Transition From Data to Knowledge

Applications for Land Administration
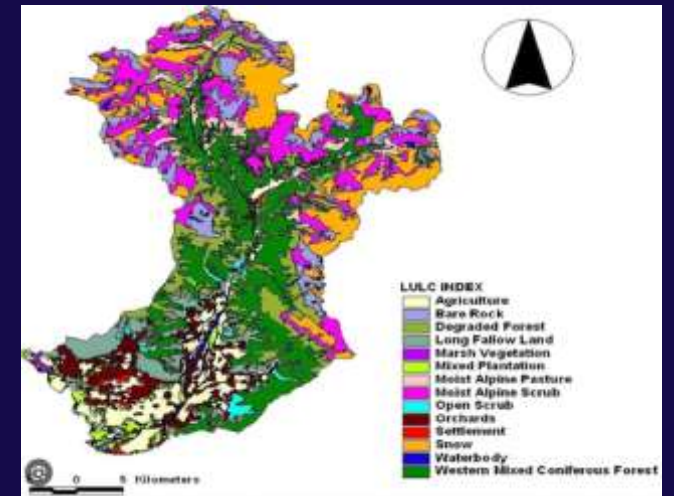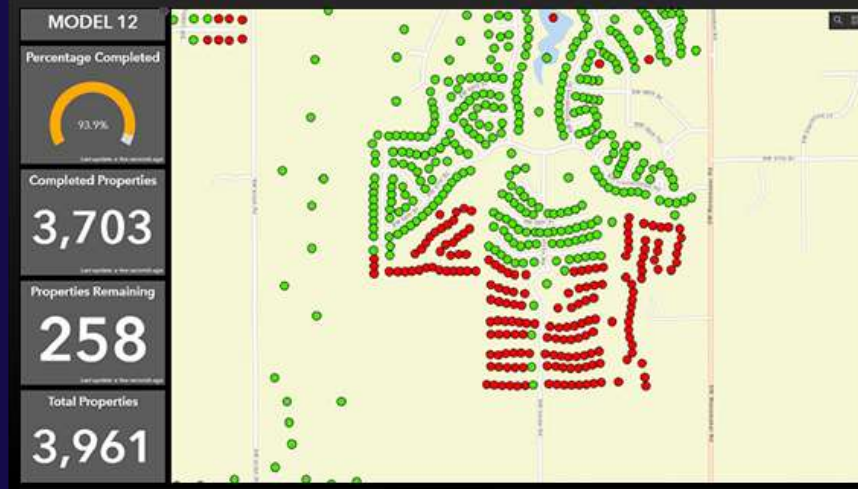
D.Dighal , Esri India

Preamble

- Land Record is Dynamic.

- Land has a Value and sometimes it's the ONLY asset to Citizens.

- Land Record , Land Use , Land Cover is an important data for country growth

- Boon for BFSI (Banking , Finance , Insurance sector) with Digital Property Card

Land

- Record of Right
- Plot & its dimension
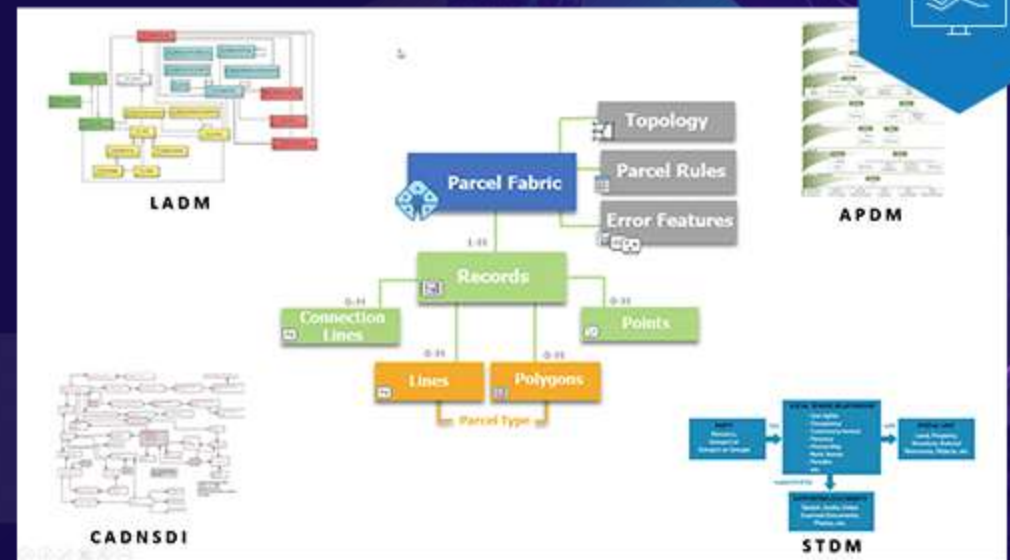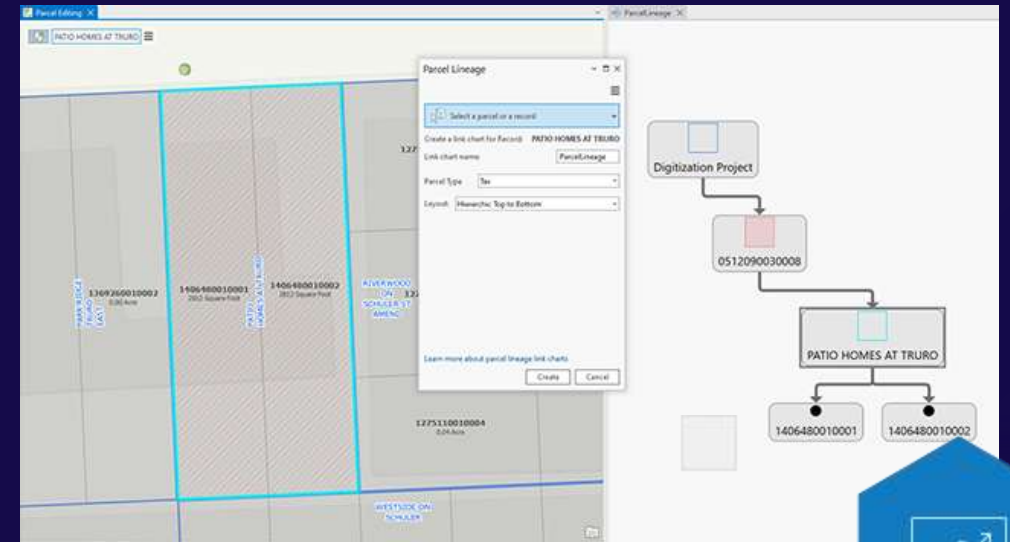- Land Use & Land Cover
- Valuation

A Robust & Comprehensive Land Record Data Model

Unlock the potential of Legacy Plot data

- Flexible Data Model to Manage 3D and 4D parcel data
    - 2D
    - 3D
    - 4D (Changes over time)

- Historical parcels and lineage
    - Tracking the legal record that causes parcels to be created and edited
    - The ArcGIS Parcel Fabric saves the parent parcel data as historic when edits are performed.
    - The historic parcels maintain a lineage to the parent and children parcels.

- Web GIS enabled

Valuation of the Cadastral Plot

Land Records Management Programme in India & Role of GIS

DILRMP
(Digital India Land Record Modernization Programme)

- Non Abadi Area
- Computerisation of LR
- Automation of Sub registrar office
- Integration of LR & Property Registration
- RoR in the Web
- Survey / Resurvey
- Digitisation of Cadastral Map
- Textual & Spatial Data integration
- Creation of modern Record Room
- Citizen Centric Interface

SVAMITVA
(Survey of Village Abadi & Mapping with Improvised Technology in Village areas)

- Adadi Area
- Drone Survey of Abadi area
- Fresh Digitization and Ownership data capture
- End to End Digital Land survey
- CORS aided field data capture
- Digital Property Card
- Citizen Centric Interface
- BFSI sector ready database

3 Phase implementation

1. Integration of Image with Existing Map in central GIS lab

2. Creation of GIS Lab & working manual

3. Data model designing

4. Version Management

1. Enterprise GIS based feature & Image service publishing.

2. Job allocation for field survey

3. CORS enabled Android rover based Data update

4. HQ & District Based QA/QC

1. Enterprise based ULPIN integration

2. Implementation of Geo-Blockchain for dispute free property

3. Land valuation

4. Citizen Interface & subsequent self update

Enterprise Grade Version Managed Centralized Database

Workflow Using ArcGIS

Products:
1. ArcGIS Pro

Kick-off

Products:
1. ArcGIS Pro

Importing ORI Images from SOI/Survey Vendors in GeoTiff format

Products:
1. ArcGIS Pro
2. Image Analyst

Creating a seamless Mosaic Dataset in an Enterprise GDB

Tools:
1. Create Mosaic Dataset tool

Products:
1. ArcGIS Pro
2. ArcGIS Enterprise
3. Image Server

Publishing the Mosaic Dataset as an Image Service

Tools:
1. Publishing tools

Products:
1. ArcGIS Field Maps or Custom Mobile Application

Accessing the Image Service in the Mobile Application to collect the field Data

Collect all the vertices of a polygon

Dashboard for monitoring field Porgress

Products:
1. ArcGIS Pro

With the help of GP tools in ArcGIS Pro. We can automatically convert the vertices into Polygons

Tools:
1. Add Point Data
2. Points to Line
3. Split Line at Vertices
4. Feature to Polygon

Automatic Digitization

Automatically

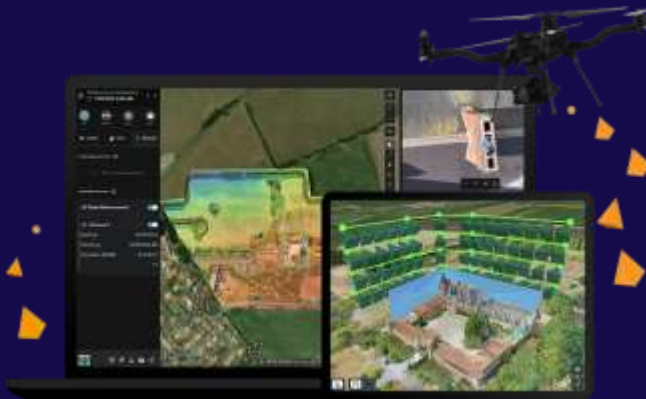This step would be appropriate if the polygons are being drawn maually in ArcGIS Pro

Products:
1. ArcGIS Pro

Manual Digitization

Manually

Digitizing the Polygons

Products:
1. ArcGIS Pro

Products:
1. ArcGIS Pro
2. Data Reviewer

Identifying the Duplicate Geometry

Identifying Duplicate vertices witht the help of Data Reviewer in ArcGIS Pro

Products:
1. ArcGIS Pro

Importing the field data

Importing the vertices in the form of a feature service and downloading the points for Area of Interest

Tools:
1. Add Polygons
2. Feature vertices to Points
3. Split Line at Vertices
4. Delete Identical
5. Enable COGO
6. Add Field
7. Calculate Field

With the help of Data Reviewer in ArcGIS Pro we will carry out several checks to identify errors such as
1. Duplicate Geometry
2. Polygon Overlaps
3. Dangles

QAQC

Products:
1. ArcGIS Pro
2. Data Reviewer

Linking the Village Map with RoR Database

Products:
1. ArcGIS Pro

Joining ROR Details

Tools:
1. Data Management tools

Products:
1. ArcGIS Pro
2. Data Reviewer

Identifying & Verifying the Duplicate Values

Identifying the duplicate attribute values with the help of Data Reviewer

Web App

Products:
1. ArcGIS Pro

Append the Data into Enterprise Geodatabase

Tools:
1. Data Management tools

Products:
1. ArcGIS and share with Web App

Generate Village Map

Property card template needs to be designed
1. Printing the Maps in PDF format

Products:
1. ArcGIS Pro

Print, Bind & Deliver Property Cards

Printing Property Cards for the Dissemination

Products:
1. ArcGIS Pro

Incorporate Changes

Any changes suggested by the Higher officials would be iincorportaed

Submit Drafts

Submitting the PDF files to the Higher Officials

Products:
1. ArcGIS Pro

Generate Individual Property Maps

Generating Map series Layouts for Individual Plots
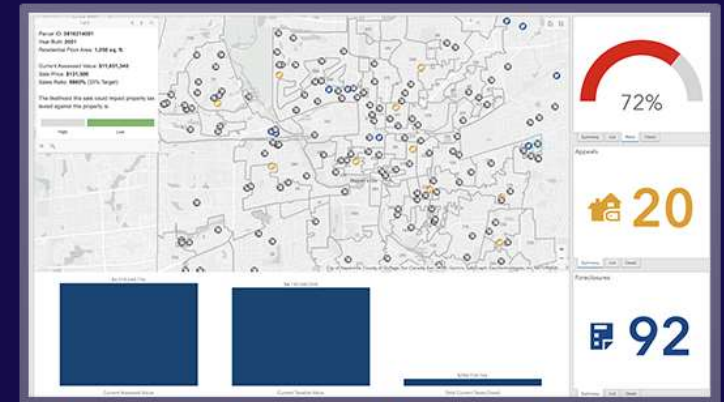1. Printing the Maps in PDF format

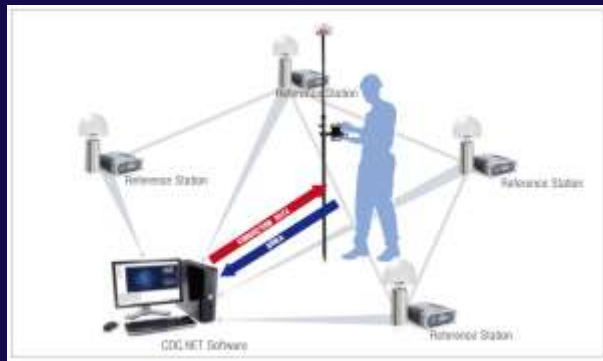# The seamless data flow from Lab to Field-Components

Cloud Based Drone Processing
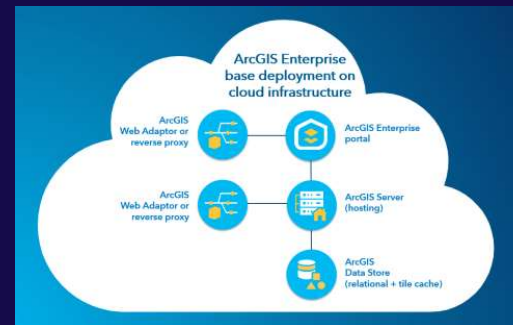
Desktop GIS with Workflow and Version managed Geodatabase

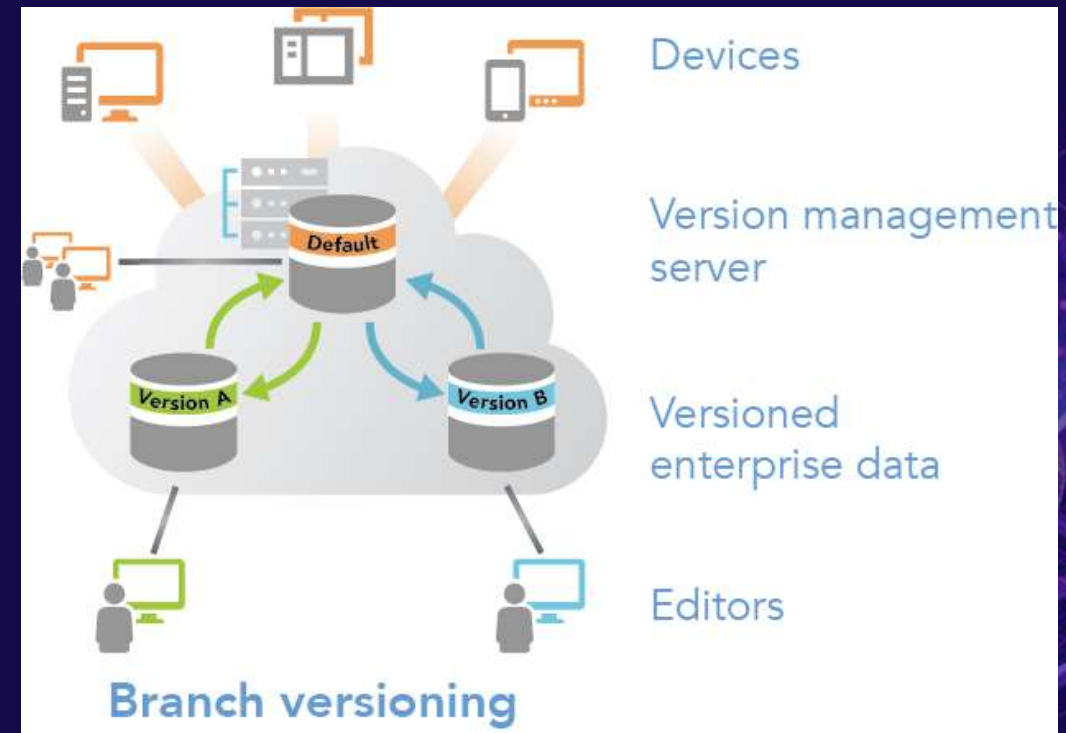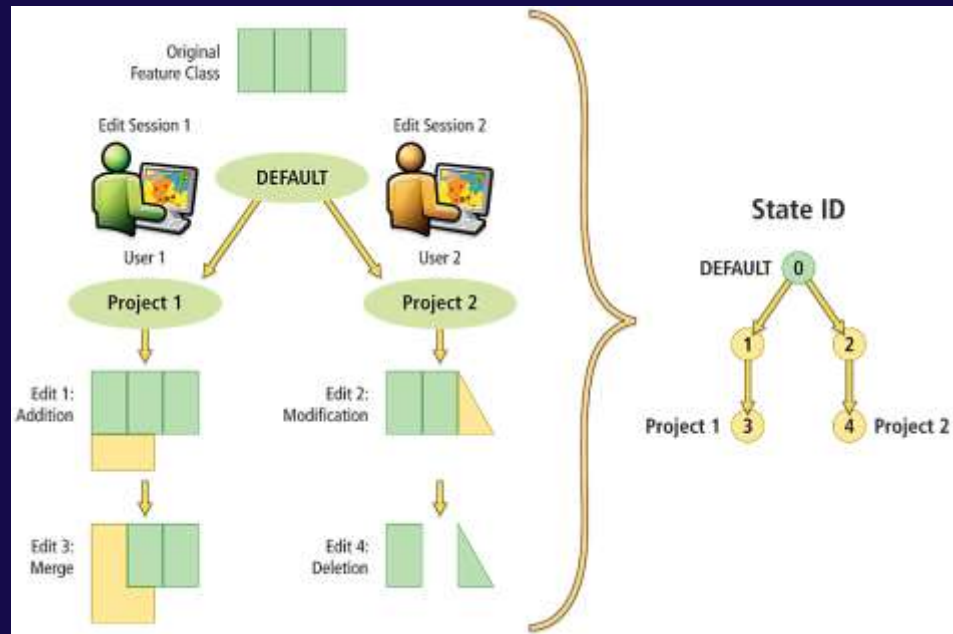Dynamic GIS Portal with Dashboard
Dynamic GIS Portal with Dashboard

Geosaptial Cloud

SOI- CORS

High End GNSS in BYOD
Mode utilizing CORS

Version Management

- allows multiple editors to alter the same data in an enterprise database duplicating data
- Reconcile and post changes (Field or Lab update)
- Store all backward updates of the plot to roll back.

Role of Cloud

- Meity Cloud Policy help Land Record department to Store , Process , Roll out technology quickly
- Drone Processing in cloud help quick turnaround time
- ArcGIS enterprise on cloud help complete end to end data management
- Rolling out Citizen centric interface can be scalable , due to elastic nature of cloud
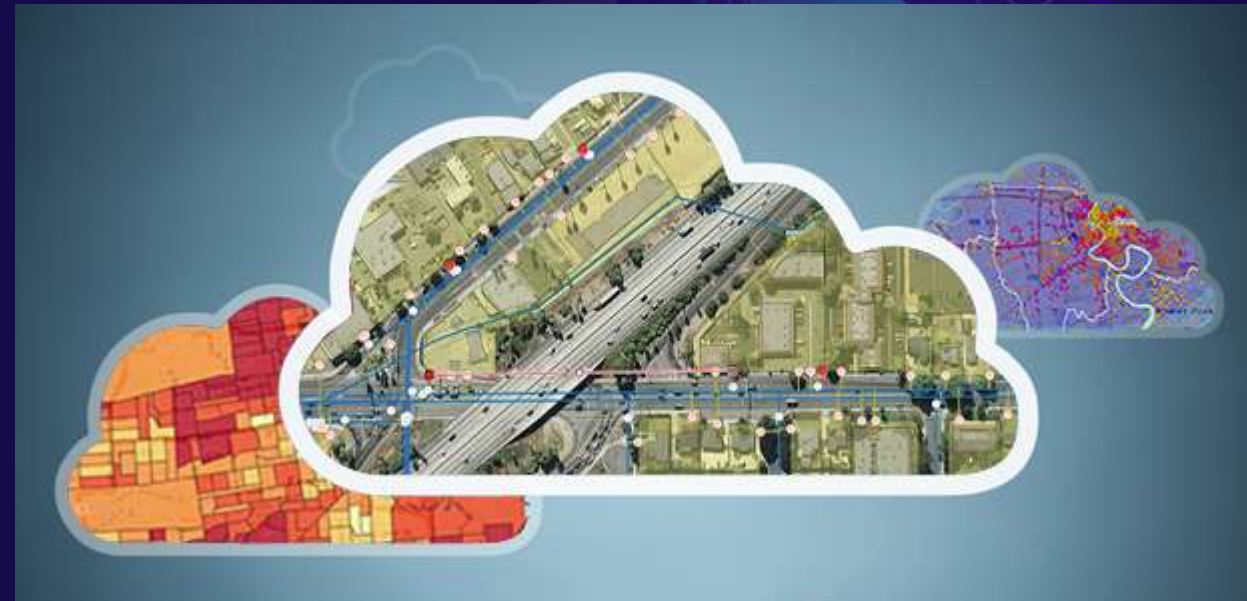
Digital & Connected Survey for Update
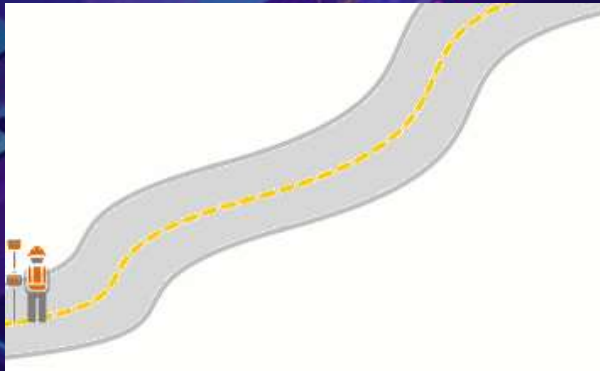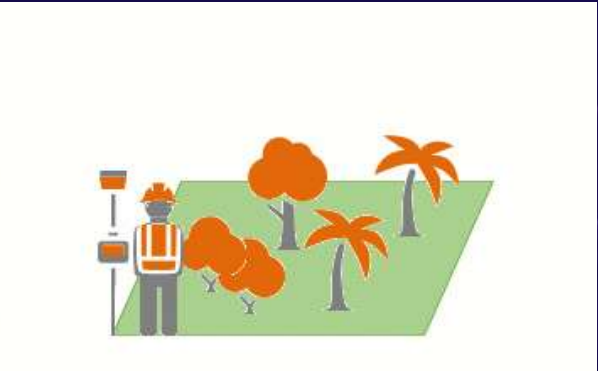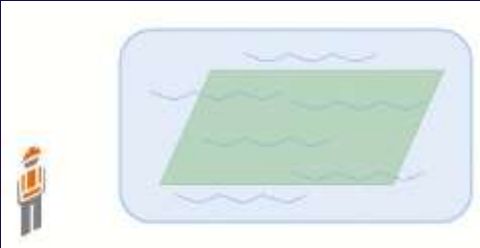
Workflow management from Lab to Field

- Automate Production process of Map

- Allocate Job

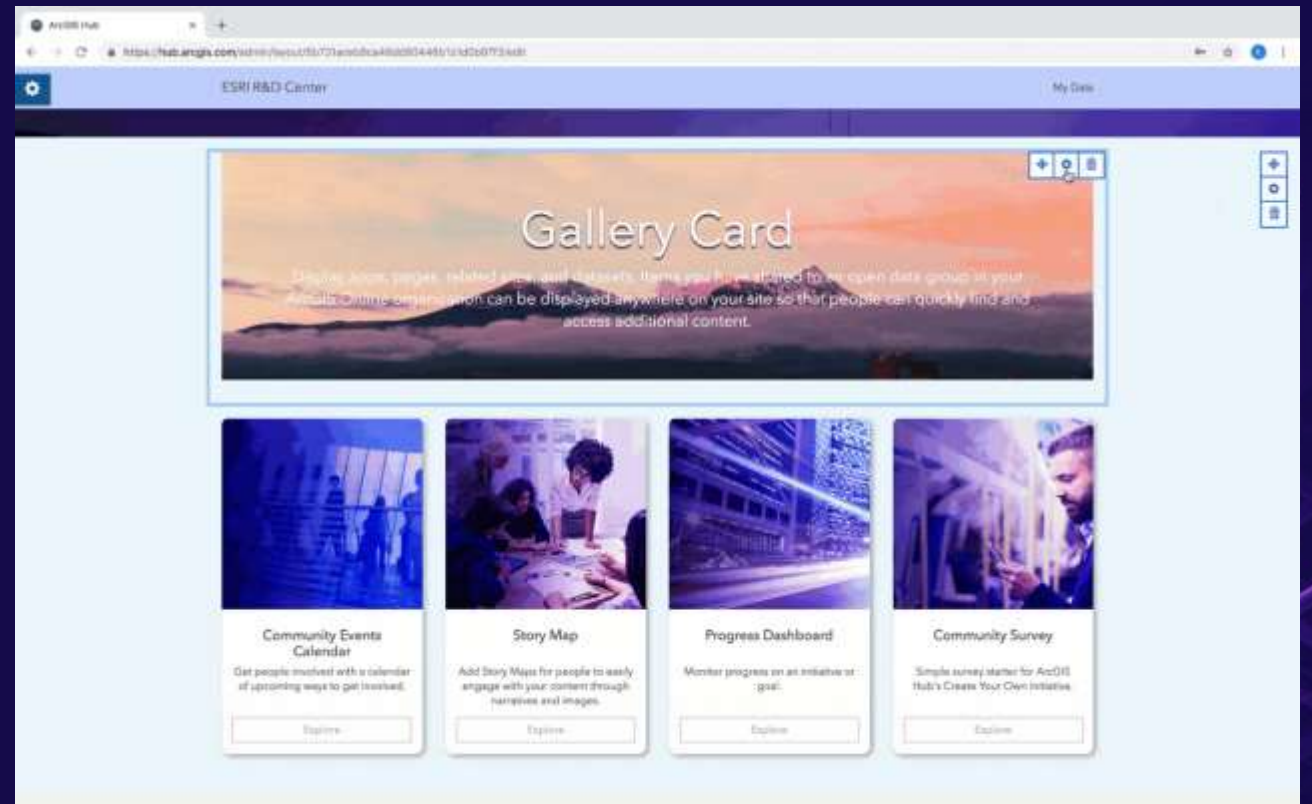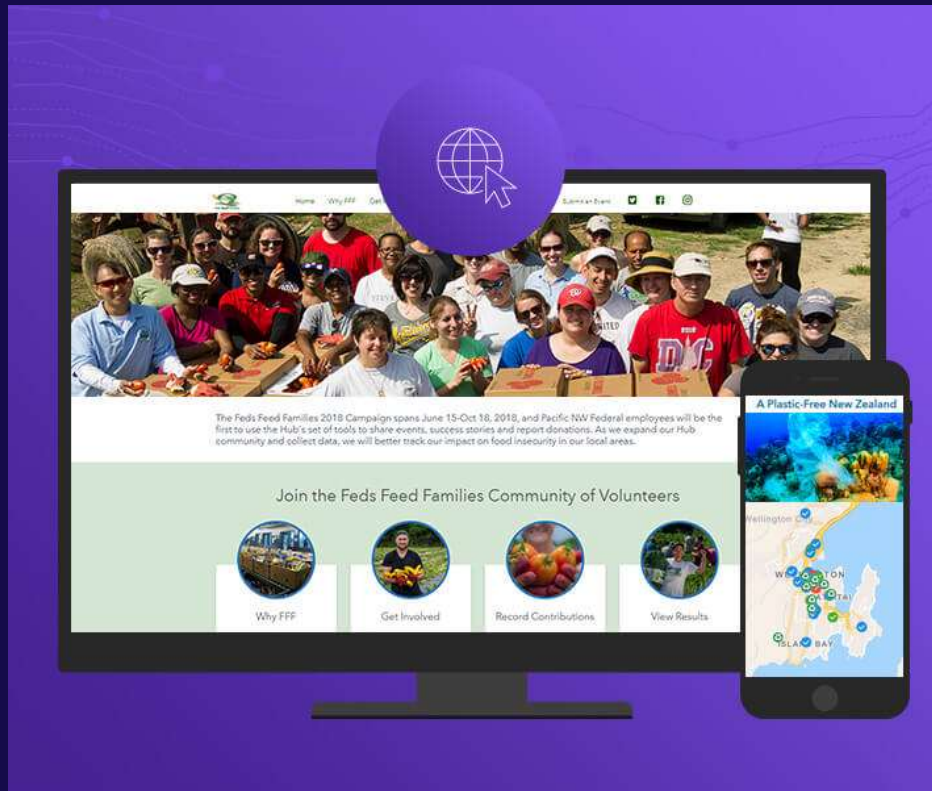- Automate repetitive manual tasks such as data preparation and cleanup
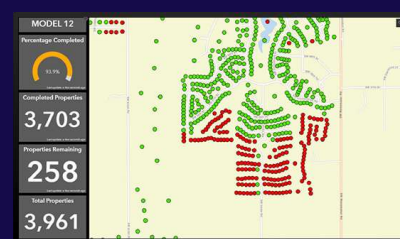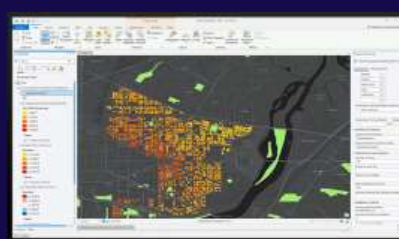
One App for All

- Currently there many App (Each state has their own app)

- Citizen should be able to alter their Land data and get verified (like Aadhar)

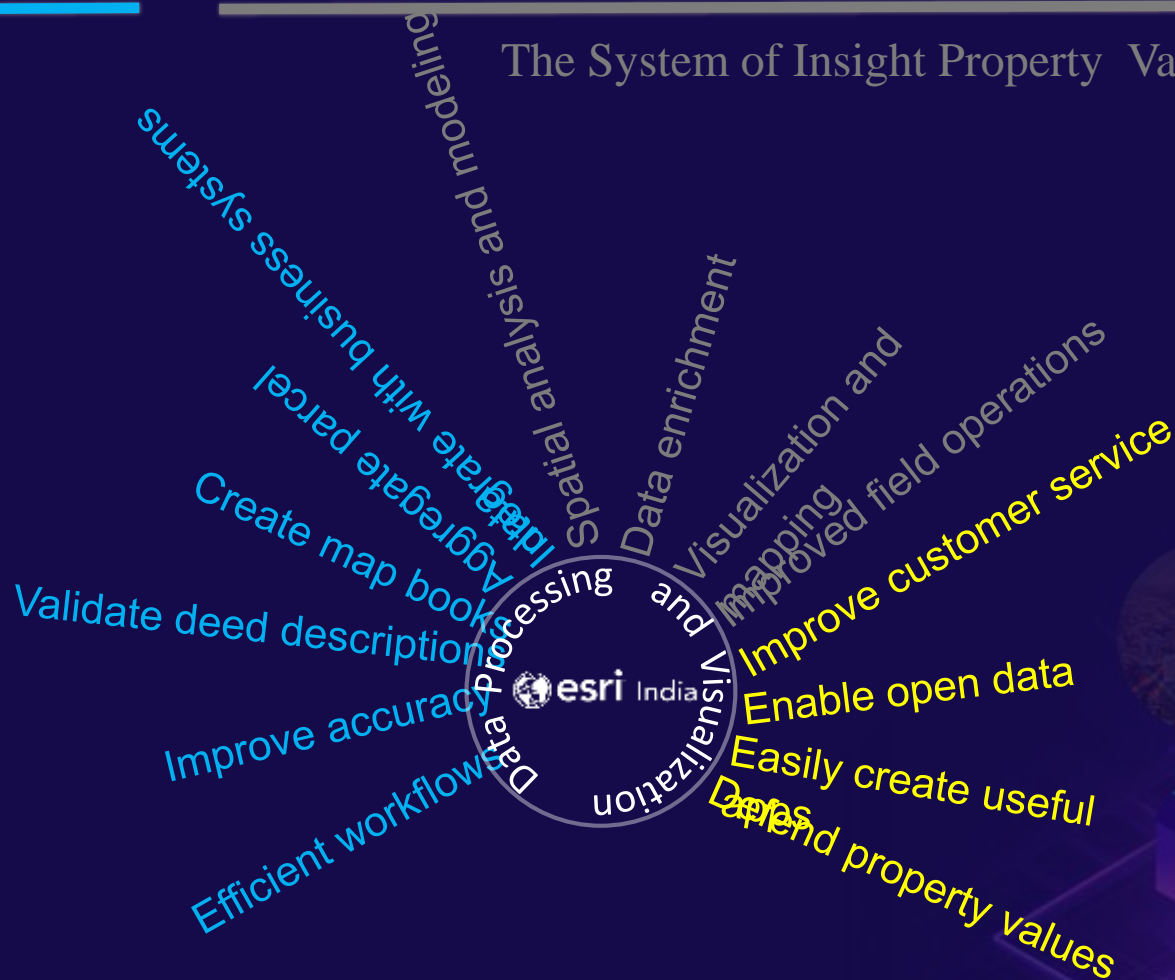- Ownership change can be initiated by citizen

Hub and Site for Citizen Engagement & Data sharing

- Land Data is an asset which can be shared to other Govt dept
- Rest API / OGC service for consuming data

The System of Insight Property Value Analysis

The System of Record Parcel Management

Stakeholder Engagement

Spatial analysis and modeling

Data enrichment

Visualization and mapping

Improved field operations

Improve customer service

Enable open data

Easily create useful

Defend property values

Aggregate with business systems

Aggregate parcel

Create map book

Validate deed descriptions

Improve accuracy

Efficient workflows

Data Processing and Visualization

Data Processing

Data Visualization

Demos

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MODEL 12
Percentage Completed
Completed Properties
3,703
Properties Remaining
258
Total Properties
3,961

Open Data

1,992
1,543 ac.
$143.9M

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