

## GIS FOR LAND ADMINISTRATION

GIS purports Singapore's vision of integrated government in the sharing of land information.

### Highlights:

- Singapore's vision of integrated government in the sharing of land information
- Real-time data exchange and interoperability on the Web
- A data model for unique funding
- Integrating government agencies (ILIS, SLA Map Portal, National Broadband Network Planning, SPIO, State Land Register, Land Resource Management and e-services System and Environment Protection)

### Singapore's vision of integrated government in the sharing of land information

Supporting Singapore's vision of an integrated government, Singapore Land Authority's (SLA) and Information Network (LandNet) is a spatial data-sharing portal that has propelled interagency sharing of information to a higher level. Many new applications and services were spurred by the creation of LandNet, which promote the availability of data and interagency connectivity. With online and real-time map-based e-consultation and e-collaboration among government agencies, Land- Net has enabled efficient and quick decision making and strategic planning.



Sharing of land information is not a new concept among the government agencies. The practice started in the late 1980s when the Land Data Hub (LDH) was established. Created and managed by SLA, the objective of LDH was to provide a one-stop shop for land information. Over the years, this resource centre eliminated duplicative efforts in spatial data acquisition. LDH subscribes to the idea that data should be created once and used many times.

Today, 15 participating agencies contribute more than 30 types of spatial data to LDH. While LDH supports SLA's vision of sharing data, the hub's operating model of manually changing data every quarter was not keeping up with the contemporary demands. Demand for spatial data has increased in the recent years for the management of security, environmental, and

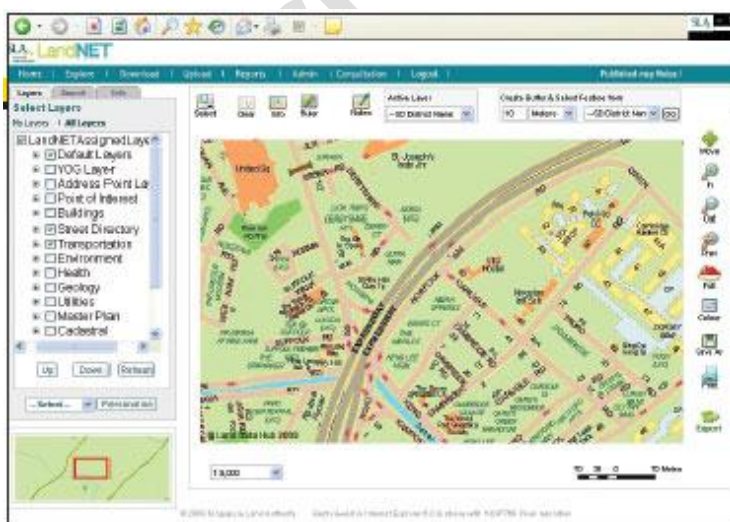
health risks, as well as for planning and management of land and resources. There has also been a desire to see online data sharing, e-consultation and even project collaboration to reach the goal of integrated government.

### Real-time data exchange and interoperability on the Web

In 2004, with the help of key data supply agencies, SLA began pilot-testing a new technology that provided LDH with new capabilities, including online updates and map based e-consultation. After a three-year pilot phase, Land- Net system was rolled out in June 2007. It is Web-based and allows agencies to view, access, spatially analyse, upload and download data directly from LDH. In essence, LandNet enables online and up-to-date data sharing across different agencies even those that use different GIS technology.

Designed on a whole-government approach, LandNet provides an effective, paperless means for agencies to discover and share spatial data. With this, agencies can upload and download data in a variety of spatial data formats. LandNet provides the convenience of automatically downloading based on user-desired frequency and location of download. Many agencies use this feature to download LandNet data directly to their GIS servers at their preferred frequency.

LandNet makes it possible to view multiple types of spatial data like road lines, cadastral lots, landownership and utilities data, using a Web browser without the need for GIS software. Non-spatial types of data like socioeconomic statistics can be layered easily. Satellite images can also be used as a backdrop for spatial data.



Innovative features of LandNet include profile-based access to data and a simple map browser with map view, query and analysis tools. The map browser can be personalized based on user preference. Users can set the number and appearance of the layers they want to view each time they log in. LandNet also offers tools for map-based e-government and e-consultation.

For agencies with their own customised GIS, LandNet acts as a virtual GIS data warehouse. LandNet system was one of the early adopters of ESRI ArcGIS Server map caching tools and

advanced behind-the-scenes geoprocessing features. It was also the first system in the Asia-Pacific region to possess enterprise GRID technology, which gives it higher performance and better scalability. Another first was the implementation of LandNet's GIS Web services with the government Web service exchange (GWS-X). The marriage of the two allows government agencies to integrate maps into their websites without having to operate a GIS infrastructure. LandNet is as much a showcase of international standards as of geospatial technology. The system adopted ISO/TC 211 standards for metadata creation; OGC's Geographic Markup Language (GML) standard for data interchange; and the OGC Simple Features specification for data storage.

### Government Agencies Utilising LandNet

|        |   |
|--------|---|
| URA    | Urban Redevelopment Authority   |
| BCA    | Building and Construction Authority   |
| LTA    | Land Transport Authority  |
| JTC    | Singapore's leading master planner, developer, and manager of high-quality industrial facilities and business parks |
| HDB    | Housing and Development Board   |
| ENV    | Ministry of Environment and Water Resources   |
| NEA    | National Environment Agency   |
| PUB    | Public Utilities Board  |
| PA     | People's Association  |
| MHA    | Ministry of Home Affairs  |
| MINDEF | Ministry of Defense   |
| SLA    | Singapore Land Authority  |

#### A data model for unique funding

LandNet is maintained and operated on a cooperative funding basis where members come together to share their data as well as the operating costs of data sharing. Agencies pay a one-time yearly subscription and a download service fee on a pay-per-use basis.

The income generated by the system is used to cover operating costs. The surplus income is returned to member agencies in the form of subscription fee rebates. This funding model ensures sustainability of the land data sharing programme and accountability. The use of LandNet as a shared infrastructure helps save significant costs overall for the government.

The use of LandNet as a shared infrastructure helps save significant costs overall for the government. It is estimated that in absence of LandNet, the agencies would have to spend more than S\$9.0 million in development costs and S\$2.5 million in annual maintenance costs to enjoy the same capabilities and benefits that LandNet offers.

### **Integrating government agencies**

With its good interagency connectivity, GIS functionalities and the ready availability of spatial data, LandNet has become the enabler and preferred GIS platform to support other national initiatives and map-based applications.

### **Integrated Land Information Services (ILIS)**

A visit to [www.inlis.gov.sg](http://www.inlis.gov.sg) allows citizens to purchase property and land-related information from multiple agencies. INLIS uses LandNet as a conduit to pull GIS from various agencies.

### **SLA Map Portal**

The SLA Map Portal, found at [www.map.gov.sg](http://www.map.gov.sg), provides citizens with free street-level maps, information on landownership and locations of free Wi-Fi hot spots. Many other government websites also take advantage of these map services to show the location of government facilities and services.

### **National Broadband Network Planning**

LandNet helps the Infocomm Development Authority (IDA) in the laying of cables for the next-generation broadband network. By making essential spatial utilities and services data available, LandNet Web browser provides maps, allowing stakeholders to visualise utility network data such as underground sewerage, water and gas.

### **State Properties Information Online**

Built on LandNet's GIS platform, State Properties Information Online (SPIO) provides up-to-date map-based listings of vacant state-owned properties available for rent or lease. With this information readily available, the use and occupancy rate of these properties are maximised.

### **State Land Register**

Government agencies can view and inquire on the listings of their state-allocated land and building inventory using the State Land Register. Accessing data from LandNet, it facilitates

the verification, confirmation, and certification of the listings to ensure accurate and complete records for accountability.

### **Land Resource Management and e-Services System**

Serving citizens through better interagency coordination and e-consultation, the Land Resource Management and e-Services System integrates several back-end land administration work processes. This is achieved by exploiting LandNet's interagency connectivity and wealth of spatial databases, which eliminate the need for the agencies to approach one another manually on land administration matters.

### **Environment Protection**

Government agencies exchange information on trees via LandNet to help maintain Singapore's status as a green city. Updated spatial data on land aids in dealing with geostrategic implications of climate change. Information gathered at LandNet helped in creating Singapore's first landslide susceptibility maps showing tree information accountability.

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