Driving fit-for-purpose Innovation and Capacity for effective Land Administration & Management

Lessons learned and good practices

13th UN-GGIM AP Plenary Meeting
New Delhi, India.

Chris Fowler, Esri.

Land is the worlds most important resource because it is...

- Where we live

- Where most of our food is produced

- What provides security

- Where we generate capital

- What drives micro and macro economic growth
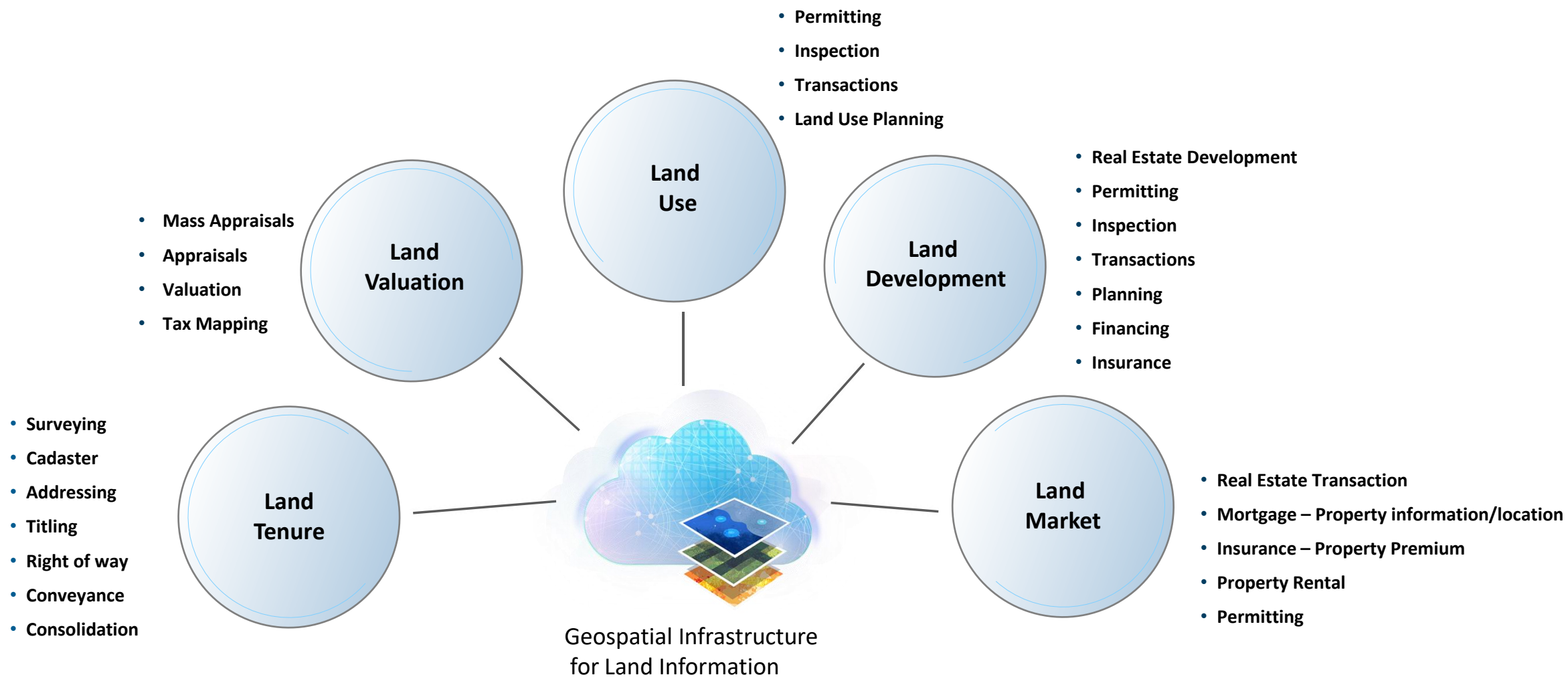
- What underlies SDG's

- Where we have fun

- ....

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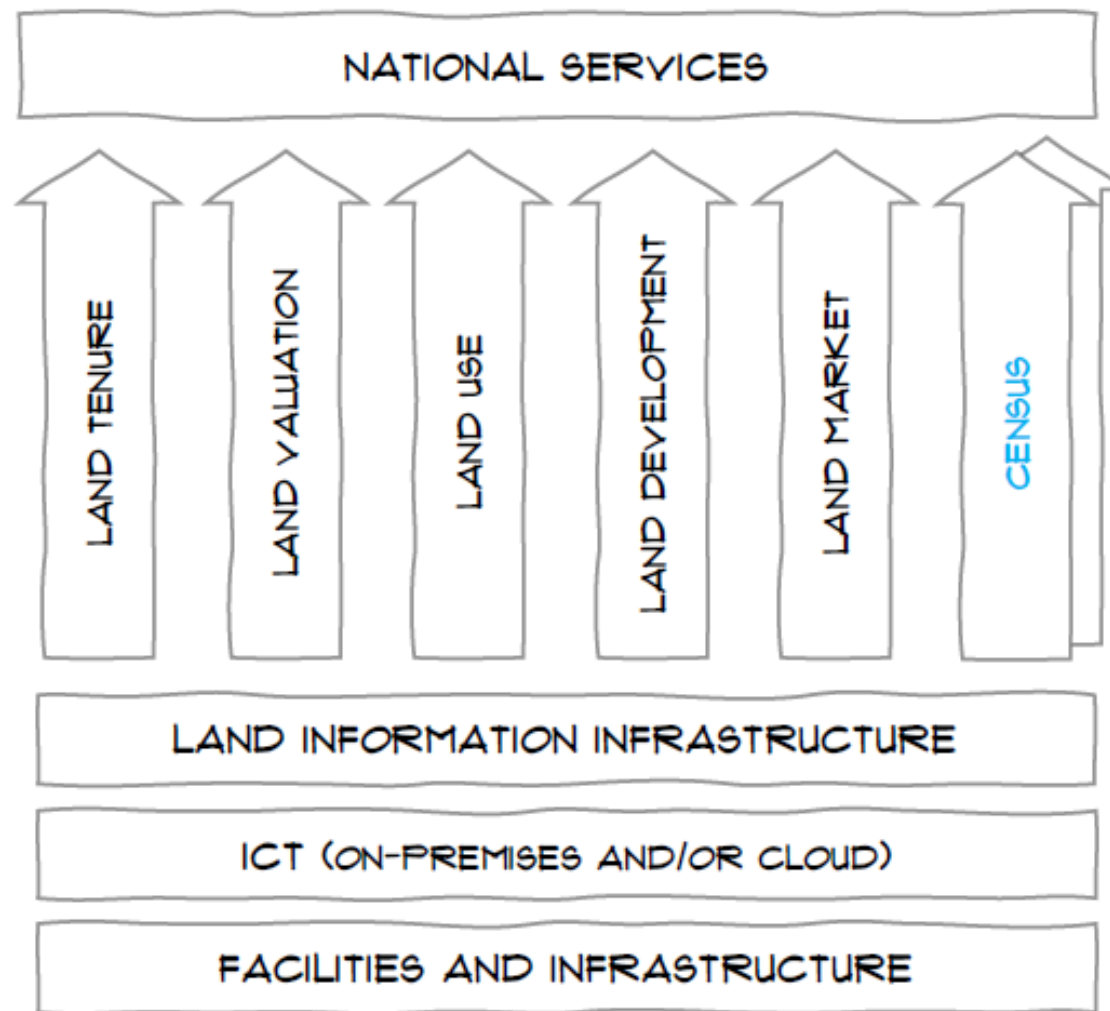**There is a need for a land administration system because of...**

- Insecure land rights
- Complex land tenure system within jurisdictions
- Uncontrolled land use
- Systematic land grabbing
- Uncontrolled urban expansion and densification
- Constrains in economic development
- Impacts from climate change
- Inaccessibility to hidden capital from land market
- Lack of awareness about the land

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS	SUSTAINABLE DEVELOPMENT GOALS

Land Administration

- Permitting
- Inspection
- Transactions
- Land Use Planning

Land Use

- Real Estate Development
- Permitting
- Inspection
- Transactions
- Planning
- Financing
- Insurance

Land Development

- Mass Appraisals
- Appraisals
- Valuation
- Tax Mapping

Land Valuation

- Surveying
- Cadaster
- Addressing
- Titling
- Right of way
- Conveyance
- Consolidation

Land Tenure

Land Market

- Real Estate Transaction
- Mortgage – Property information/location
- Insurance – Property Premium
- Property Rental
- Permitting

Geospatial Infrastructure
for Land Information

Building a Geospatial Infrastructure

A conceptual model for a nation-wide land administration system

However, reality is somewhat different…
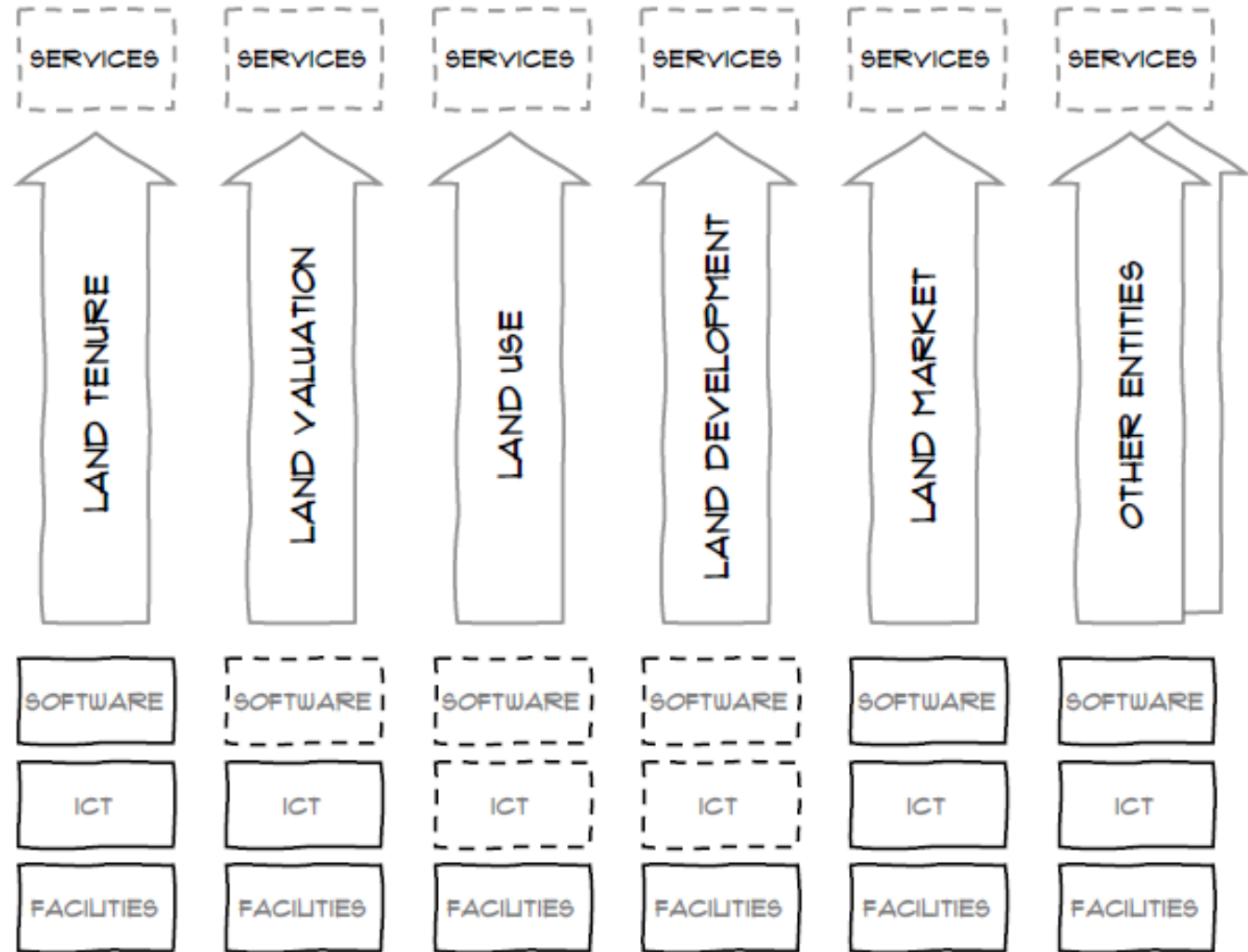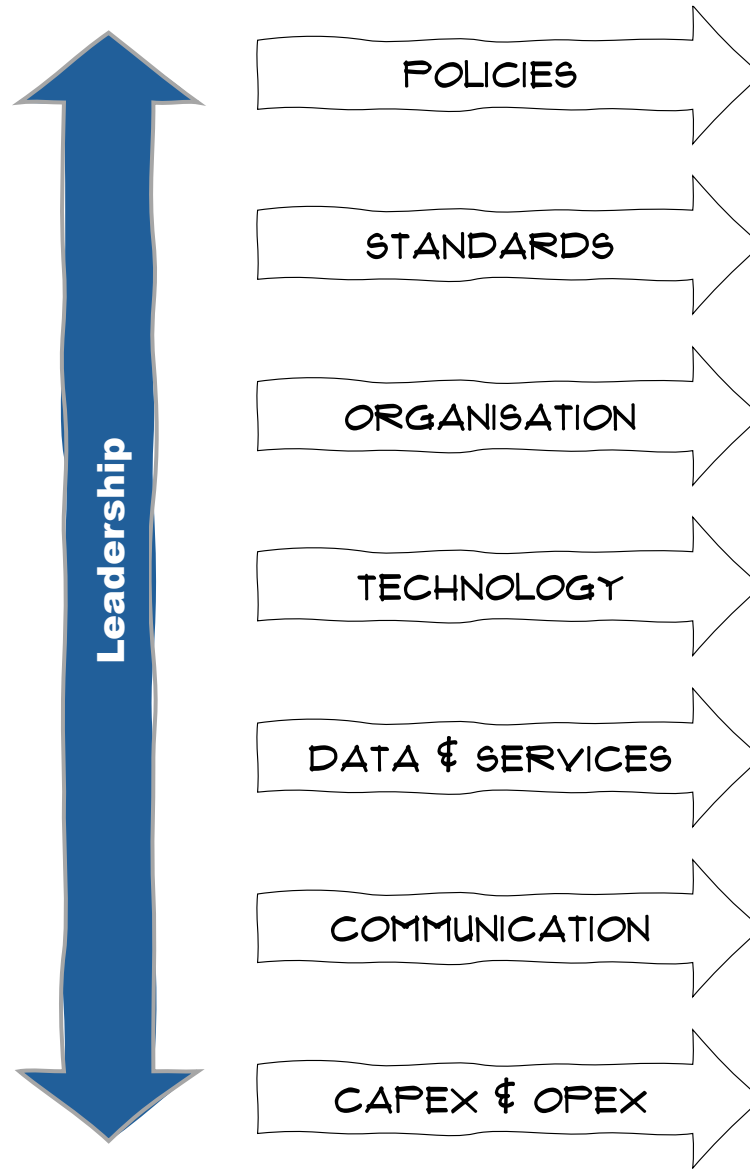
One way to start

UNGGIM - IGIF

The nine strategic pathways

The Integrated Geospatial Information Framework (IGIF) provides a basis and guide for developing, integrating, and strengthening geospatial information management.

Governance model	Legislation	Business model	Data themes	Innovation	Legal interoperability	Partnerships	Capacity and education	Communication and engagement
Leadership	Implementation & Accountability	Investment	Custodianship, Acquisition & Management	Promoting Innovation & Creativity	Data Interoperability	Industry Partnerships	Formal Education	Planning and Execution
Institutional structure	Norms, Policies & Guides	Opportunities & Partnerships	Data Supply Chain Interlinkage	Bridging the Digital Divide	Technical Interoperability	International Collaboration	Entrepreneur	Integrated Engagement Strategies
Value proposition	Data Protection & Licensing	Realization & Benefits	Data Curation and Delivery	Process Improvement	Semantic Interoperability	Community Participation	Professional Workplace Training	Monitoring and Evaluation
GOVERNANCE			TECHNOLOGY			PEOPLE		

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For this to work the key is…

Leadership

POLICIES →

STANDARDS →

ORGANISATION →

TECHNOLOGY →

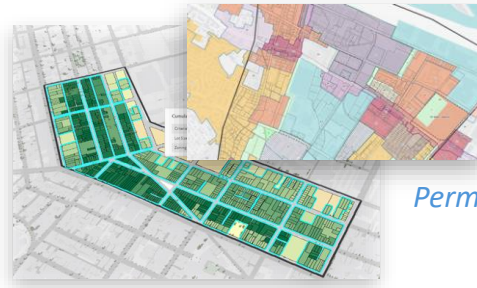DATA & SERVICES →

COMMUNICATION →

CAPEX & OPEX →

- Program sponsor and champion
- Change management leadership
  - Continuous communications both internally and externally
  - Mitigate resistance
  - Sustainability strategy
  - Capacity building
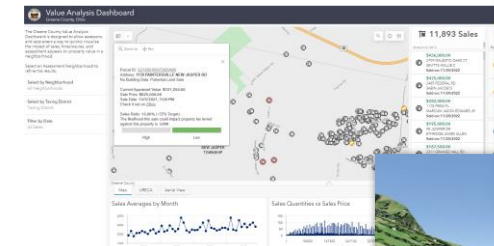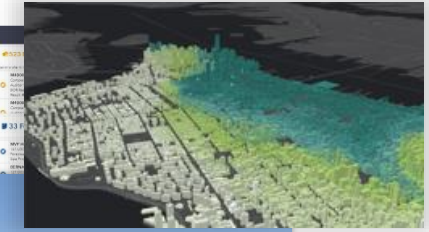- Vision to execution plan
- Risk mitigation
- Etc.
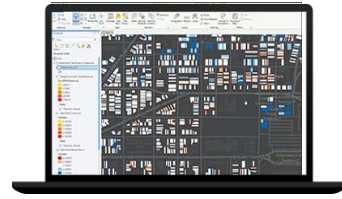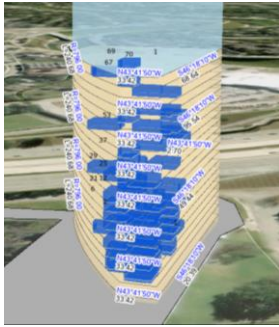
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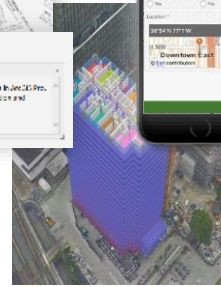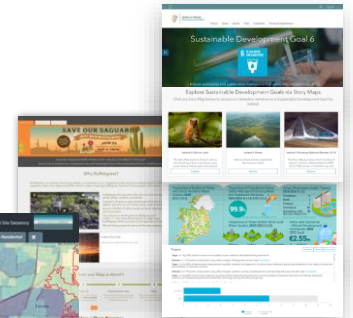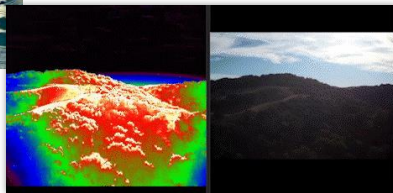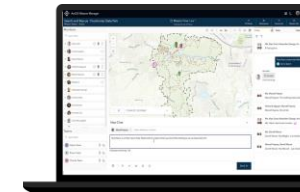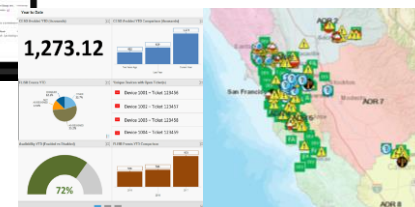
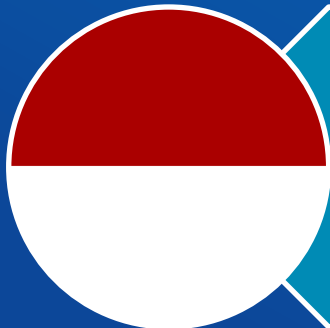# Urban Cadastre Case Studies

Luanda, Angola

Jakarta, Indonesia

Luanda, Angola:
Fit for Purpose Urban Cadastre and Property Registration

Main Challenges

- Map more than 450,000 urban parcel boundaries to be mapped

- Need to register 100,000 properties

- Implement a registration system

- Implement a cadaster system

- Amend legal framework

- Training and capacity building needed

- No cadaster and cadaster system

- Insufficient accuracy of mapping infrastructure

- Only 50,000 existing registrations in Luanda

- More than 8 million people (est.) in Luanda

- Land and properties are expensive (Luanda)

- Insufficient legal framework

Approach

- Fit for Purpose approach

- As-Built & Imagery based

- Accurate (<1:500) & Detailed photogrammetric mapping

- Use of historical data, maps and documents (wherever exists)

- Modern and easy to use equipment and software

- Adjust legal framework

- Training, knowledge transfer & long-term technical assistance

GEODATA

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Geodetic Network

- Rehabilitation of the national geodetic network
- Establishment of a geodetic network of control points
- High accuracy ground control points ~ 1cm
- Critical for assuring high accuracy cadaster
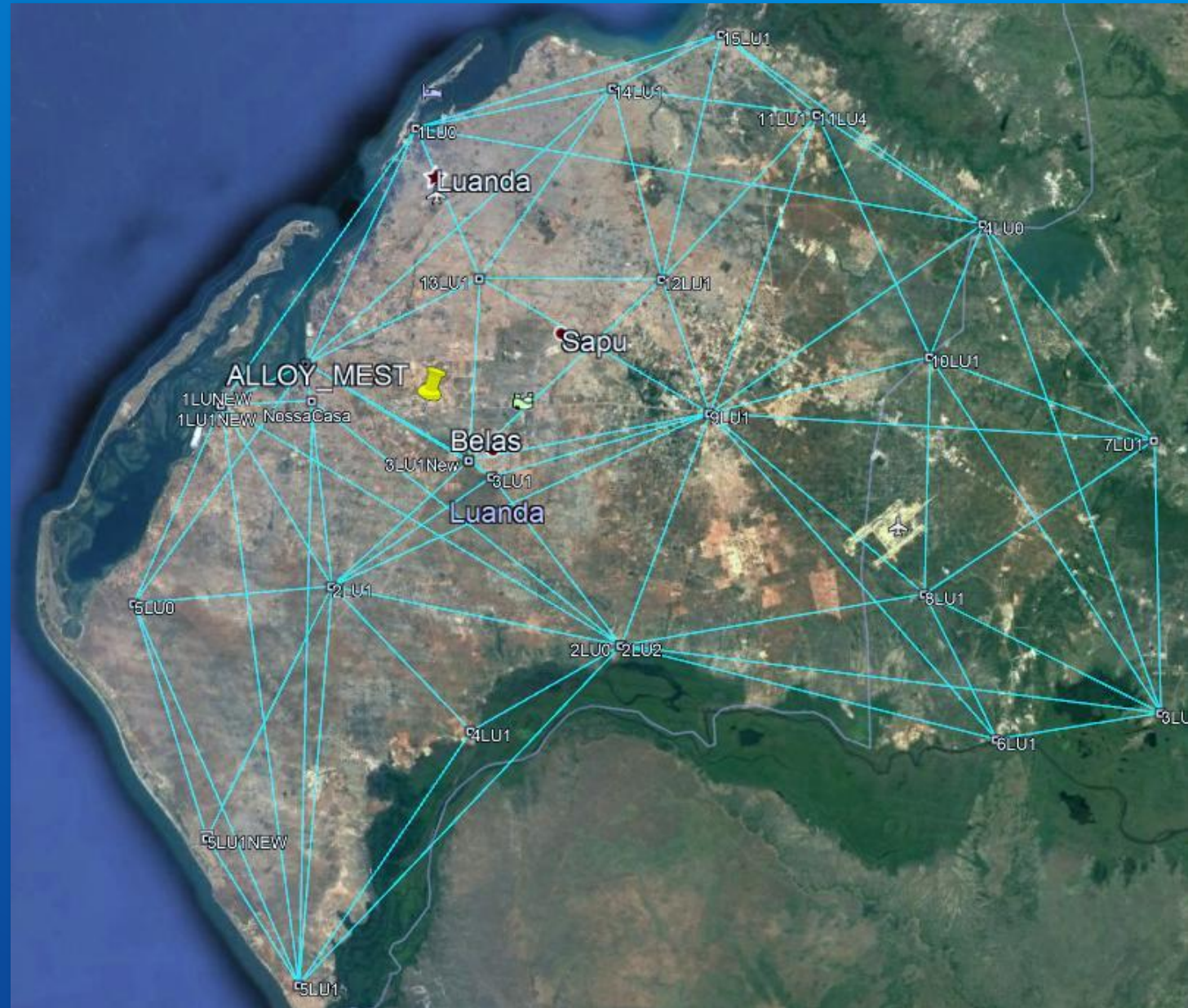
Photogrammetry infrastructure

Aerial Survey

- Luanda 3000 Km²

- 38 additional cities ~2200 Km²

- Resolutions: 5cm - 7.5cm GSD

- Accuracy <1:500

Drone Survey

- Area: 28 cities ~500Km2

- Resolutions: 3-4 cm GSD

- Accuracy: 1:250

- Easy to operate & fly under clouds

GIS & Cartography infrastructure - 3D Photogrammetric mapping

Stereo Mapping (3D)

As Built Mapping

5,000,000 features   2,000,000 buildings
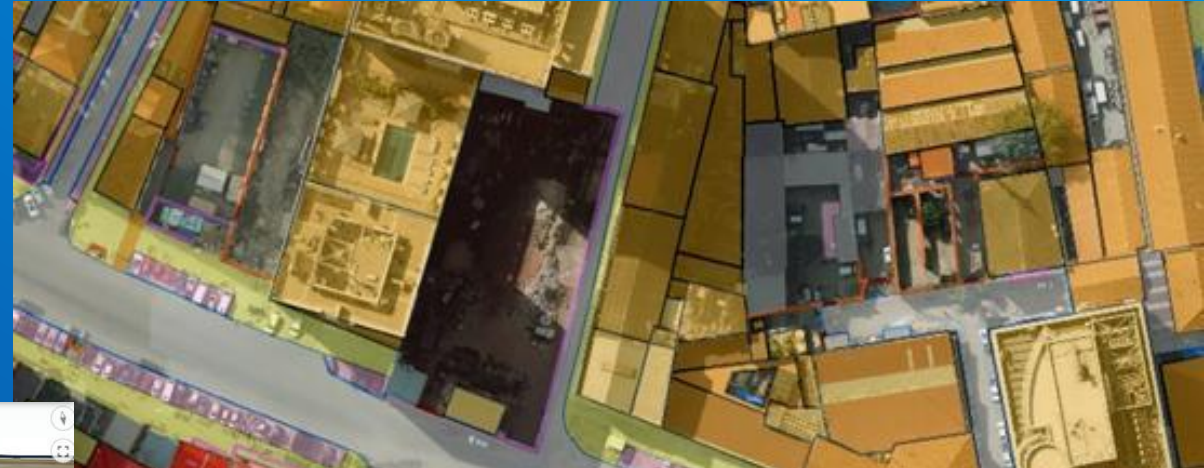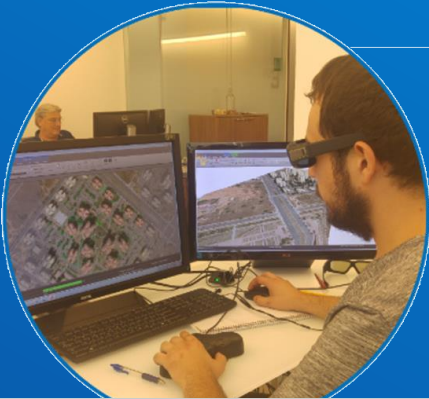
Legend

Roads		Buildings	
Allyway		Commercial\Public	
Bridge		Colonade	
Dirt Road		Residential	
Road		Colonial Buildings	
Traffic Island		Unidentified	
Tunnel		Porches	
		Shed	
Parking Spots		Tin_Building	
Dirt Parking		Utility	
Makeshift Parking			
Parking		**Fences**	
		Temporary Fence	
		Hybrid Wire Fence	
Open Areas		Gate	
Vegetation		Live Fence	
Open Area		Solid Wall	
Paved Surface		Wire	
Dirt		**WalkWays**	
		Dirt Path	
		Pass	
		Paved Surface	
		Sidewalk	
		Stairs	

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Angola: Results

- Results | Return on Investment

1
Cadaster System

6400 Km
Street View

70 SqKm
Address Survey

7
Law Legislation

100,000
Property Registration

400 SqKm
Digital mapping

1
Property Registration System

6200 SqKm
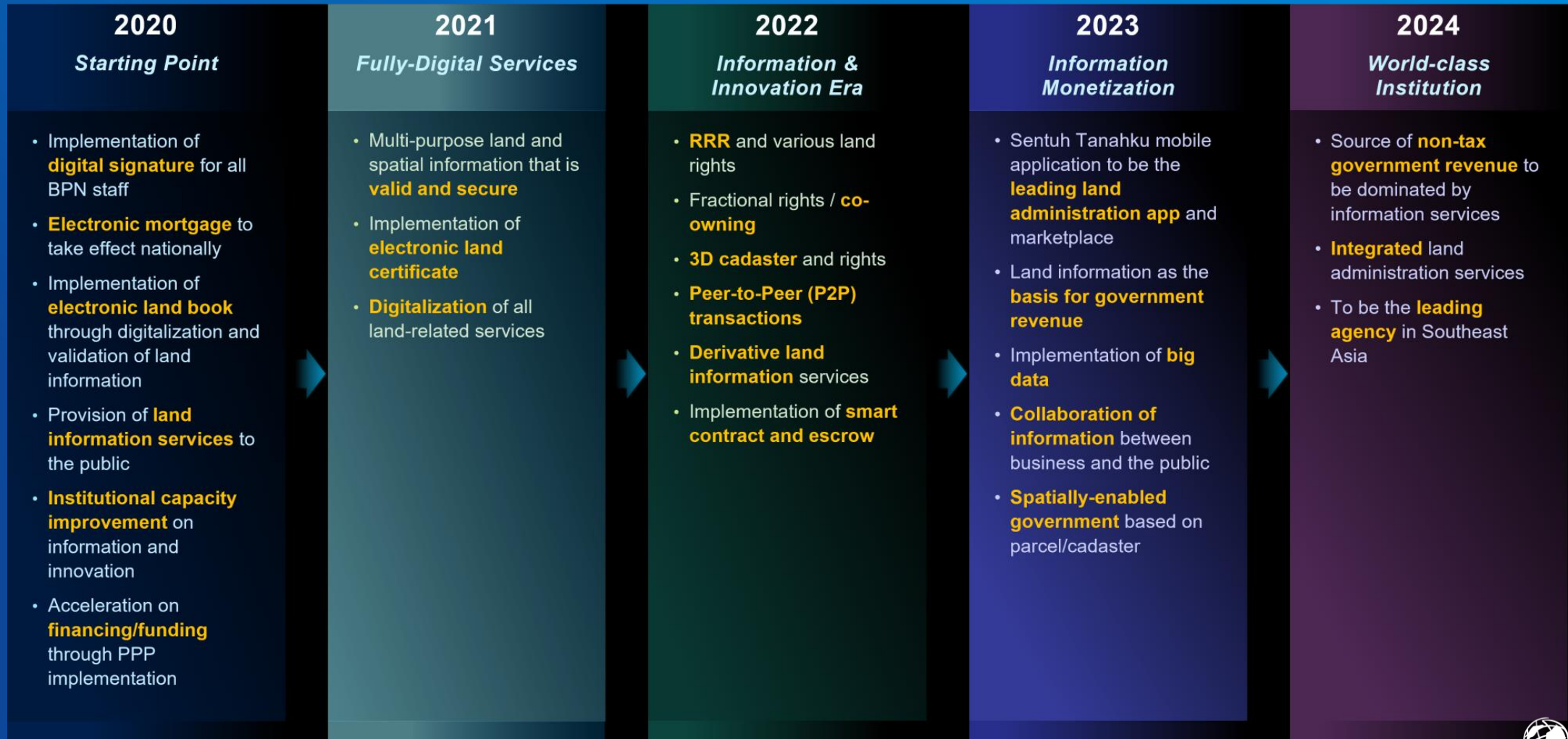Aerial and drone Survey

25 Cities
Urban Plans

450,000 Parcels
Urban Cadaster

2.4M Documents
Scanned and Digitized

Jakarta, Indonesia: "Cadastre for Everyone"

Roadmap:

2020
Starting Point

- Implementation of **digital signature** for all BPN staff
- **Electronic mortgage** to take effect nationally
- Implementation of **electronic land book** through digitalization and validation of land information
- Provision of **land information services** to the public
- **Institutional capacity improvement** on information and innovation
- Acceleration on **financing/funding** through PPP implementation

2021
Fully-Digital Services

- Multi-purpose land and spatial information that is **valid and secure**
- Implementation of **electronic land certificate**
- **Digitalization** of all land-related services

2022
Information & Innovation Era

- **RRR** and various land rights
- Fractional rights / **co-owning**
- **3D cadaster** and rights
- **Peer-to-Peer (P2P) transactions**
- **Derivative land information** services
- Implementation of **smart contract and escrow**

2023
Information Monetization

- Sentuh Tanahku mobile application to be the **leading land administration app** and marketplace
- Land information as the **basis for government revenue**
- Implementation of **big data**
- **Collaboration of information** between business and the public
- **Spatially-enabled government** based on parcel/cadaster

2024
World-class Institution

- Source of **non-tax government revenue** to be dominated by information services
- **Integrated** land administration services
- To be the **leading agency** in Southeast Asia

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Jakarta Context

Geography

Area (ha)	66,401
Forest Area (ha)	364
Non-forest Area (ha)	65,869

Demography

Population	10,609,681
Population Density (per ha)	159.78
Living in Urban Areas (%)	96.53
Living in Rural Areas (%)	3.47

Economy

GRDP per Capita (2021) (USD)	18,405.54
Economic Growth Rate (2010-2021) (%)	3.56

Administrative Structure

Number of Municipalities/Districts (*Kabupaten/Kota*)	6
Number of Sub-districts (*Kecamatan*)	44
Number of Villages (*Kelurahan*)	267

Cadastral System

Purpose	To facilitate land title registration
Types of Cadastral System	Title registration
Approach for establishment of records	Systematic and sporadic
Legal requirement to register land ownership	Compulsory for systematic; Optional for sporadic
Contents of cadaster	Land Book, Letter of Measurement, and Cadastral Map
Cadastral issues	Incompleteness and unreliability of cadastral contents
Current initiatives	Systematic Registration (PTSL), Quality Improvement, and Digital Transformation

Magnitude`

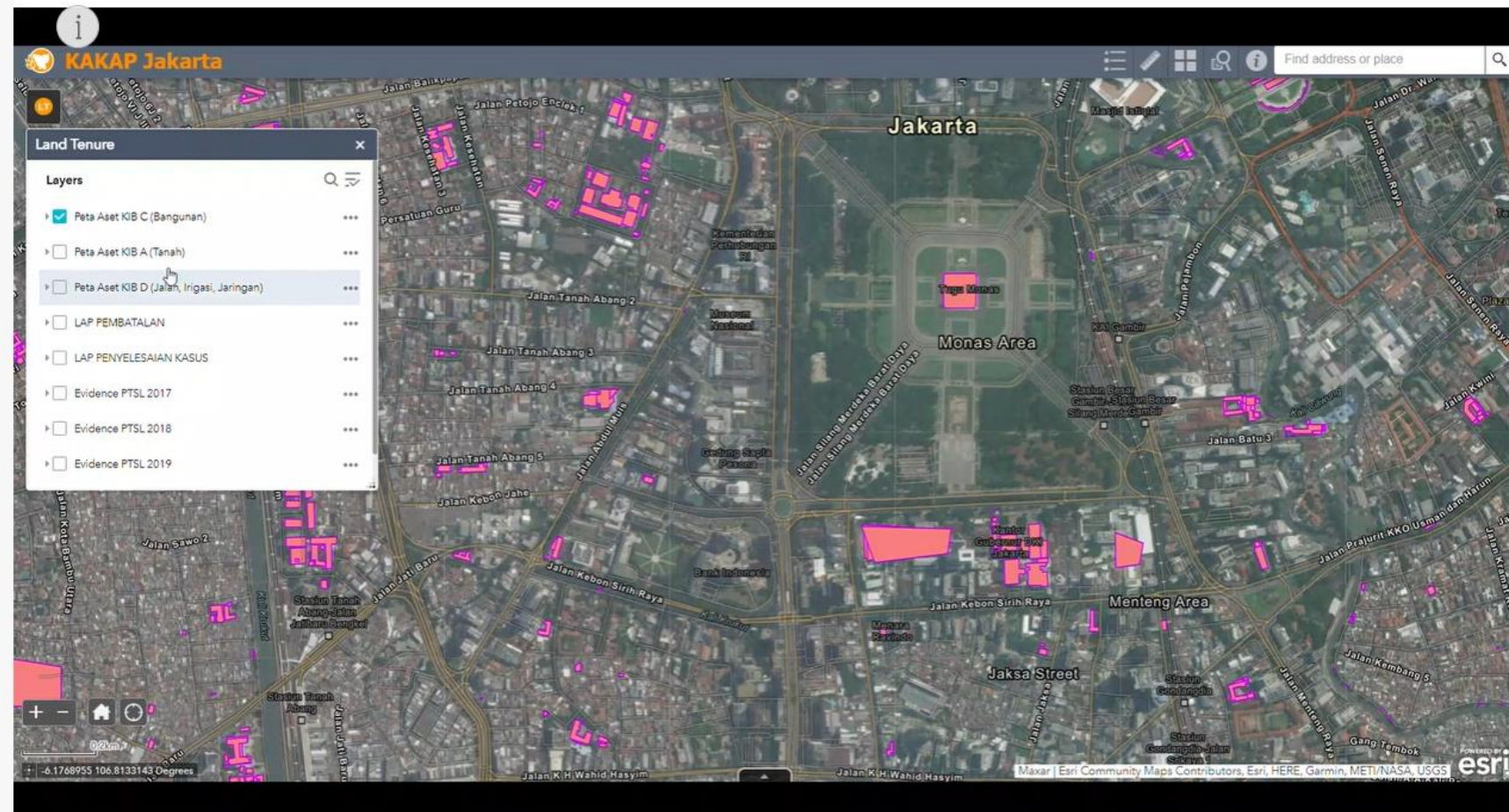|	
Number of Parcels	2,053,860
Number of Land Books	1,449,122
Number of Licensed Surveyors	448
Number of Land Deed Officers (*PPAT*)	5,813
Strata Title (unit)	280,075

View of the Implemented System: Land Tenure

View of the Implemented System: Cadastre Infrastructure

Cadastral Infrastructures

Cadastral & Topographic Data

Geospatial Data Infrastructures

1. Administrative Boundaries
2. Land Parcels
3. Basic Infrastructures (e.g., roads)
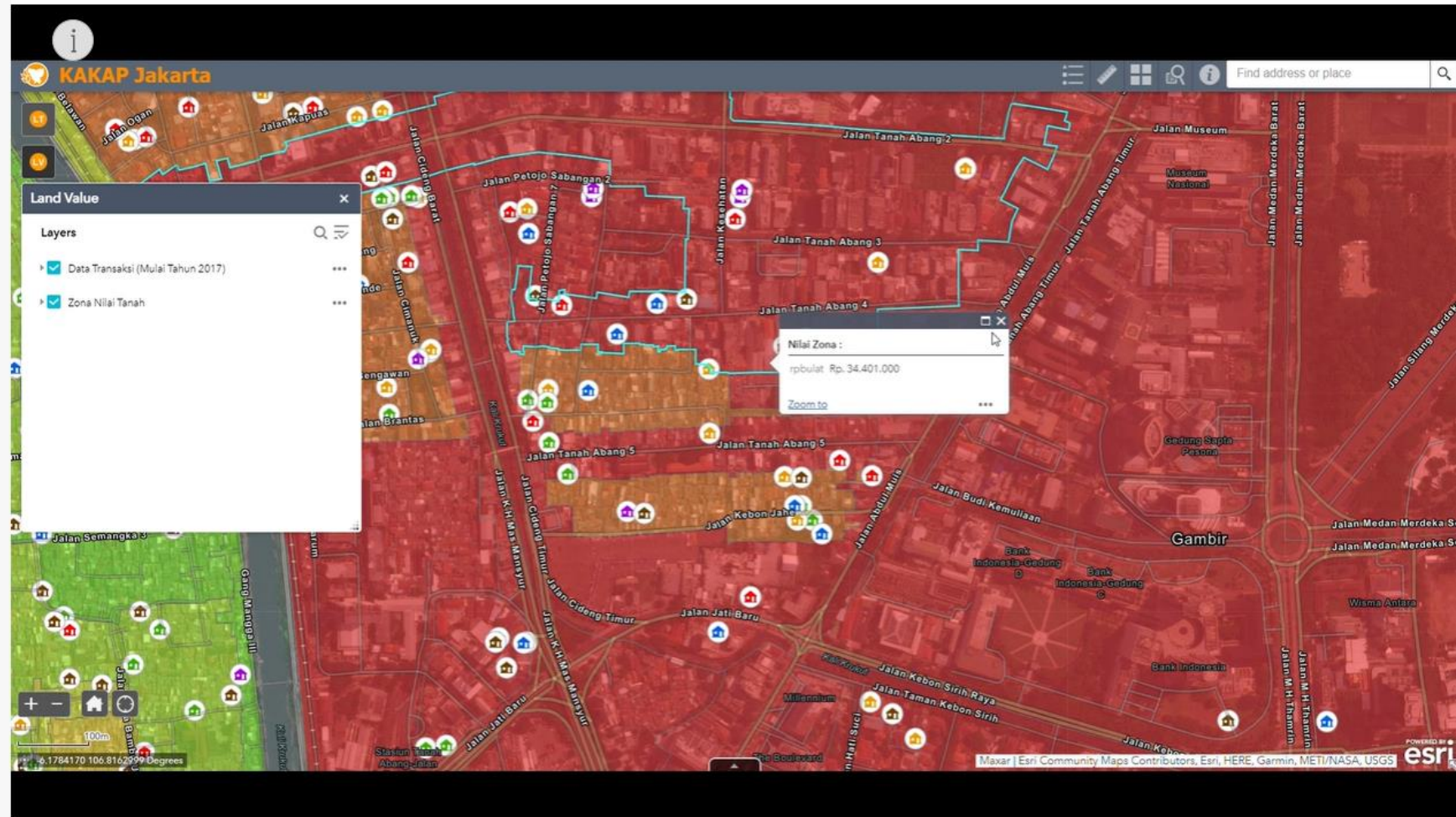4. Satellite Imagery (Current & Historical)
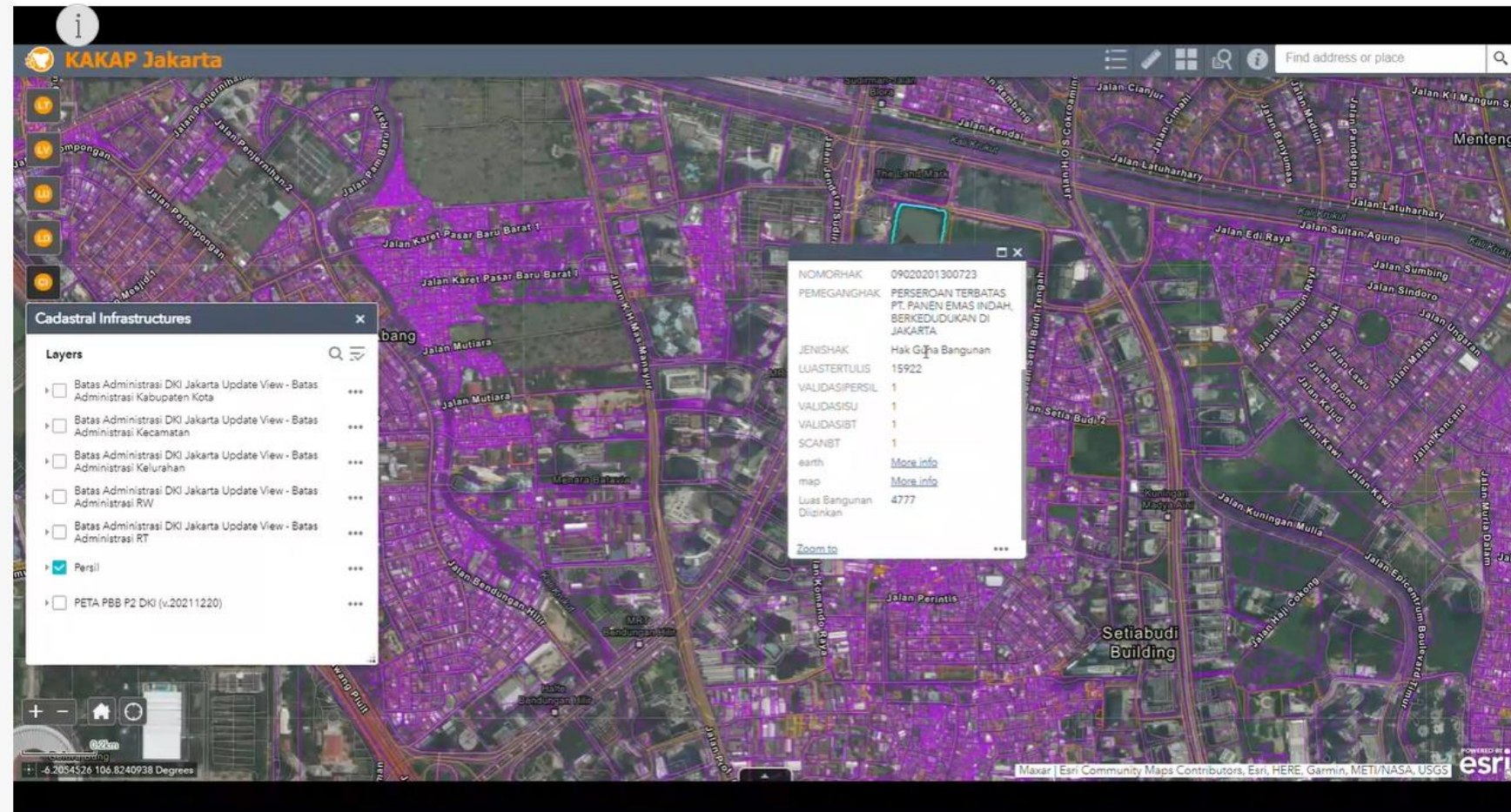
View of the Implemented System: Land Value

Project Impacts

- **5 -** five local land offices served by KAKAP Jakarta:
  - Central Jakarta, North Jakarta, West Jakarta, East Jakarta, South Jakarta
- **10+ -** more than ten activities/themes supported by KAKAP Jakarta:
  - e.g., land registration validation, land disputes and conflicts monitoring, land use & spatial plan compliance monitoring, land transactions monitoring
- **15+ -** more than fifteen apps developed in 6 months, leveraging commercial-off-the-shelf (COTS) solutions
- **75 -** increased efficiency in land document checking by seventy-five percent
- **150+ -** more than a hundred and fivety layers of information hosted on KAKAP Jakarta
  - consisting of land tenure, land value, land use, land development, and cadastral infrastructures information
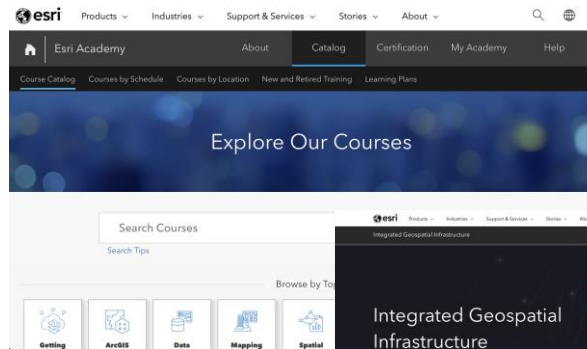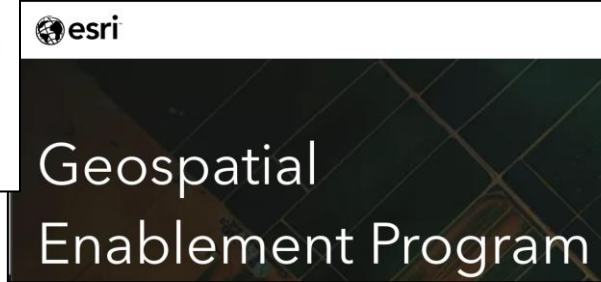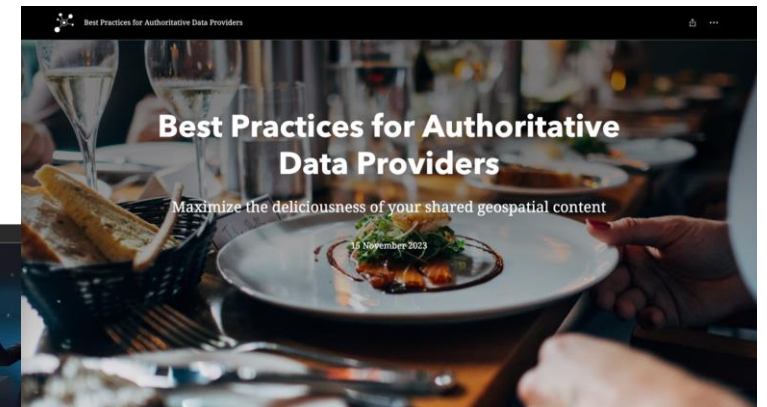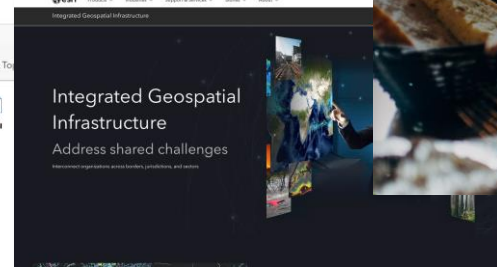
https://storymaps.arcgis.com/stories/a6c92741e46046c08e3fc4bf96a14d89

Some resources to start with

IGIF

Geospatial Enablement Program

Esri Living Atlas

Explore Our Courses

Esri academy

Integrated Geospatial Infrastructure
Address shared challenges

Best Practices for Authoritative Data Providers
Maximize the deliciousness of your shared geospatial content
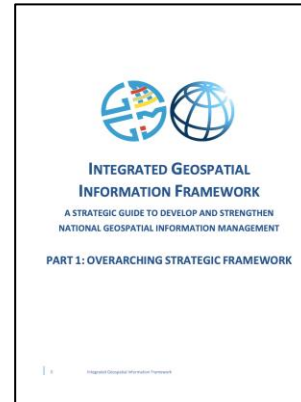
Templates and best practices

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Thank you

Chris Fowler
cfowler@esri.com

System of systems