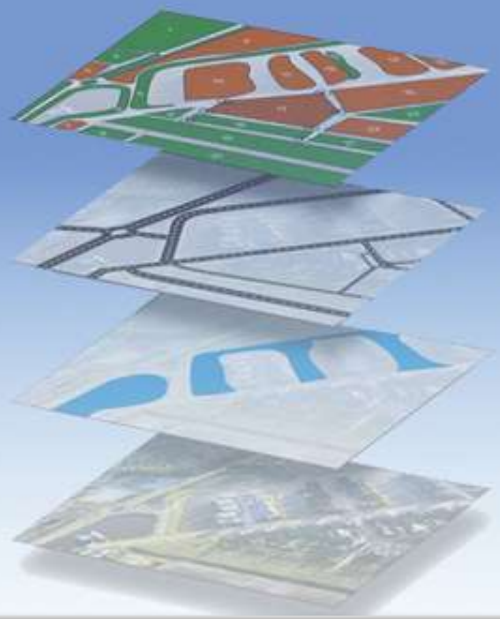


Sivan design

www.sivandesign.com

3D Cadastre GIS Technology

3D GIS in the Cloud

ESRI Developer Network

Autodesk® Authorised Developer

3D Cadastre GIS

Presentation Topics

- Previous 3D Cadastre GIS R&D Highlights
- 3D GIS in the Cloud key features and technology
- 3D GIS in the Cloud and 3D Cadastre
- Future 3D Cadastre GIS

3D Cadastre GIS

The Challenge in 3D Cadastre GIS

It is a challenge to design and create GIS platforms that can fully support a 3D cadastre

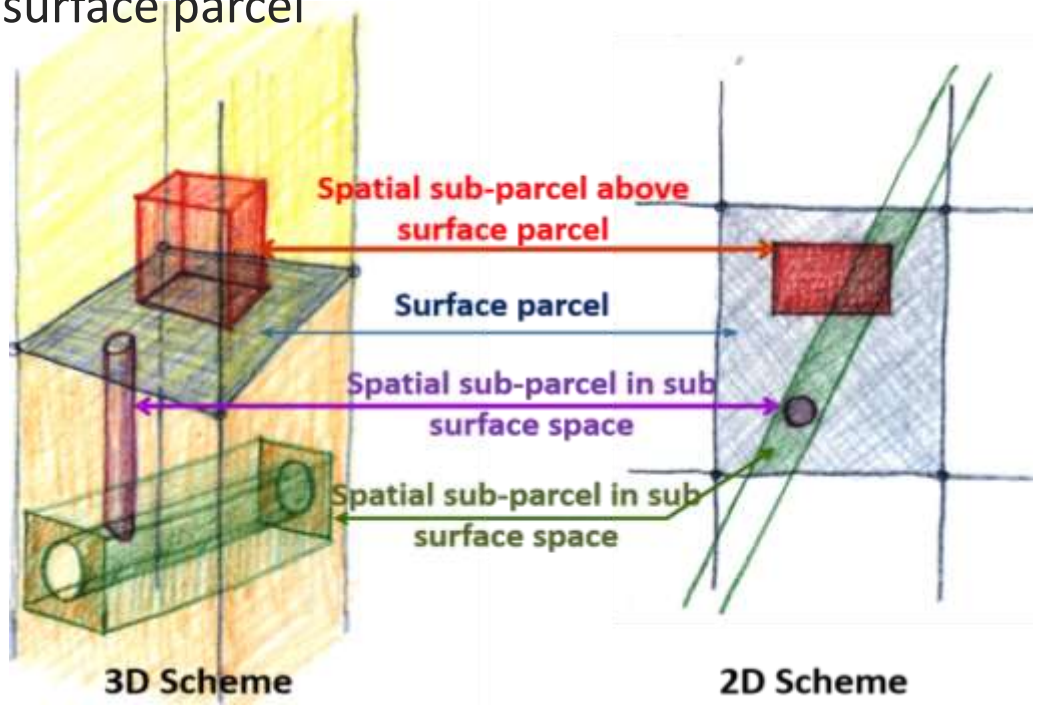
- How to view and manage a 3D Parcels in GIS?
  - Issues in its geometry, topology, database, reparcellation…
  - Integration with existing 2D layers and data structure
- Requires hi level accuracy
- Dealing with large scale data and area
- Discrepancy between surfaces and between topography to man-made objects (bridges, tunnels)
- Visibility / Invisibility issues
- Requires knowledge in geodesy, geometry, databases, CAD, information systems, process analysis…and of course GIS

3D Cadastre GIS

Past 3D Cadaster R&D in Israel

2004 Survey Of Israel R&D

- Proposed Solution to 3D Cadatre - Spatial registration by sub-dividing the surface space into Spatial Sub-Parcels
- A final volume object that will be included as a part of the surface parcel; No changes in definition of the surface parcel
- Will be noted in the Title Register
- Continuity of the existing registration method



3D Cadastre GIS

Past 3D Cadaster R&D in Israel

- **2009 – Sivan Design (for SOI) - Integration of 3D Cadastre in GIS**

  Recommended solution for 3D Cadastre implementation – Multi Layers Model

  - **Surface Parcels in 2D layer as the current cadaster (Polygons)**
  - **Spatial Sub Parcels as 3D layer (B-rep)**

Boundary Representation (B-rep)

Describes the surface of a volume by the relationships between the faces, edges, and nodes which compose that volume.

Advantages:

- **Adopts SOI's R&D recommendations**
- **Support modular development: enables current state land registration continuance in the future while 3D Cadastre (e.g Spatial Sub Parcels) development will be additive rather than alternative**

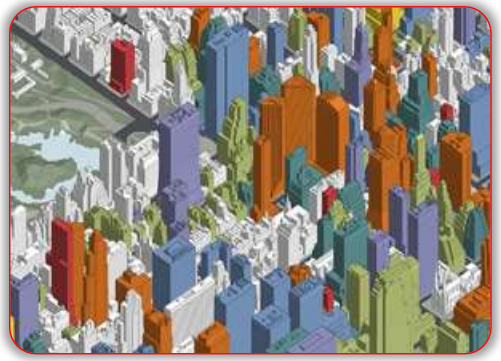
3D Cadastre GIS

3D GIS in the Cloud: Main Purposes

City Planning

Upper and underground infrastructure

3D Cadastre



Highways and roads

3D Cadastre GIS

3D GIS in the Cloud Uses

- Simulate proposed plans and test-case different scenarios
- Time-of-day visualization and analysis of a structure's volumetric shadow affect
- Visualize how proposed plan changes the city skyline and evaluate its impacts
- Area/Line-of-sight evaluation from various observation points and heights
- Create realistic 3D flythrough animations of any scenario such as touring within a proposed project or to evaluate situational impacts
- Create volumetric 3D Buffer and identifies intersected and collided objects and features within the buffer
- Evaluate expropriation of underground sub-parcels

3D Buffer and safety Distance

Plan changes in the city skyline (1 – 3)

1

2

3

3D Cadastre GIS

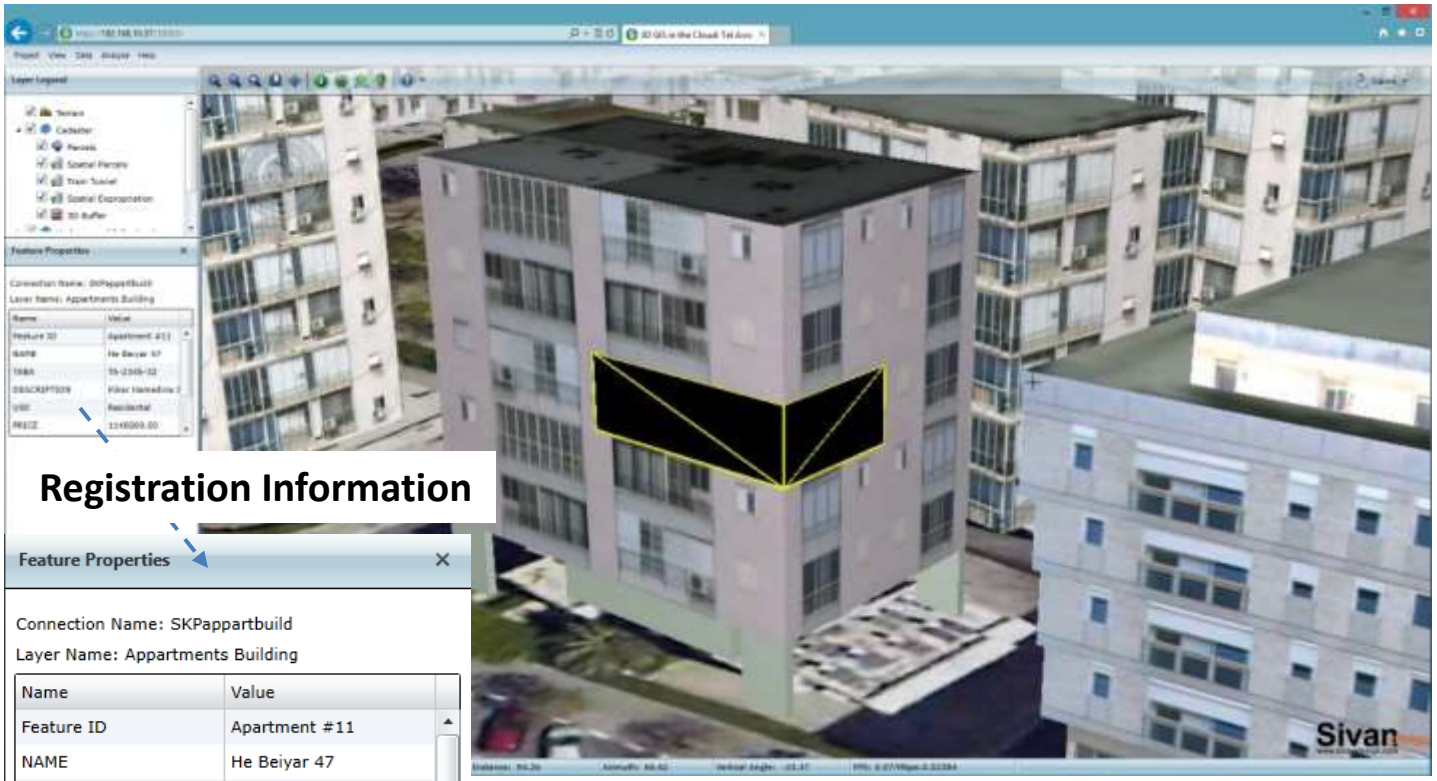
3D GIS: Technology and Key Features

- Purely web application (3D GIS Studio and 3D GIS Explorer)
- Cloud computing approach
- Server Side Rendering based Technology
- Convert data/projects from 2D to 3D in few steps
- Viewing, Analyzing and Exploring in 3D
- Support for most common data formats and Geo-Spatial protocol
- Includes additional new features such as 3D buffer, 3D Parcel, Pipeline, Manhole, etc
- Available for iPad and mobile devices

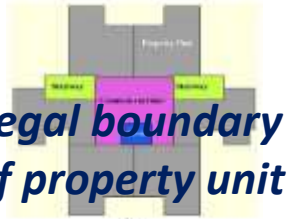
3D Cadastre GIS

What to include in a future 3D Cadastre GIS?

- **Registration of Common Properties / Households**



Physical shape of property



Legal boundary of property unit

Collection of the 3D property units

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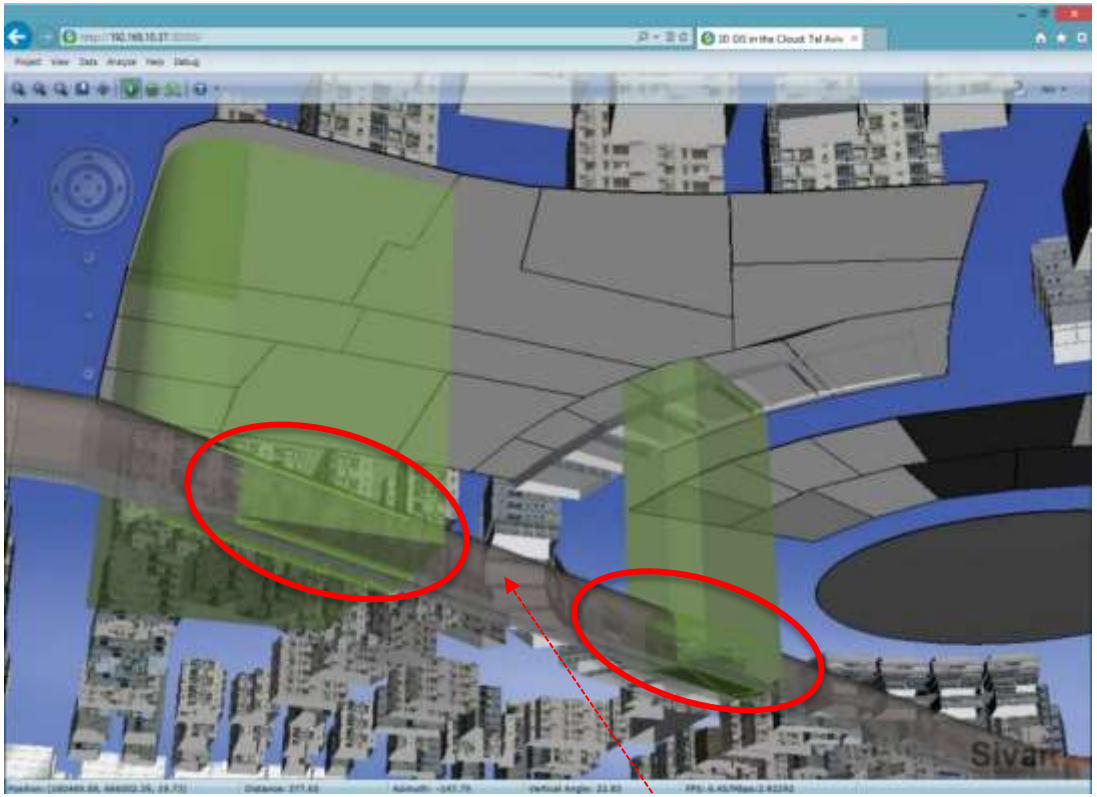
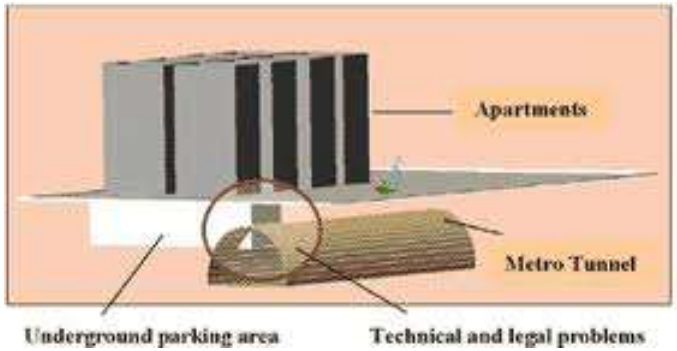
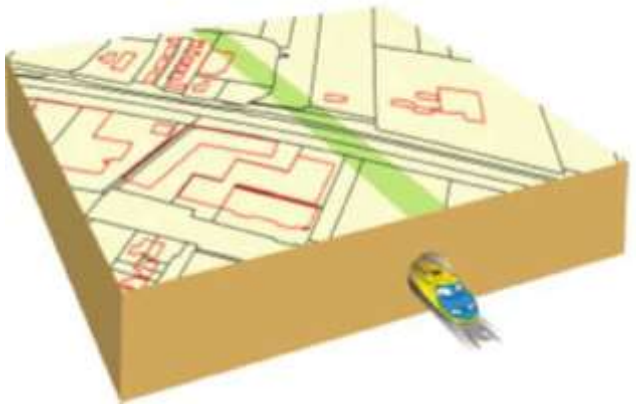
Future 3D Cadastre GIS

- **Spatial Sub Parcel and Sub Surface Expropriation**
  - **Spatial calculation and display of sub surface expropriation**



Tunnel

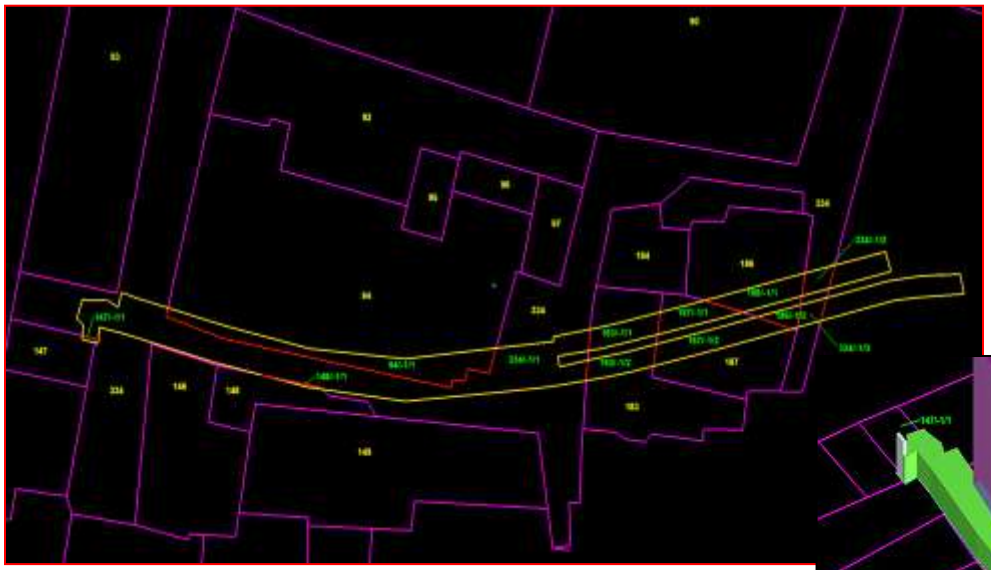




3D Cadastre GIS

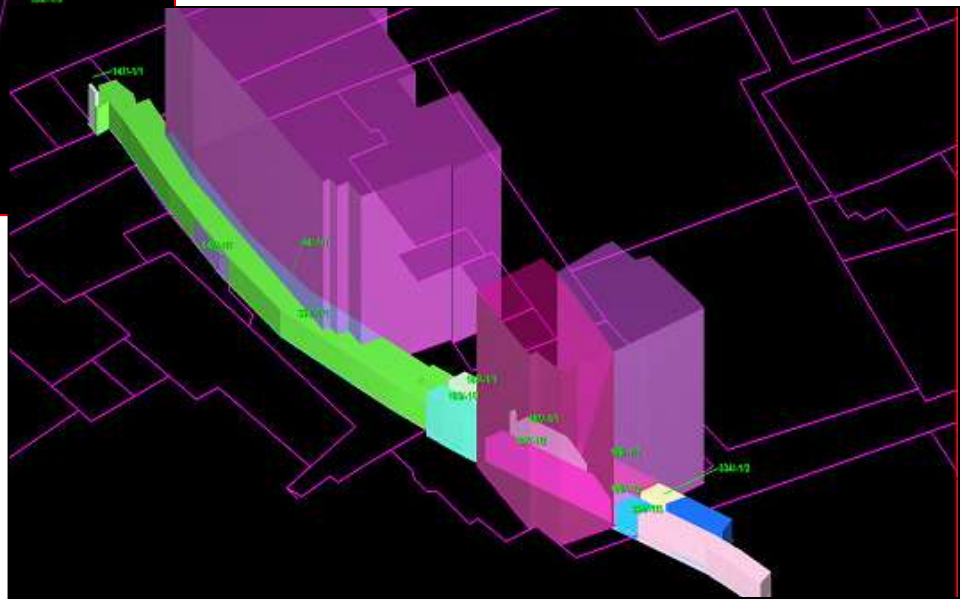
Future 3D Cadastre GIS

- **Spatial Registration Plan: from AutoCAD to 3D GIS feature**



The Spatial sub-parcels on the background of the existing land parcels

3D Presentation of the spatial sub-parcels



3D Cadastre GIS

3D GIS In the Cloud and 3D Cadastre

3D GIS in the Cloud Evaluates and assist in designing existing and planned spatial space

- Storing and managing 3D GIS features such as the Spatial Parcel and Spatial Sub-parcel
- Storing and Managing Topological relations between the 2D parcel and the 3D Parcels and 3D Sub-parcels at the upper or under space of the 2D parcel.
- Provides a realistic and detailed 3D model of parcels
- Handles complex spatial spaces above and below ground
- Use Level Of Details (LOD) techniques to overcome large scale data and area challenge
- Contains registration and ownership information

3D Cadastre GIS

3D GIS In the Cloud and 3D Cadastre

Regulation Administration

- **3D Capabilities and Visualizations**
  - Store and manage 3D Cadastre data
  - Compare between existing or planned design to a specific area regulation
  - Easily understand complex urban planning regulation as 3D visualization
- **Web application**
  - Support local governments in achieving planning consents with relevant communities
  - Inform residents about new regulations to facilitate an early feedback

3D Cadastre GIS

Current Activity

3D Cadastre GIS Pilot with Survey of Israel

המרכז למיפוי ישראל
Survey of Israel

- 1year R&D research
- Major outputs:
  - Display Spatial Registration Plan as 3D GIS features in full 3D GIS environment
  - Design and specification of solutions for future 3D Cadastre GIS (Parcel and Spatial Sub parcels, 3D spatial queries…)