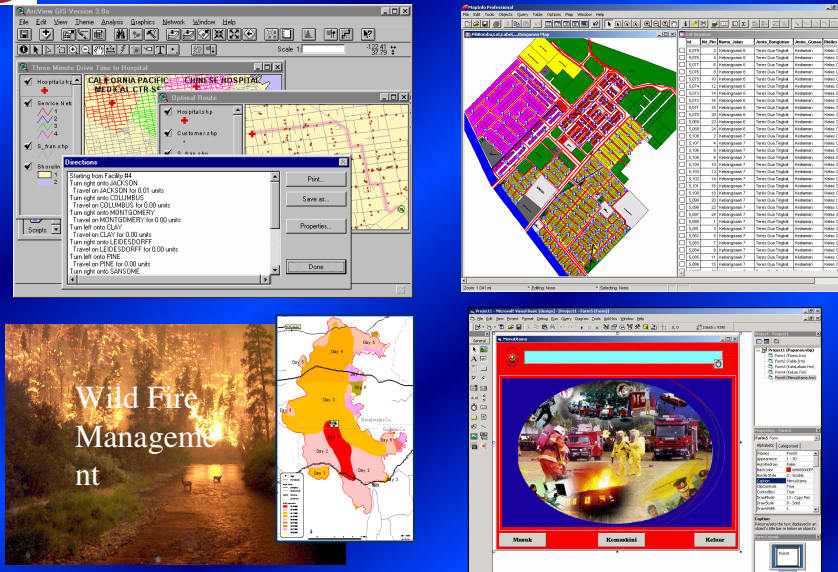
Health Care Application



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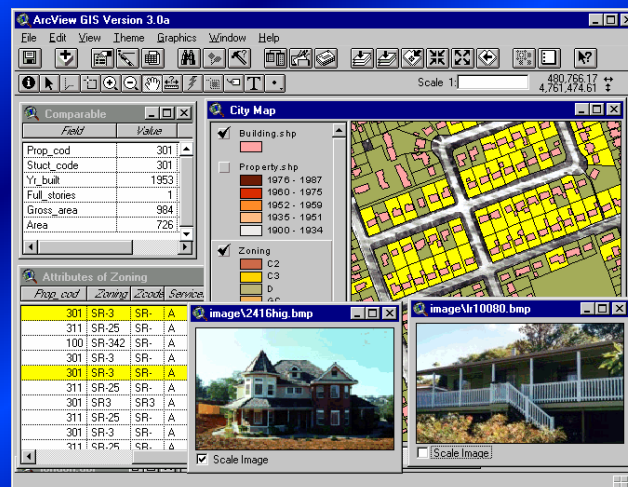
Emergency Respond Application



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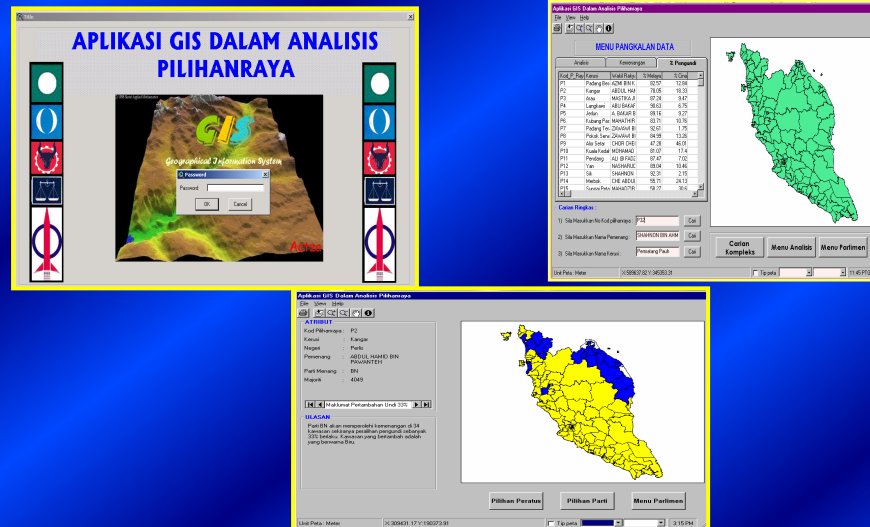


Real Estate Application



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Public Election Application



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