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The Systematic Land Verification (SyLVer) Protocol

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OUTLINE

- BACKGROUND
- CURRENT INITIATIVES
- SyLVer Protocol Research
- Conclusions and Recommendation

BACKGROUND


FIG KUALA LUMPUR 2014
The Systematic Land Verification (SyLVer) Protocol
Louie P. BALICANTA and Rosalia M. BALICANTA, Philippines
XXV FIG Congress 2014
Engaging the Challenges, Enhancing the Relevance
Kuala Lumpur, Malaysia, 16 – 21 June 2014
1

BACKGROUND

Cadastral Database

- parcel based and up-to-date land information database
- includes the geometric descriptions of the land parcels such as location, dimension and size.
- It is linked to other records that describe the nature of interests such as informations related to the rights, restrictions and responsibilities associated to the land parcel.

Cadastral Surveys

- surveys done to determine the metes and bounds of all land parcels within an entire municipality or city and the proponent is the government executed by licensed geodetic engineer (DENR 2007)

Isolated Land Surveys

surveys of individual or small groups of parcels done to determine the metes and bounds, correct erroneous boundaries and for other purposes and the proponent is either the government or private entities executed by licensed geodetic engineer.

BACKGROUND

- Philippine Reference System of 1992
- Land Administration and Management Project

UPDATING???

DENR Regional Offices

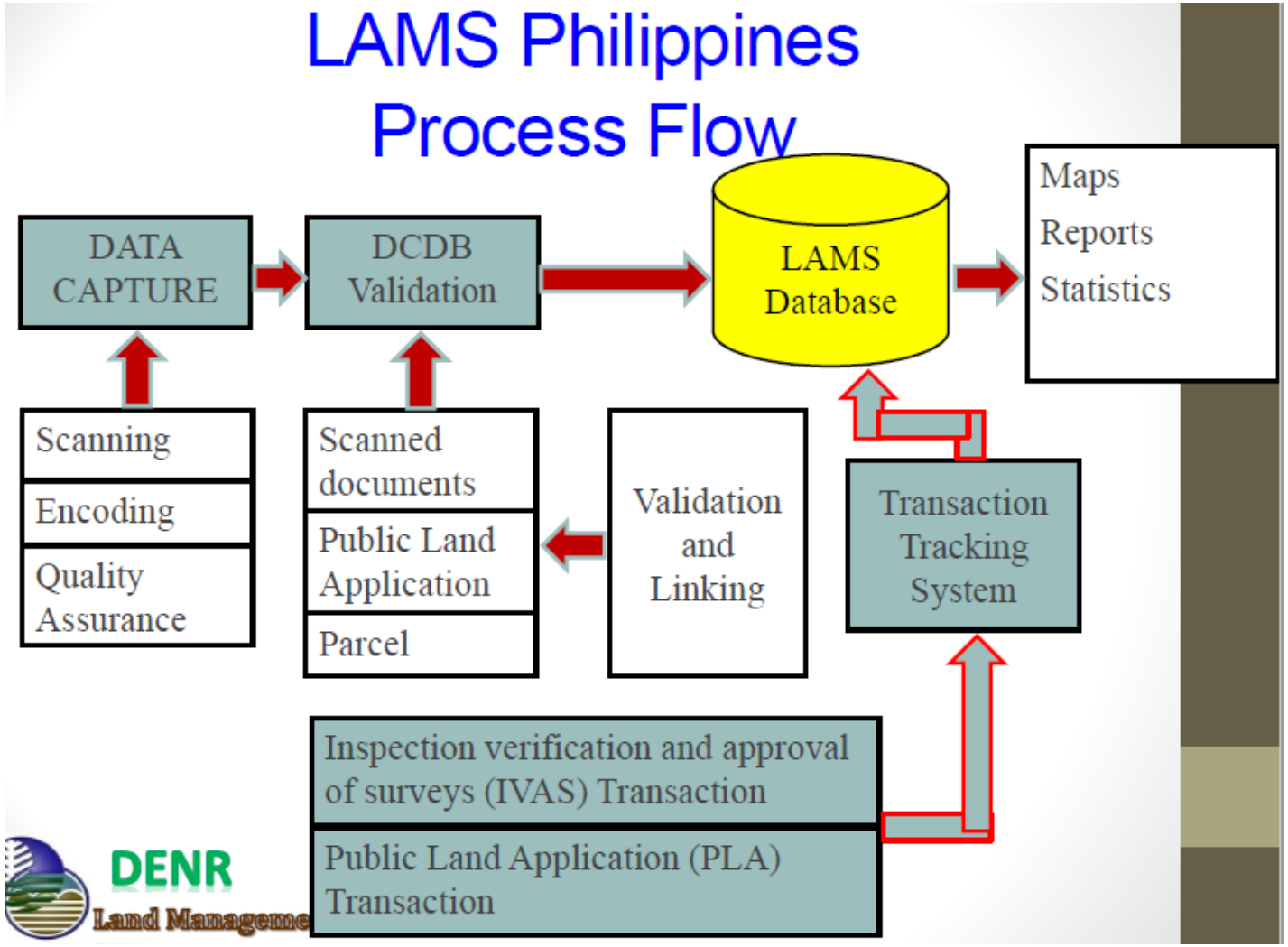
- digitize cadastral data
- encoding and plotting the coordinates of individual parcels
- scanning and digitizing cadastral maps
- producing a computerized cadastral database

BACKGROUND

- Numerous initiatives done to improve land information system but minimal effort was done to answer the problem of maintaining and updating a cadastral database

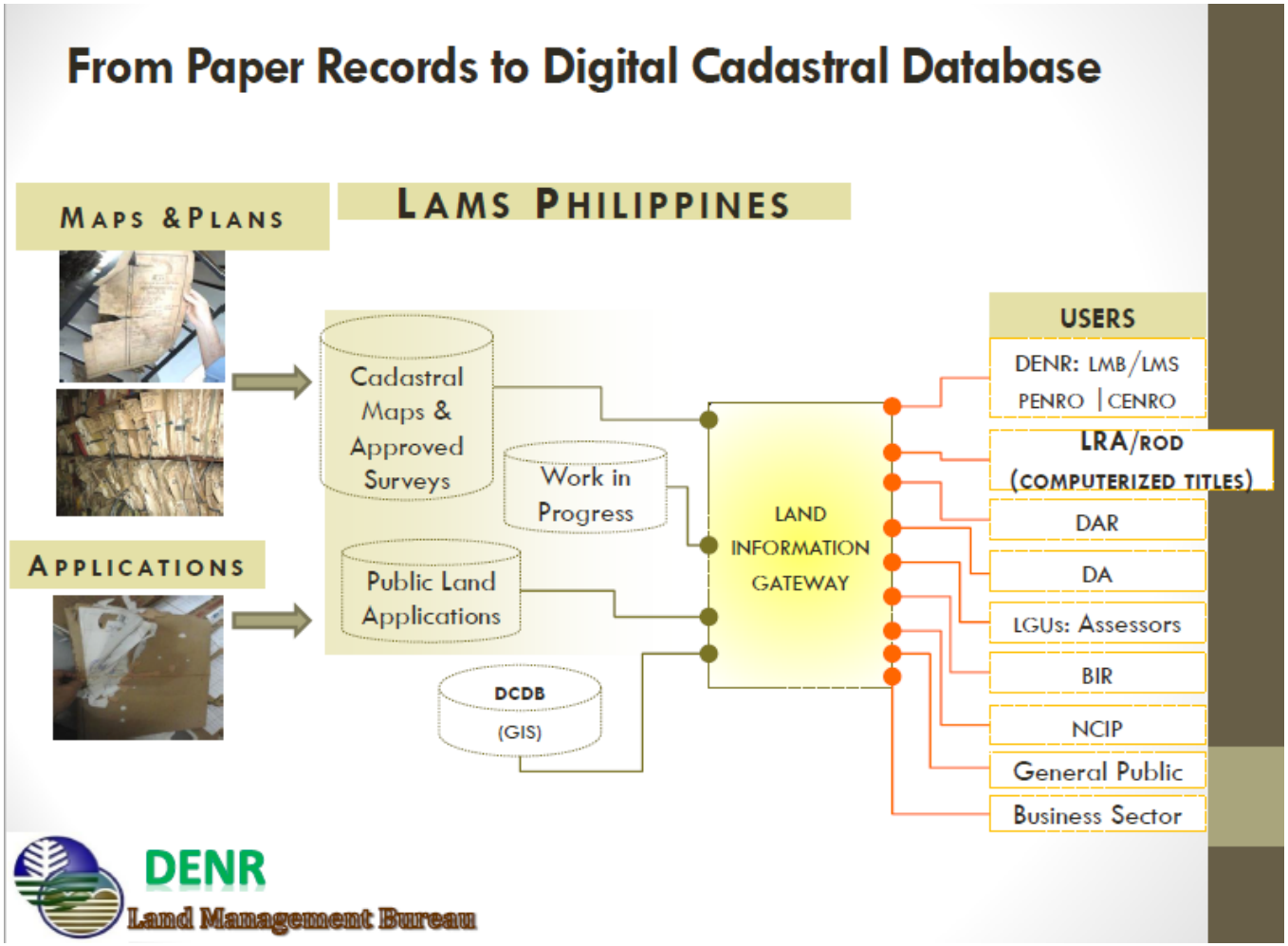
- Development of modern geographic information systems (GIS) help solve the problem of incremental updating of cadastral database

CURRENT INITIATIVES



LAMS Philippines and e-SurveyPlan
Engr. Warlito G. Quirimit

CURRENT INITIATIVES



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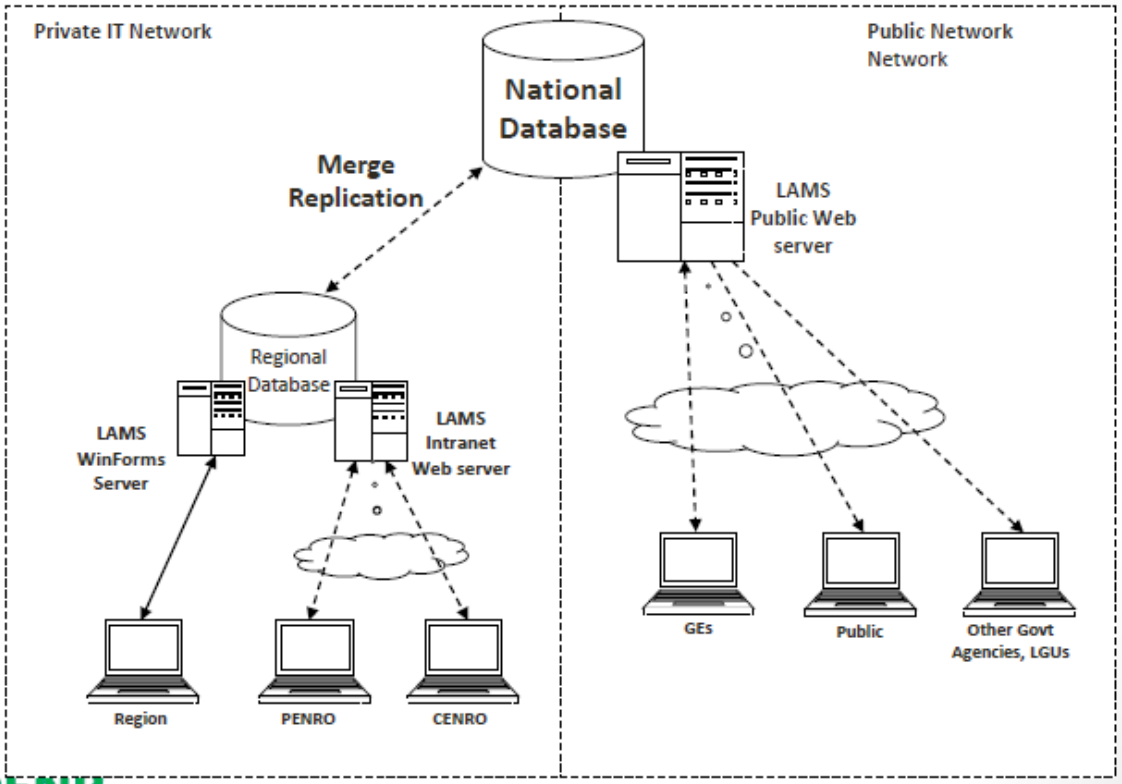
CURRENT INITIATIVES

Nationwide Database of Land Records



DENR
Land Management Bureau

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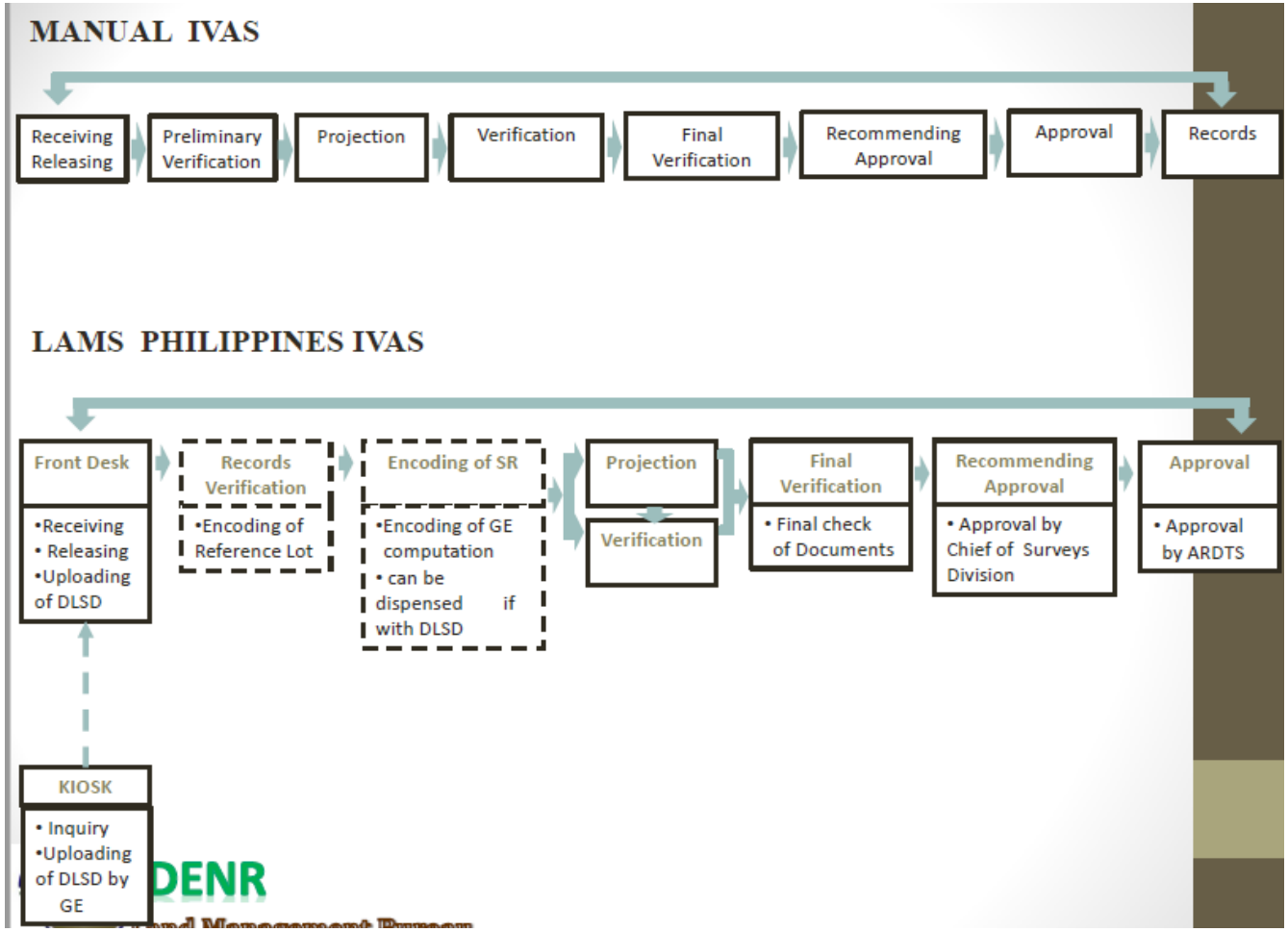
CURRENT INITIATIVES



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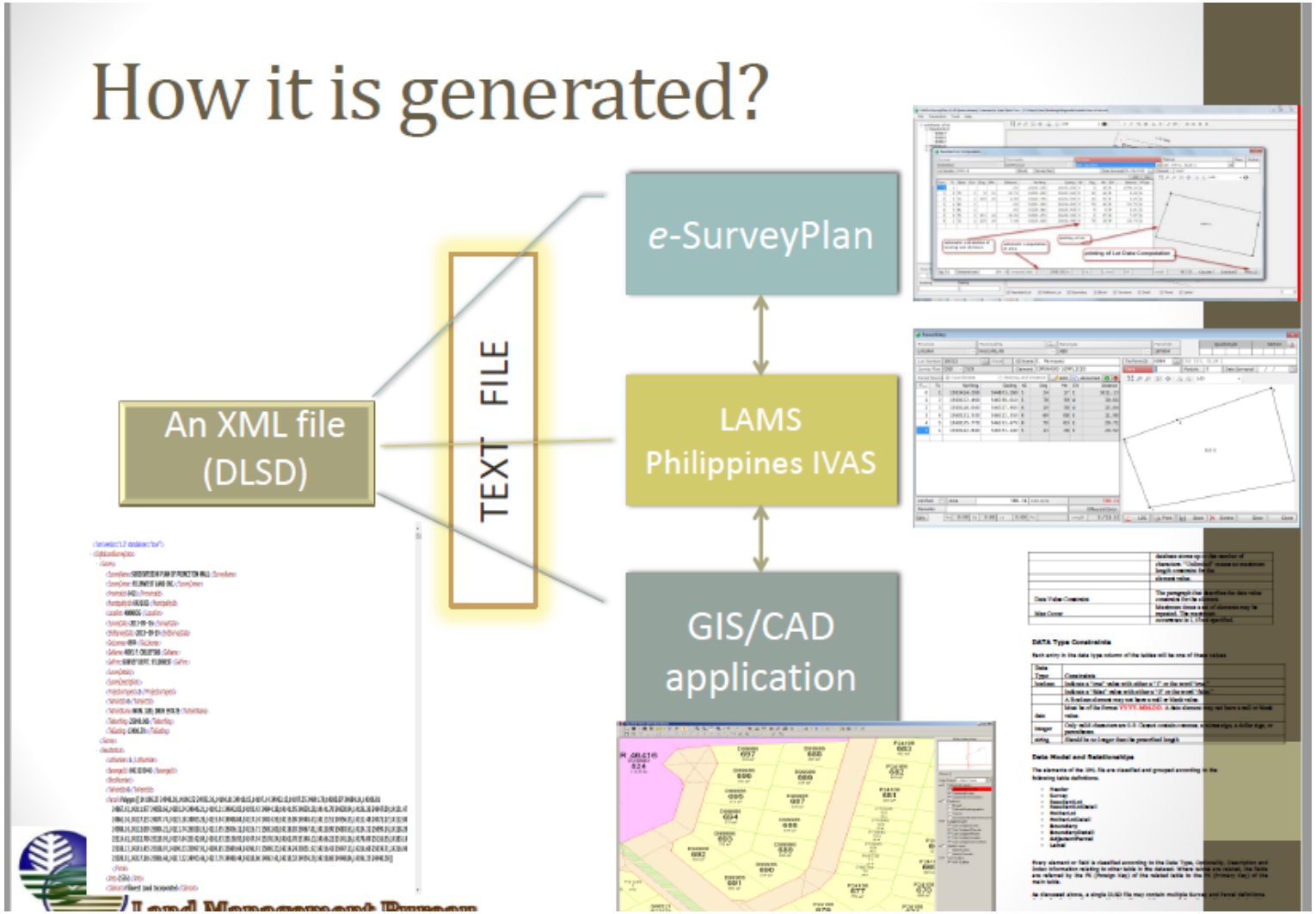
CURRENT INITIATIVES



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CURRENT INITIATIVES

eSurveyPlan Windows Application

- ADVANTAGES
  1. can control who uses the app by distributing the program with registration keys (PKI, GE license number)
     - we can/need to identify who accesses the LAMS database
     - can meet the requirement of eCommerce Law by identifying the origin or recipient of data
  2. user responsive application
  3. can work offline, connection to regional office can be established on demand
  4. ClickOnce deployment
  5. GIS enabled (open source GIS)

- DISADVANTAGE
  1. require app to be installed on a personal computer/laptop

DENR

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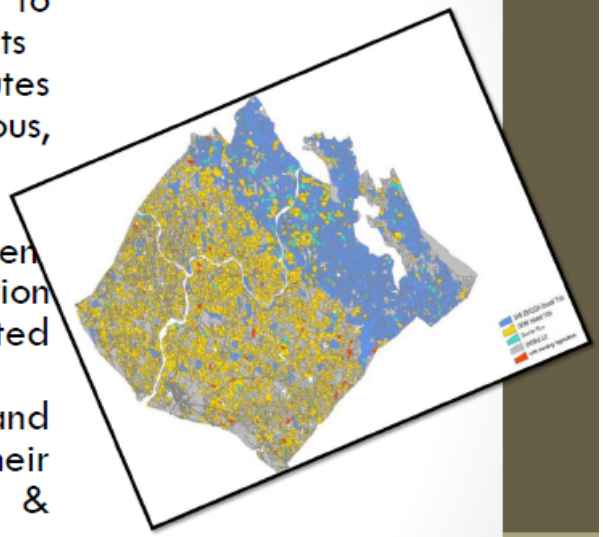
CURRENT INITIATIVES

LAMS Philippines Operational Benefits

2. Improved access to land records & information at reduced costs to government, private & public clients
3. Reduced land conflicts/disputes brought about by erroneous, overlapping or missing records
4. Double titling are avoided
5. Improved land records management & maintain up-to-date information through linkage with other related systems
6. Provision of accurate land information to LGUs to support their resource/development planning & tax mapping



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CURRENT INITIATIVES

Land Sector Modernization Project (LandS Mode)

- **Three Components:**
  - **Three Dimensional Cadastre (3DCad)**
  - **Unified Projection System for Cadastral Data (UPSCad)**
  - **Cadastral Survey Records Reconstruction (CadSRR)**

CURRENT INITIATIVES

LandS Mode: 3DCad

Objectives:

- Formulate an appropriate methodology in the generation of 3D Cadastre;
- Conduct field experiments in the data acquisition using appropriate equipment;
- Perform data processing and analysis on the applicability of 3D Cadastre on the study areas

Technology to be used:

- GNSS
- UAV
- Terrestrial Laser Scanner
- Computer and Processing Software

CURRENT INITIATIVES
LandS Mode: 3DCad

3 Dimensions (X, Y, Z)

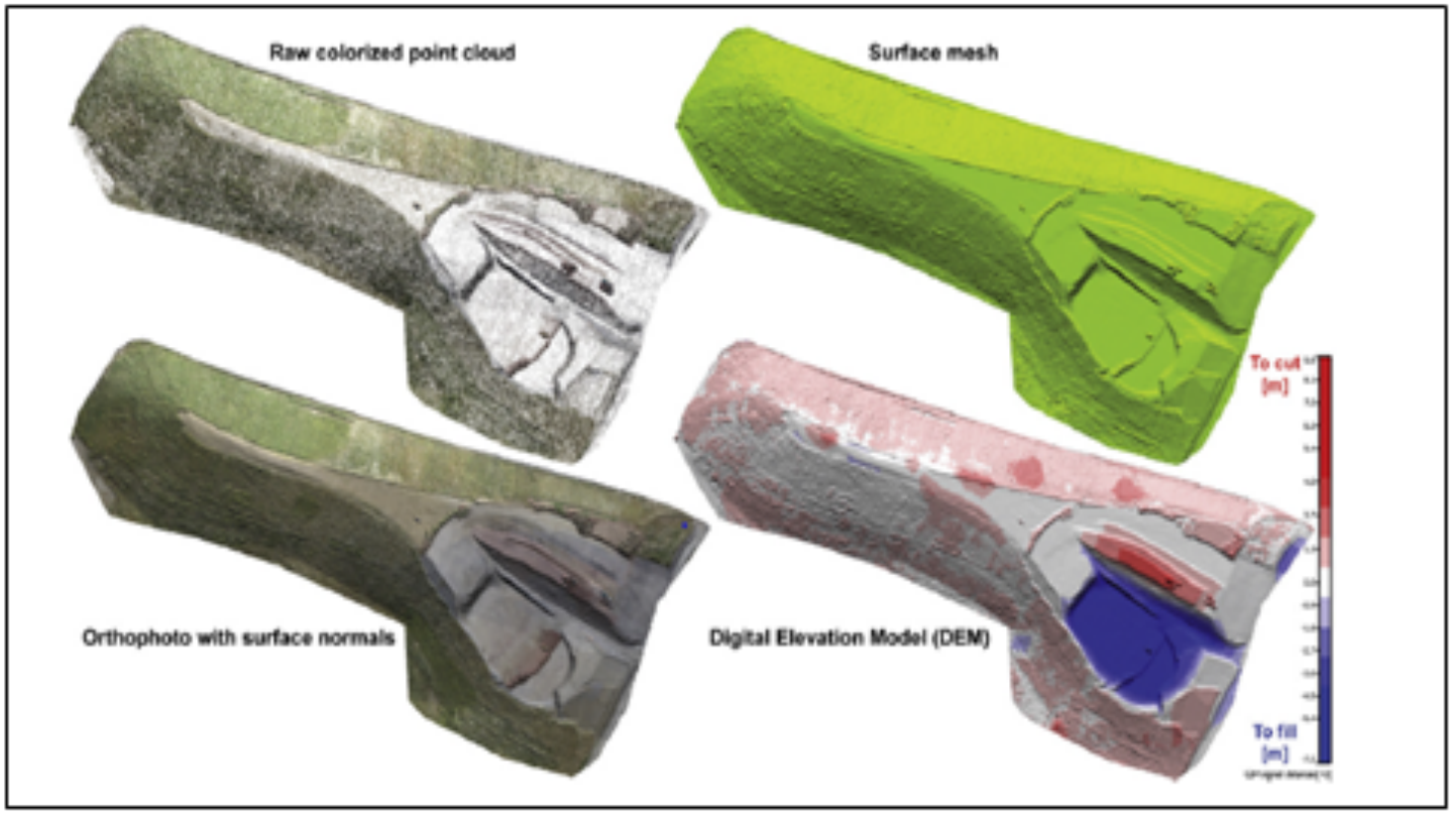


Figure I-5. Sample of processed output from a photogrammetric survey using a UAV

CURRENT INITIATIVES
LandS Mode: 3DCad

3 Dimensions (X, Y, Z)

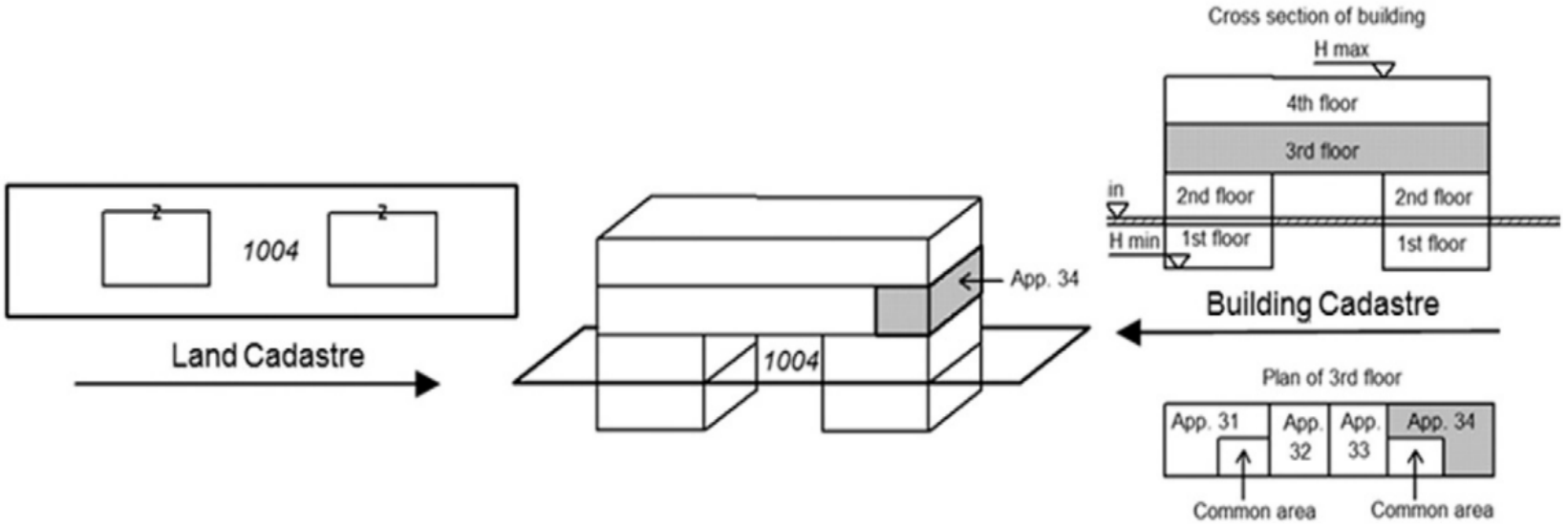


Figure I-7. Land parcel boundaries and footprints of the building in the land cadastre (left), the proposed 3D representation of real property (middle), and data recorded in the building cadastre (right)

CURRENT INITIATIVES

LandS Mode: UPSCad

Objectives:

- Formulate appropriate methodology in the generation of a common projection system;
- Conduct field surveys in one (1) municipality with three (3) adjoining selected survey projects done in three (3) different reference systems mentioned;
- Perform data processing and analysis on the applicability of using satellite / or drone imageries on the study areas

Technology to be used:

- GNSS
- UAV
- Computer and Processing Software

CURRENT INITIATIVES
LandS Mode: UPSCad

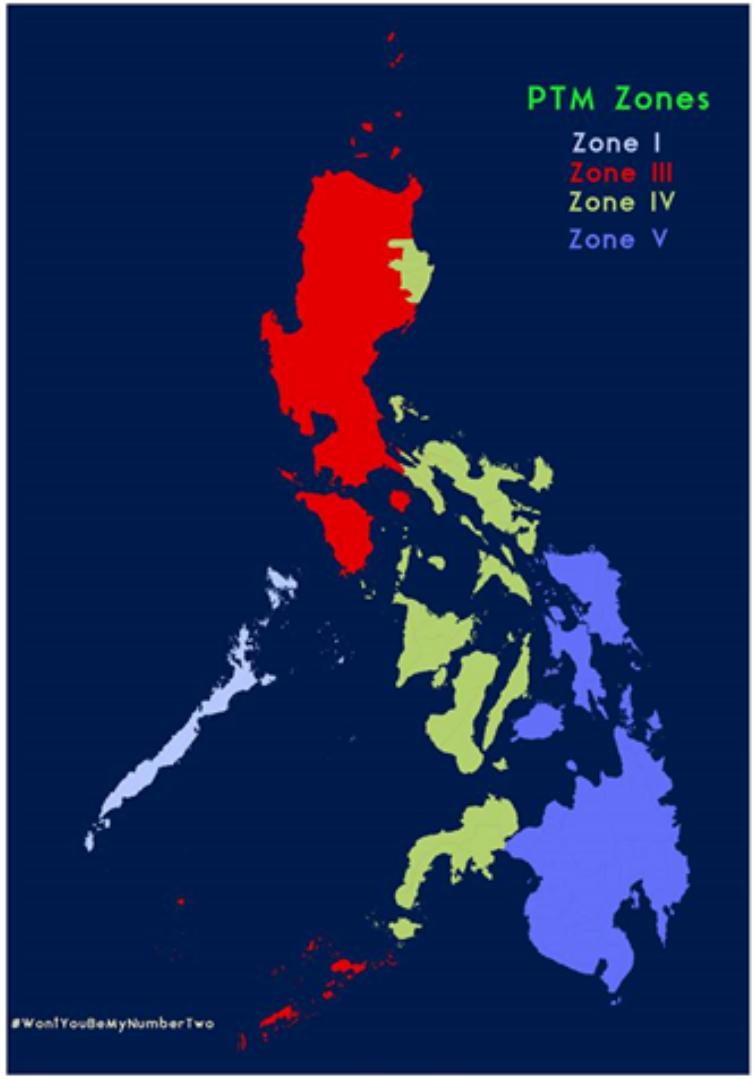


Figure II- 1. Visual representation of the PTM Zones (image source: Engr. John Louie Fabila)

CURRENT INITIATIVES

LandS Mode: UPSCad

Proposed Study Area: Adjoining Municipalities with different Coordinate System

CURRENT INITIATIVES

LandS Mode: CadSRR

Objectives:

- Review the current practices in survey records reconstruction;
- Formulate appropriate methodology in the survey reconstruction outside the LAMS-DCDB;
- Perform computer programming to provide additional commands to an open source and free GIS software which will be used as the platform for the survey records reconstruction and integration of processed data;
- Test and perform survey reconstruction methodology on the study areas

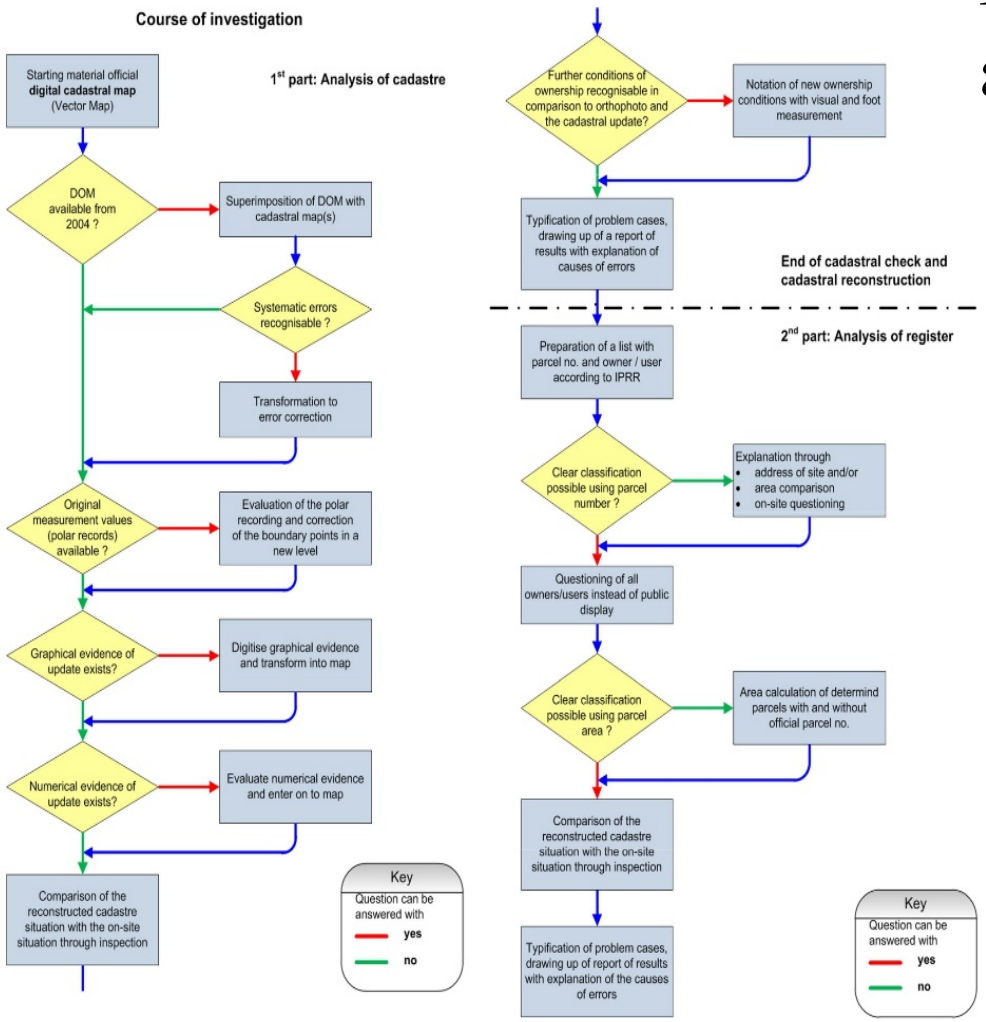
Technology to be used:

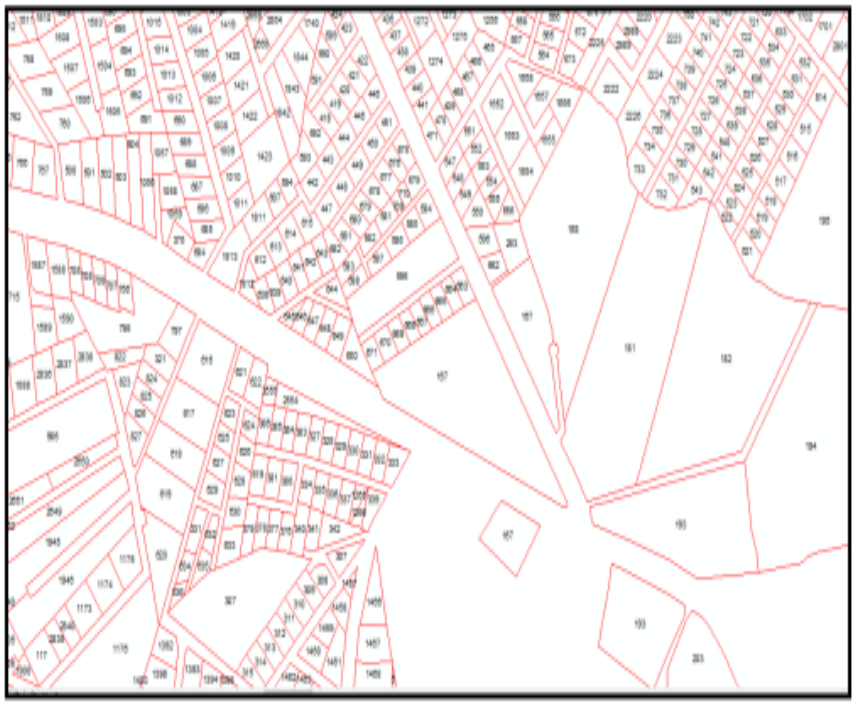
- Computer, GIS Software, Programming Software

CURRENT INITIATIVES

LandS Mode: CadSRR

Study Areas:
Regions 4A, 4B, Region 3 and NCR





SyLVer Protocol Research OBJECTIVES

- Determine and evaluate the factors affecting cadastral database's changing information, provide a way to create and update a cadastral database and provide a way to maintain the historical information.

- Propose a Systematic Land Verification (SyLVer) Protocol that may help agencies such as DENR to do computerized incremental updating while maintaining the topological integrity of a cadastral database.

- Another form of 3 dimensional cadastre (X, Y, T)

SyLVer Protocol Research
CADASTRAL DATABASE

FIELD NAME	DESCRIPTION	REMARKS
UPI	Unique Parcel Identifier, primary key	
Lotno	Lot number	
SurveyNo	Survey number	
Claimant	Claimant or owner	
CMQuadSec	Cadastral map quadrangle where the parcel is located/plotted	applies to cadastral data from Cadastral Maps
Brgy	Barangay	
Muncplity	Municipality	
Province	Province	
Island	Island	
GeEngr	Geodetic Engineer	
d8Surveyed	Date Surveyed	
SurvSymNo	Surv. Sym. & No.	applies to titled lots only
LRCNo	LRC Record No.	applies to titled lots only
Area	Area of the lot declared on the survey plan	

Attributes of the Cadastral Database

SyLVer Protocol Research

CADASTRAL DATABASE

D8Submited	Date Submitted to DENR for verification and approval	
D8Approved	Date the survey plan was approved by DENR	can be used to trace the successive history of a parcel
Mothr_lotN	Mother lot number	applies to isolated surveys only
Mothr_surN	Mother lot survey number	applies to isolated surveys only
Mothr_UPI	Mother lot unique parcel identifier	applies to isolated surveys only; can be used as link between the mother lot and resultant parcel
OrigSurNo	Original Survey number	applies to isolated surveys only
OrigSurD8	Original Survey date	applies to isolated surveys only
OrigD8Aprv	Original survey date of approval	applies to isolated surveys only
OCTNo	Original Certificate of Title Number	applies to titled lots only
TCTNo	Transfer certificate of Title Number	applies to isolated surveys on titled lots only
CompArea	Computed Area	

Attributes of the Cadastral Database

SyLVer Protocol Research

CADASTRAL DATABASE

Types of Survey Based on Survey Symbols	
Survey Type	**Survey Symbol**
Cadastral Survey	Cad
Original Survey	Psu, RS, Fli, Msi
Subdivision Survey	Psd, Csd
Consolidation Survey	Pcn, Ccn
Consolidation-Subdivision Survey	Pcs, Ccs
Verification Survey	Vs

Typical survey symbols based on the type of survey conducted

SyLVer Protocol Research

CADASTRAL DATABASE INCREMENTAL UPDATING

I. Spatial characteristic- affects the geometry of the parcel

1. Subdivision Survey (segmentation/split)
2. Consolidation Survey (mergence /union)
3. Consolidation-Subdivision Survey (complex change)
4. Verification Survey (boundary adjustment)

II. Attribute characteristic- geometric position does not change

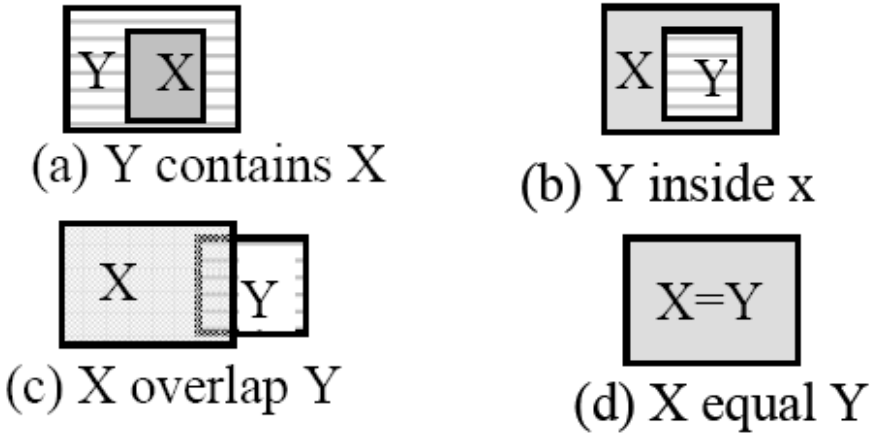
- change in ownership, land classification etc.

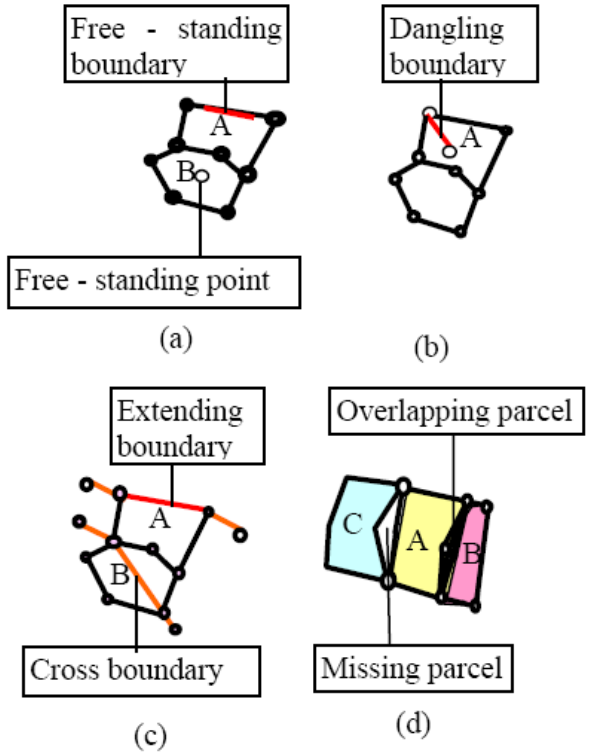
SyLVer Protocol Research

CADASTRAL DATABASE INCREMENTAL UPDATING

Change in the characteristic of a lot can be identified by

- topological relationship between the parcels before and after the change
- topological integrity constraints and attribute property (Chen, Zhou and Li 2007).

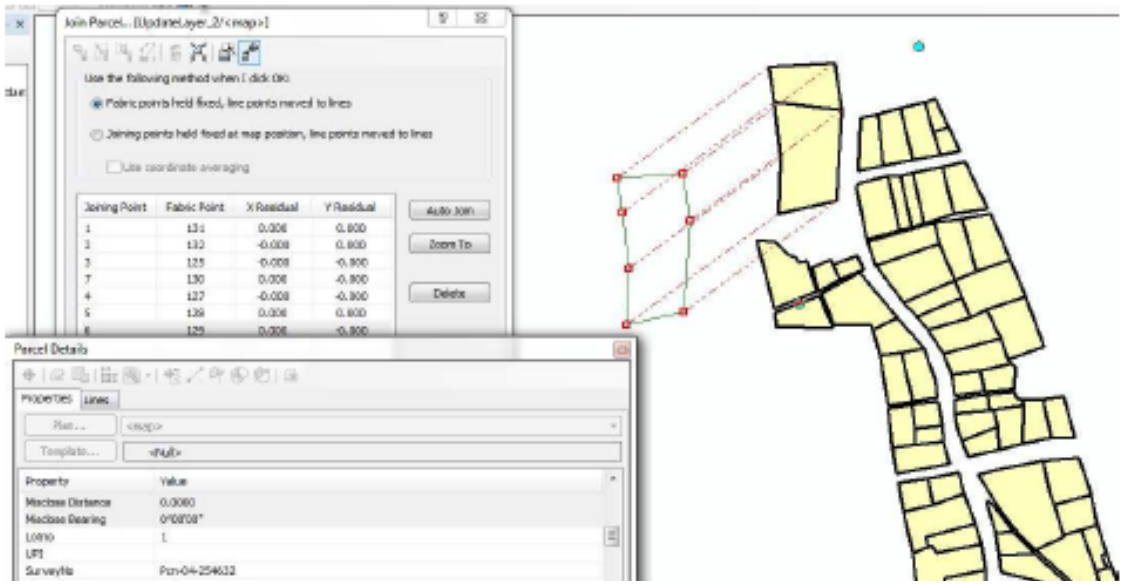




SyLVer Protocol Research

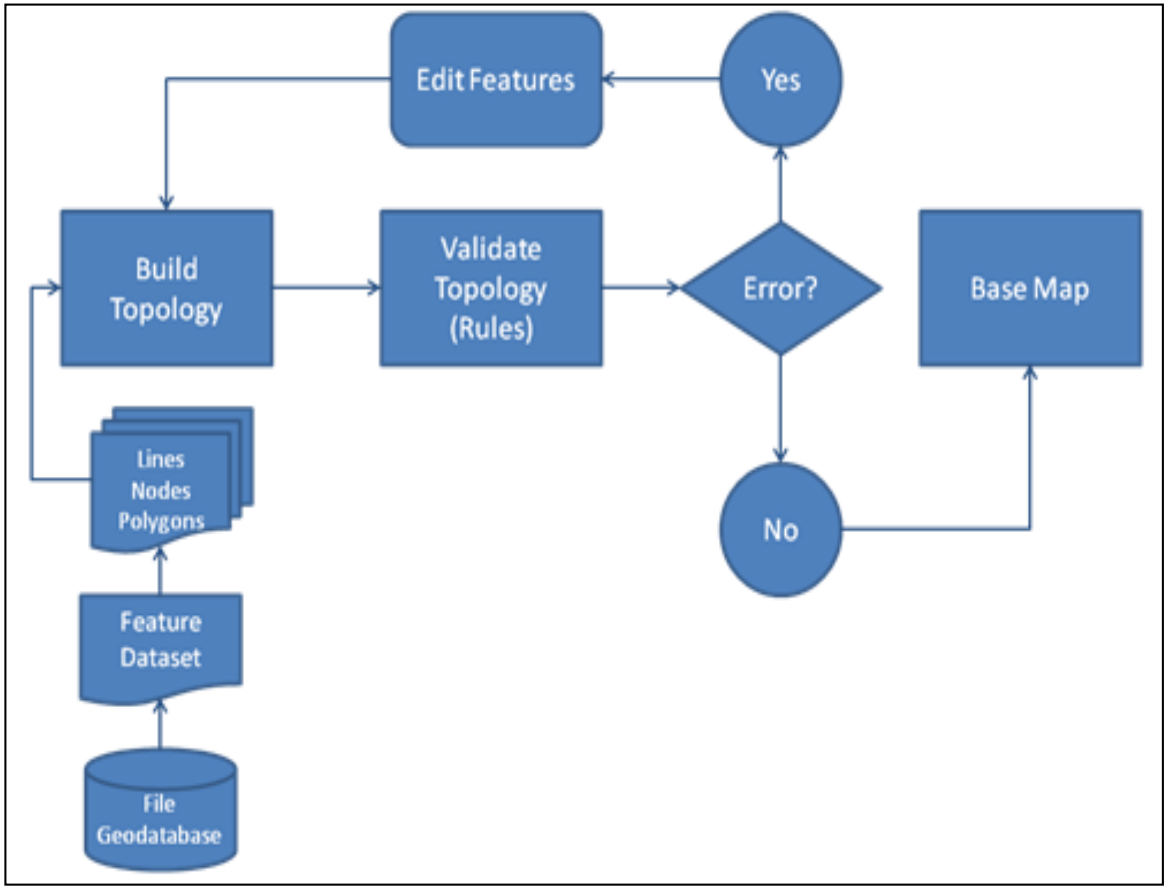
ARCGIS PARCEL EDITOR

- Parcel Fabric
- Base-map Creation
- Update Layer
- History Layer



SyLVer Protocol Research

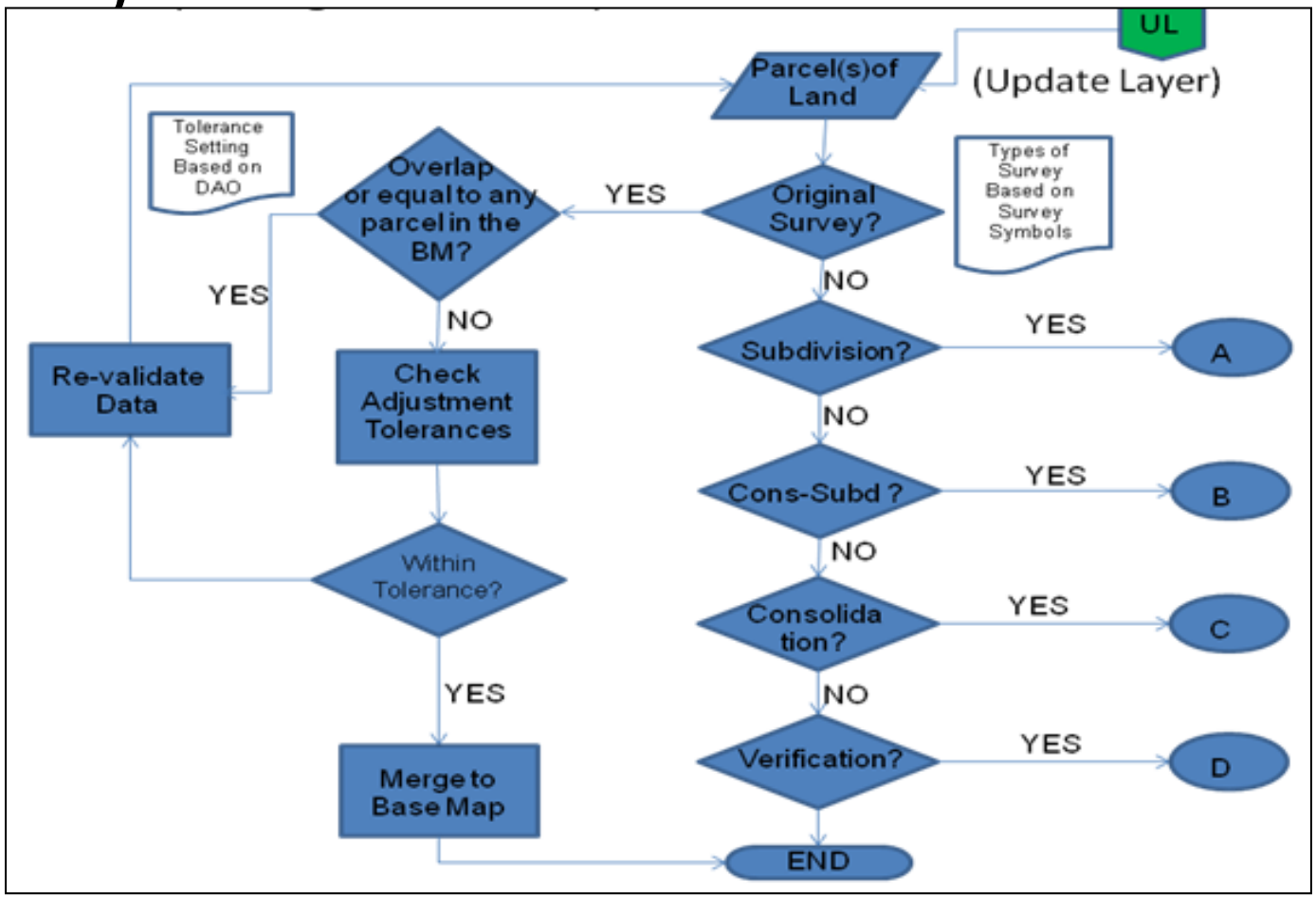
PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL



Base Map Creation Flowchart

SyLVer Protocol Research

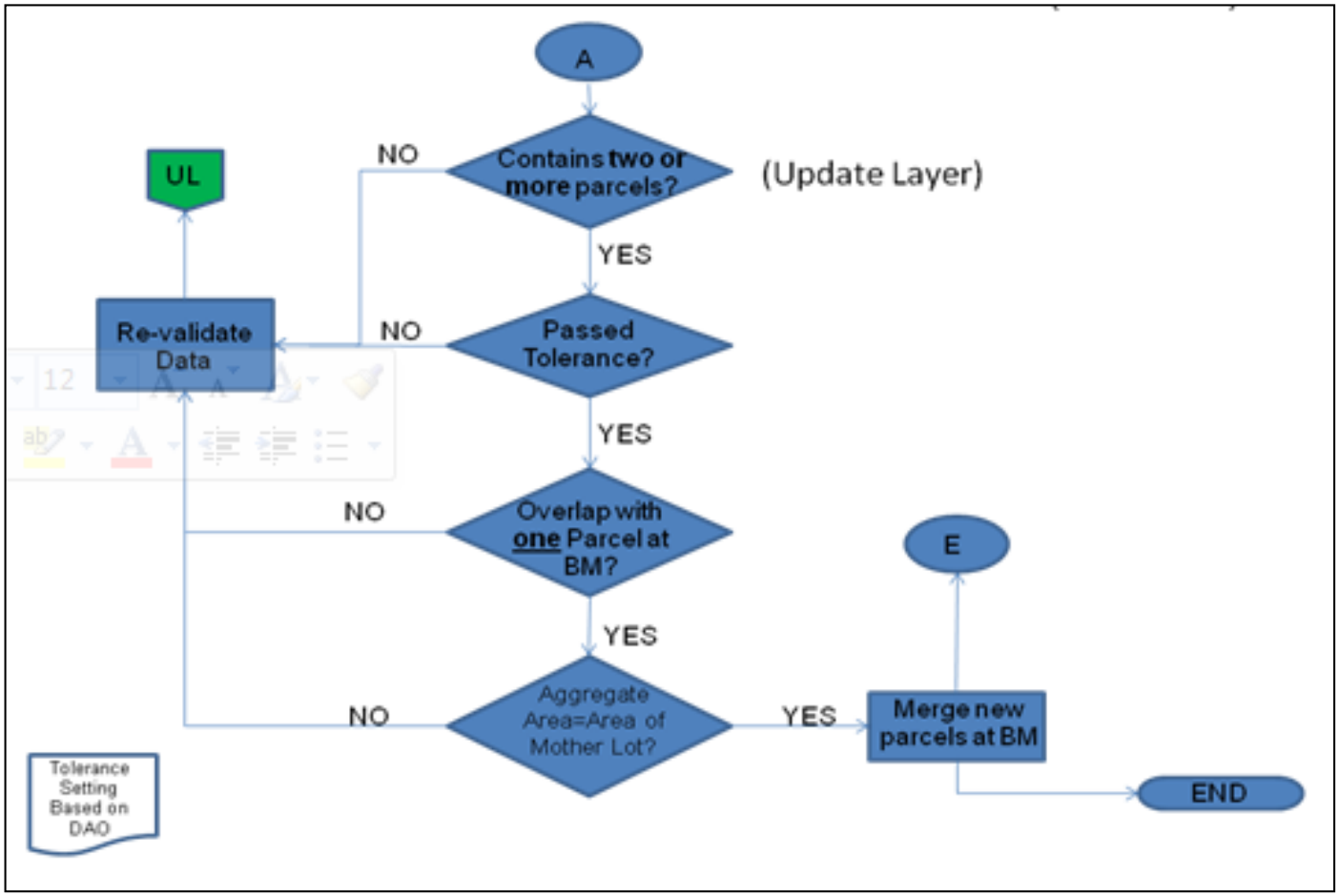
PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL



Procedure for Updating Cadastral Database Map

SyLVer Protocol Research

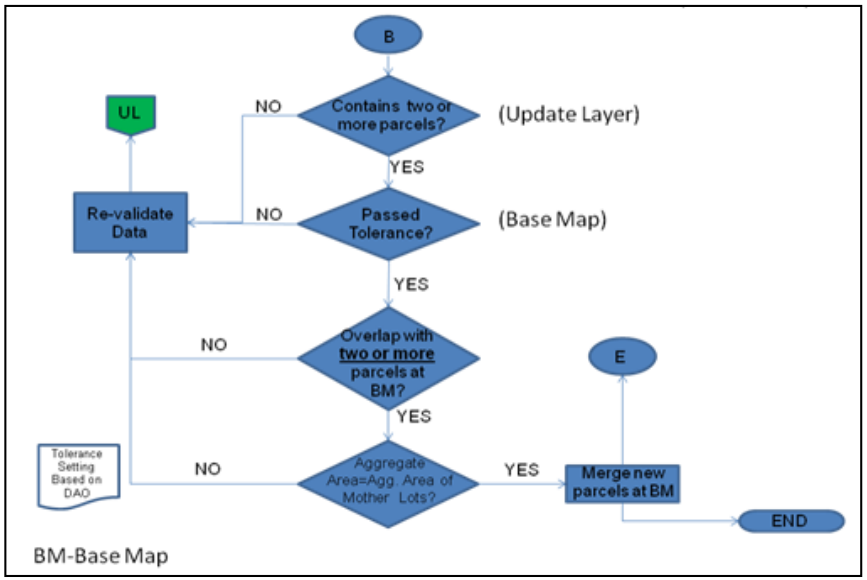
PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL



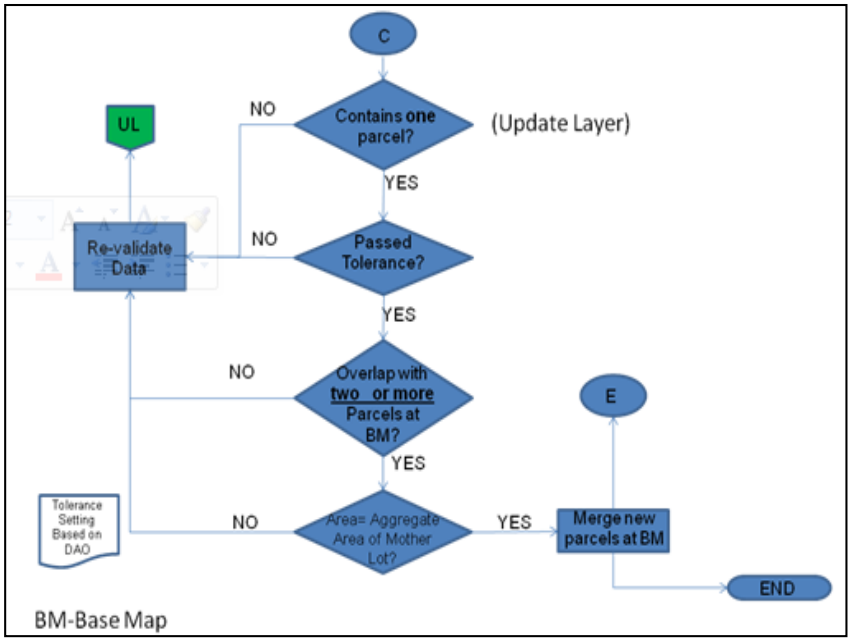
Subdivision Survey Protocol

SyLVer Protocol Research

PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL



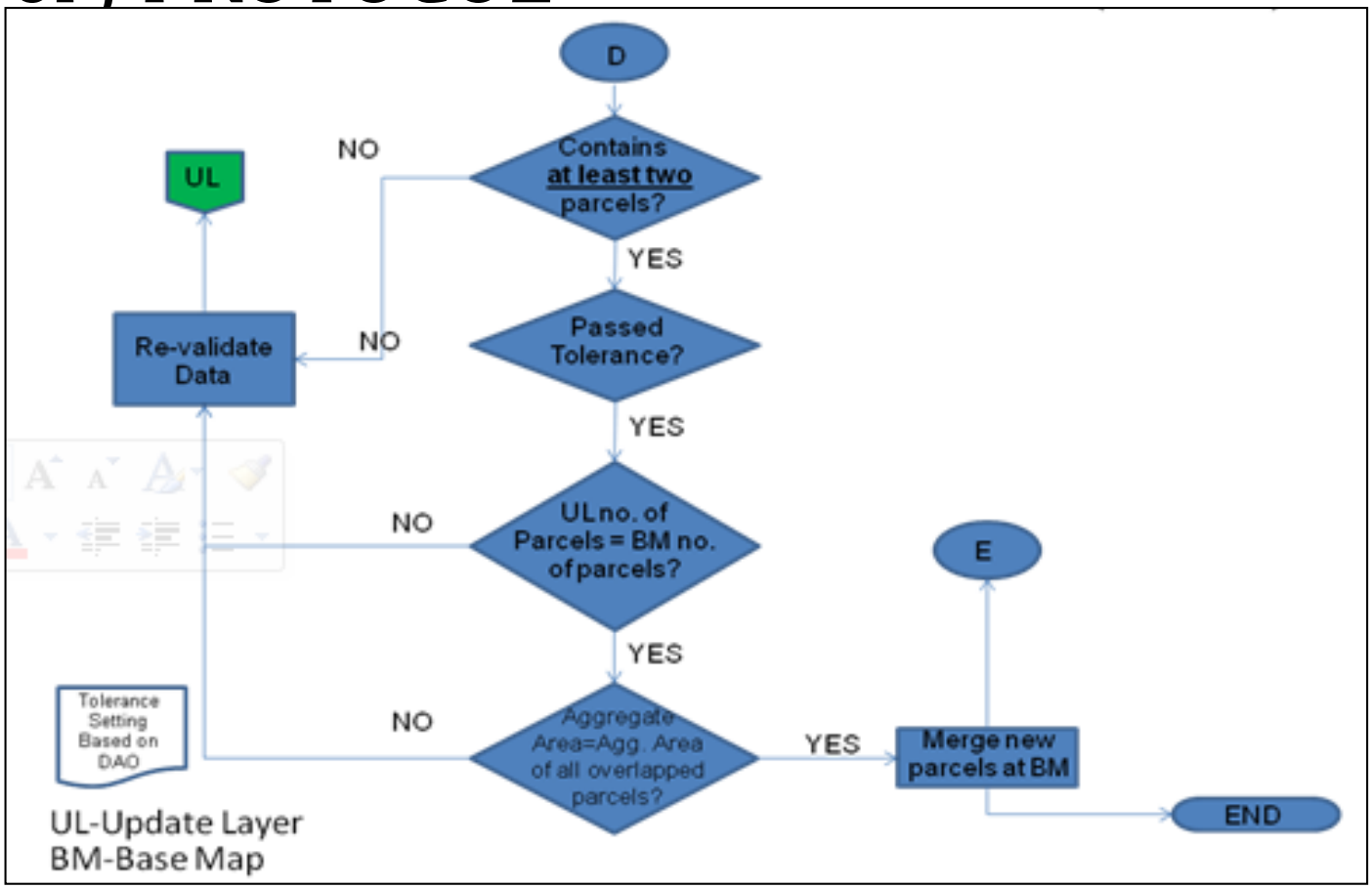
Consolidation-Subdivision Survey Protocol



Consolidation Survey Protocol

SyLVer Protocol Research

PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL



Verification Survey Protocol

SyLVer Protocol Research

PROPOSED SYSTEMATIC LAND VERIFICATION (SyLVer) PROTOCOL

Protocol checks for subdivision, consolidation-subdivision, consolidation and verification surveys include the following:

- Checking of the number of lots in the Update Layer;
- Tolerance checking;
- Checking of the number of mother lots in the base-map; and
- Checking of the computed land area of the parcels in the Update Layer and the Base Map Layer

CONCLUSIONS AND RECOMMENDATIONS

- There are current initiative in the computerization of survey records including the LAMS project and the LandS Mode Research Project

- A good parcel updating system is important as it provides user with up-to-date information. Historical data are still relevant as it provides chronological history of parcels that may be needed in several purposes such as investigation.

- The proposed SyLVer protocol may provide another level of improving and updating of cadastral database in a computer environment. It is another form of 3D cadastre where the third dimension is time.

CONCLUSIONS AND RECOMMENDATIONS

- GIS software can provide an efficient and capable tool in the implementation of cadastral database build-up and incremental updating. ArcGIS provided modules such as the Parcel Editor that can readily be used. The cost of buying such third party software must be considered. However, alternative GIS software are available.

- Implementation using actual data is the next level of the study and use of the SyLVer Protocol. This may be done in coordination and support of DENR.

REFERENCES

- Chen, Jun, Xiaoguang Zhou, og Zhilin Li. »Event-driven Incremental Updating of Cadastral Spatial Database Considering Topological Integrity.« Urumqi, Xinjiang Uygur, China: 5th ISPRS, 2007.

- DENR. *DAO 1998-12: Manual for Surveyors.* 1998.

- DENR. *DAO 2007-29: Revised Regulations on Land Surveys.* Quezon City, Philippines: DENR, 2007.

- ESRI. *ArcGIS Help.* 2012.

- LAMS Philippines and e-Survey Plan presentation by Engr. Warlito G. Quirimit (2016)

Try not to become a person of success, but rather try to become a person of value ***- Albert Einstein***

Thank you for your attention!!!