Cadastral System Implementations Using GIS

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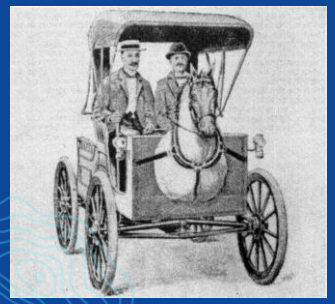
International Seminar on Effective Land Administration

Session #6 – “Partnerships and innovations for effective land administration”

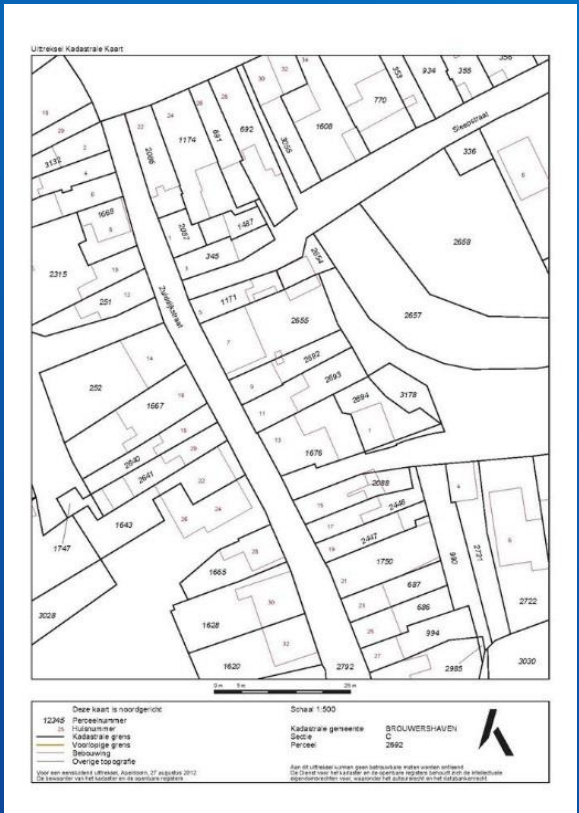
Cadastral system development:

“The moment you finished your desired system, the world appears to have changed again ….”



First time registration

Transaction



2D Map

3D model with BIM integration

So,

1 Use what’s there

2 Make it sustainability

3 Use GIS for cadastral system development

(But),

Collect

Vista Hermosa - Colombia, 2018

(But),

Manage

Beira - Mozambique, 2019

(But),

Share

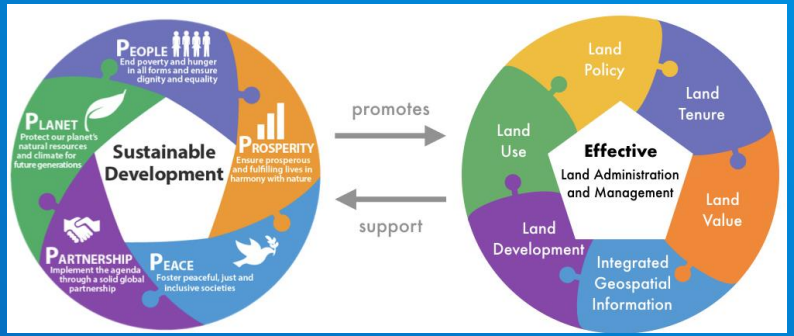
Beirut - Lebanon , 2019

1 Use what's there

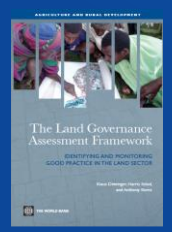
- Knowledge
- Technology and Tools
- Build and use communities (global, national, local)

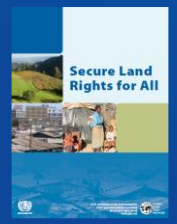
Knowledge

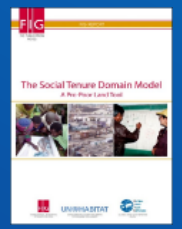
- Guidance
  - UN GGIM – Integrated Geospatial Information Framework (IGIF)
  - UN GGIM - Framework for Effective Land Administration (FELA)

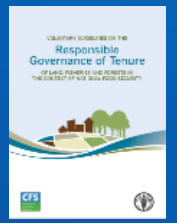


- Methods and approaches
  - Land Administration Domain Model (LADM; ISO 19152)
  - Fit for Purpose Land Administration (FFP)
  - Local and indigenous knowledge









Technology and tools

ArcGIS:

- Parcel Fabric
- Survey123
- Fieldmaps
- Enterprise Architecture
- Workflow Manager
- ArcGIS Pro / Online
- Etc.

Build and use communities

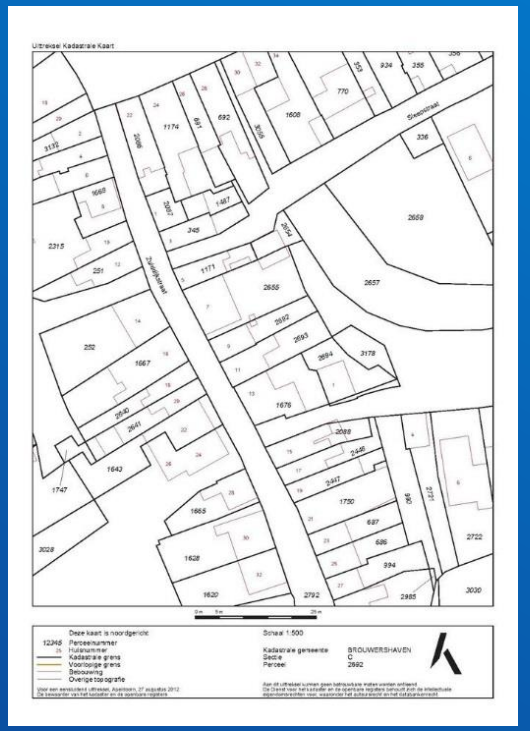
- Global, national, local

UN GGIM - Expert Group on Land Administration (Singapore, 2021)

2 make it sustainability

- Past, present, future (Map / BIM/ GeoAI)
- Scalable
- Configurable, avoid customization
- Affordable

Past, present, future



Scalability

Projects

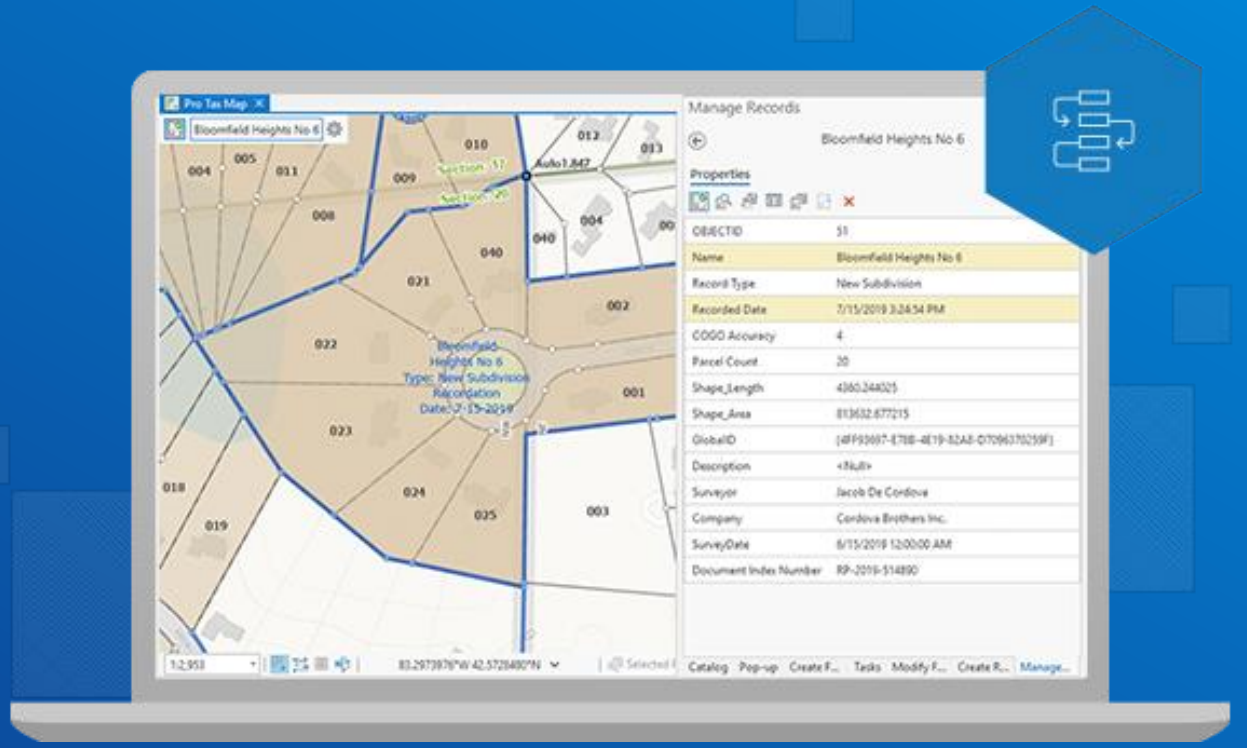
Systems

Cloud Services

Geospatial Infrastructure
(System of Systems)

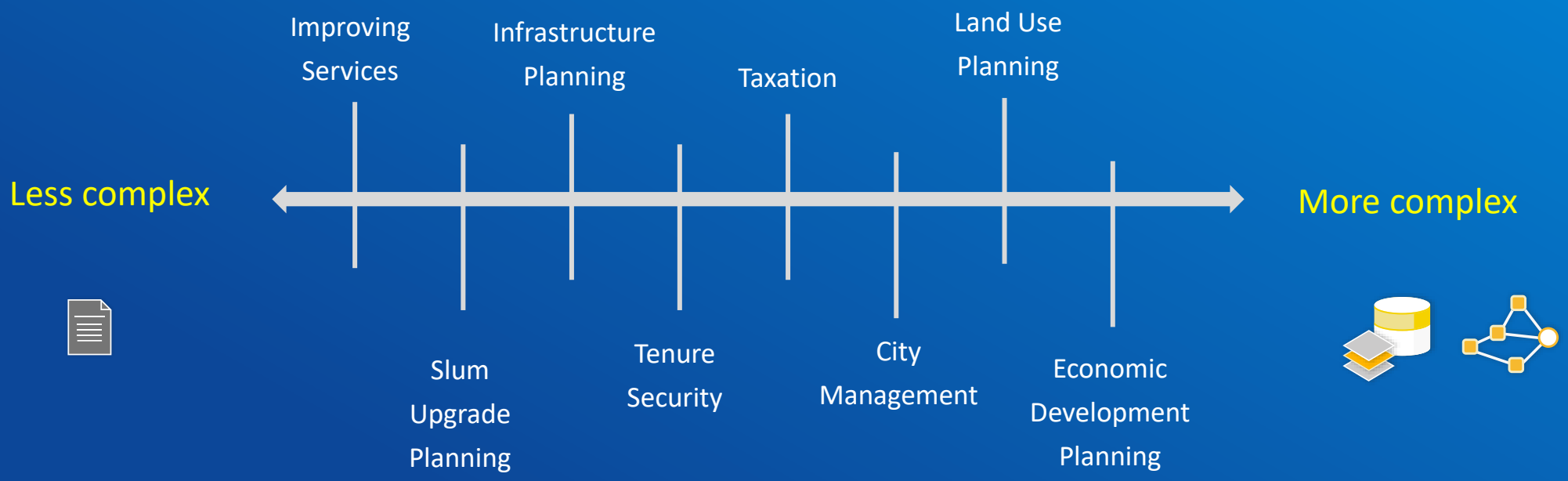
Configurable, no customization

- Take advantage of COTS
- Adapt procedures
- Build capacity (training)



Affordable: Fit for Purpose Implementations

- Consider the geospatial, legal and institutional context



3 Use GIS for cadastral system development

- System of records, insight and engagement
- Follow developments (innovation)
- Hardware, software and capacity

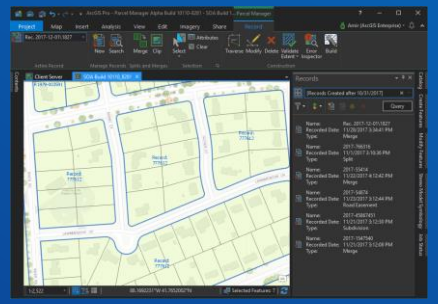
GIS and cadastral development

Collect → Manage → Analyze → Share

Field Operations

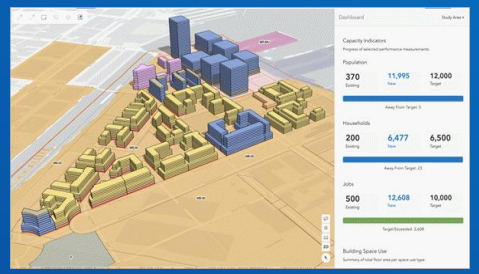
- Fit for purpose, LADM
- First registration
- Workforce Management
- Field capture of parcels and attributes
- Drone imagery

Parcel Management



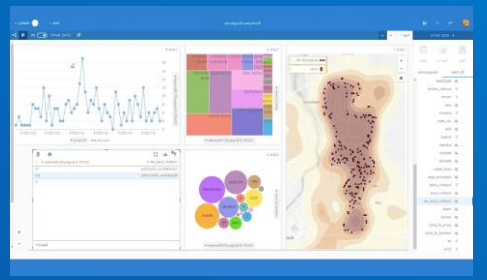
- Parcel Fabric in Pro
- Built in quality management
- Parcel history
- Spatial adjustment

Land Use Planning



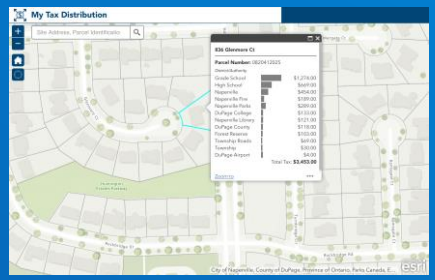
- Create zoning and land use plans
- Visualize projects
- Report on indicators
- Increase engagement

Property Valuation



- Geo-enrichment
- Data visualization and exploration
- Spatial Modeling & Value Prediction

Stakeholder Engagement



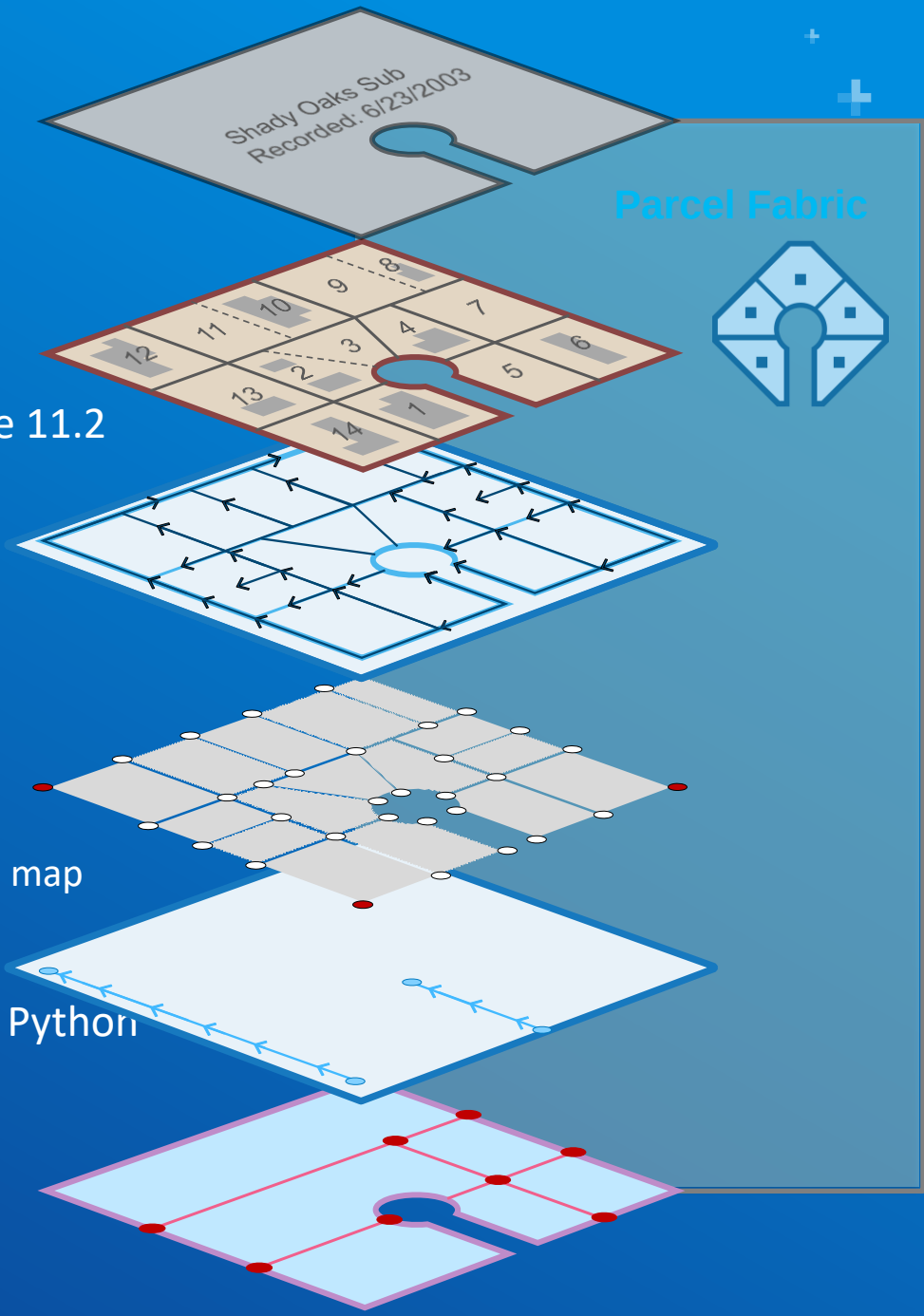
- Open data and SDI
- Community engagement
- Public-facing maps & apps

Follow developments (innovation)

(Communication - November 9, 2023)

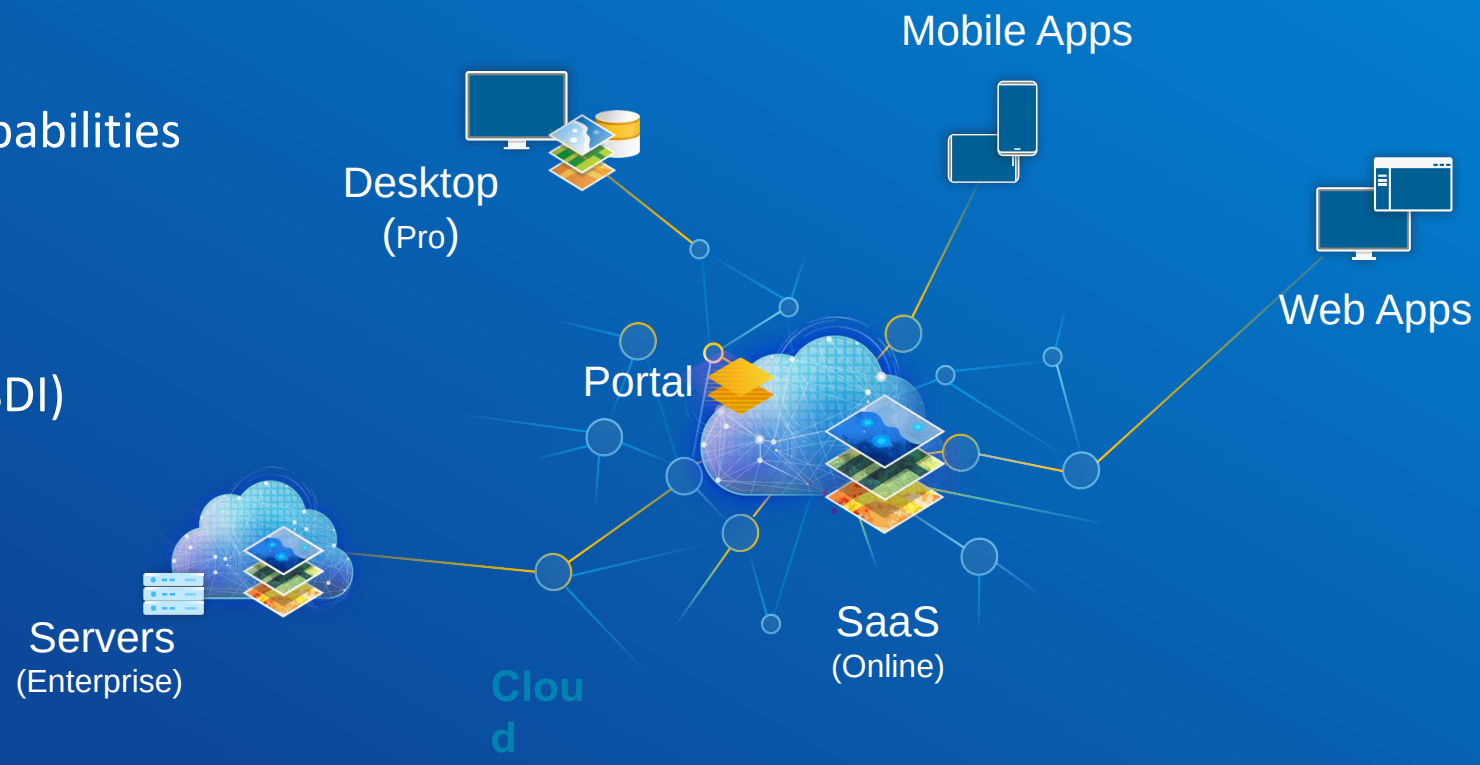
New functionality of Parcel Fabric in ArcGIS Pro 3.2 and ArcGIS Enterprise 11.2

1. New simplified **licensing** for anything that involves advanced editing
2. **Parcel Lineage** depiction using Link Charts
3. **Offline** parcel fabrics
4. **Manage Records** – field configuration and enhanced UI-UX
5. **S et Current / historic** also works on points
6. **Align parcels** enhancements
7. New geoprocessing tools:
    1. GP **Export Parcel Record Features** - used to create the 'Before and After' map
    2. GP **Delete Parcels**
    3. GP **Create Parcel Seeds**
8. **Active record automation** part of the CIM and can be automated with Python
9. **LSA**: support of additional direction types
10. The **Explode** editing tool is 'active record aware'
11. **Highlight Gaps and Overlaps** enhancement
12. **Schema Report**



Hardware, software and capacity

- Integrated registries and maps
- Scalable (performance, number of records, workflows and capabilities)
- Versioning (past, present, future)
- Use of standards (OGC, ISO, LADM)
- ETL (Extract, Transform and Load) capabilities
- Interoperability
- Data quality and security
- Evolvable (multipurpose cadaster, NSDI)
- Training and capacity



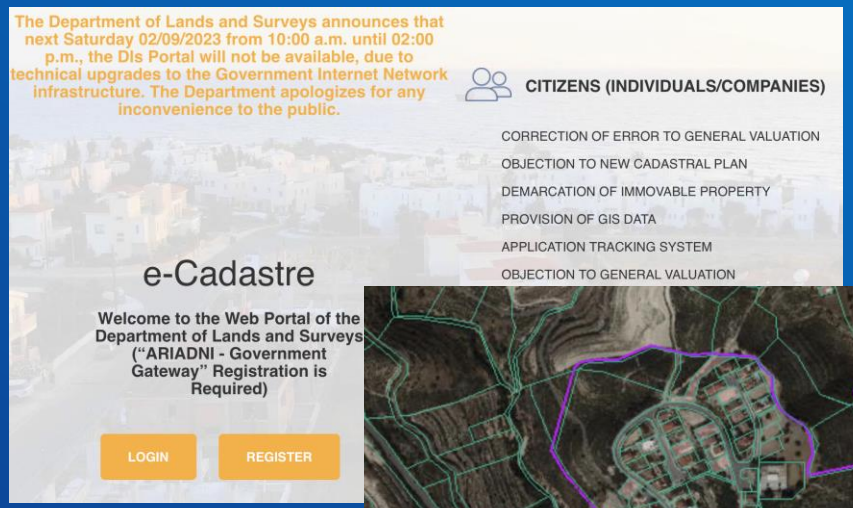
Examples

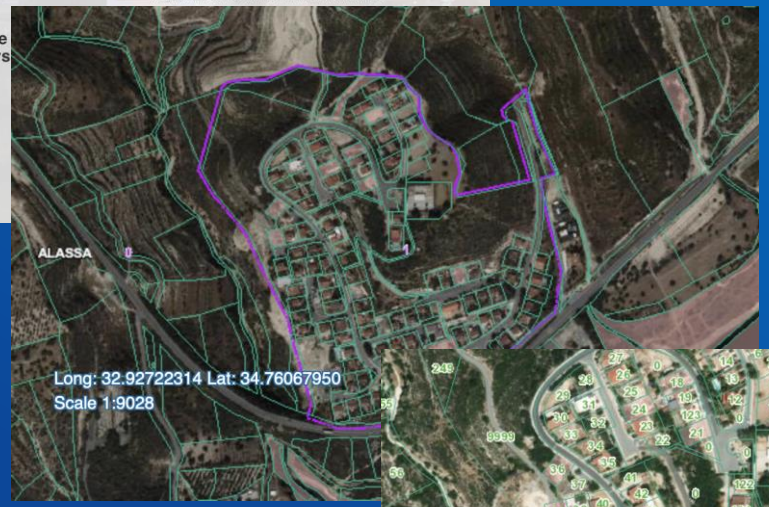
- Cyprus
- Hong Kong
- Morocco

Cyprus: Dept of Lands and Survey

Modernization of National Computerized LIS

REPUBLIC OF CYPRUS | MINISTRY OF INTERIOR
DEPARTMENT OF LANDS AND SURVEYS





DEPARTMENT OF LANDS AND SURVEYS

"The wealth of data in the Department is enormous and is considered as the most important strategic asset of the Department of Lands and Surveys.

CLIS

- Digital Transformation of 20+ year old platform
- Services Based Architecture
- First national level deployment of the Parcel Fabric
- Workflows for Customer Transactions
- Dashboards and Reporting
- Integration into Legal & Fiscal System

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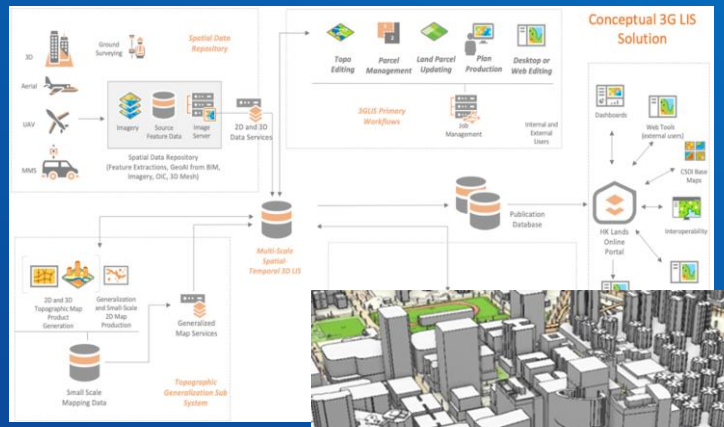
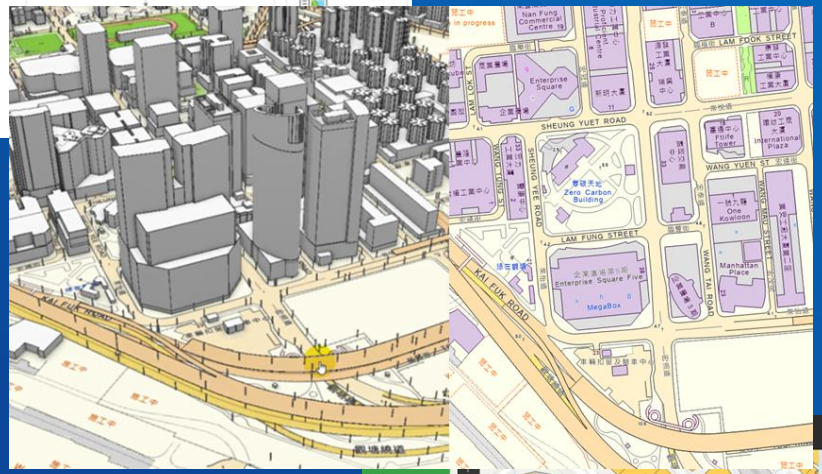
Lands Department, Hong Kong

Feasibility Study for the 3GLIS



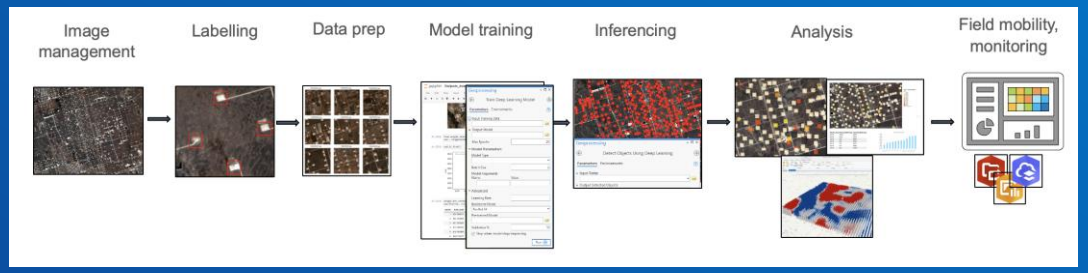


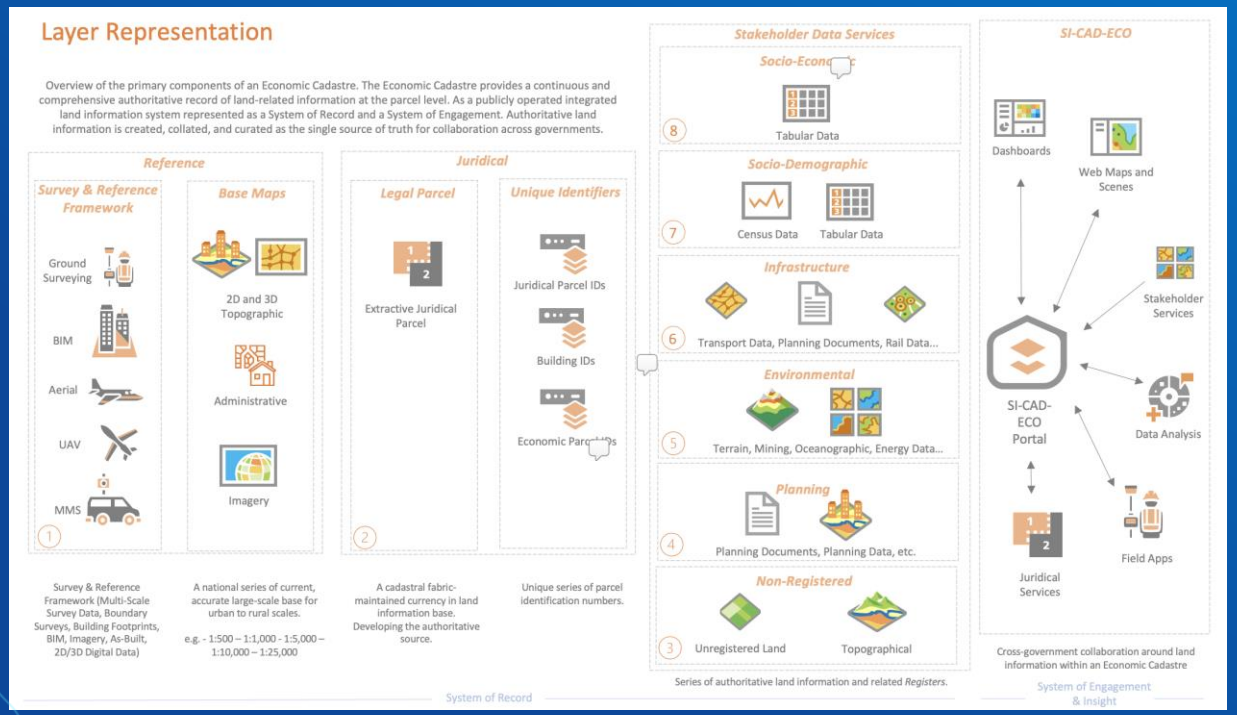
3GLIS

- Digital Transformation – 2D to 3D System of Record
- National Objectives
  - Smart Hong Kong
  - Development of a Digital Twin
- Design Principles
  - Cloud First Architecture
  - Web Editing
  - Full 3D System of record
  - Nex Generation Workflow Management
  - Portal and Apps
  - Serving the CSDI

ANCFCC, Morocco

Design of the National Economic Cadastre





SI-CAD-ECO

- Design of a National Economic (Multipurpose) Cadastre
- Cloud First Architecture
- Development of GeoAI Workflows for Feature Extraction
- Supporting the Morocco SDI
- Implementation of the Parcel Fabric at the National Level

Conclusions

1 Use what's there

- Knowledge
- Technology and Tools (ArcGIS, PF, Survey123, …)
- Build and use communities (global, national, local)

2 Make it sustainability

- Past, present, future
- Scalable
- Configurable, avoid customization

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THE SCIENCE OF WHERE