INTERNATIONAL SYMPOSIUM AND EXHIBITION ON GEOINFORMATION

Global Trends: Geoinformation For The New Economy

Studies Toward the Development of Implementation Plan Of Coordinated Cadastral System for Peninsular Malaysia

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SCOPE OF PRESENTATION

- RESEARCH BACKGROUND
- CCS: THE MALAYSIAN PERCEPTION
- DEVELOPMENT OF GEOCENTRIC BASED CADASTRAL CONTROL INFRASTRUCTURE
- REPOPULATING DCDB WITH HOMOGENOUS & SURVEY ACCURATE COORDINATES
- INTEGRATION WITH CAMS DATA

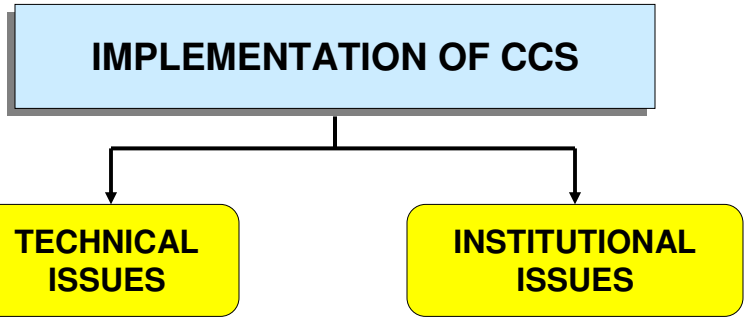
Cont…

Development of Implementation Plan of CCS for Malaysia: Research Objectives

The main objective of this study is:

i. **To develop and realize a geocentric based Cadastral Control Infrastructure (CCI)**
ii. **To establish methodology for the Development of National Digital Cadastral Data Base**
iii. **To develop techniques for integrating the digital Cadastral Data with Mapping Data**
iv. **To address the Institutional Issues on the Implementation of CCS.**

STUDY FRAMEWORK



- Development of Geocentric Based Cadastral Control Infrastructure (CCI)
- Development of National Digital Cadastral Data Base (NDCDB)
- Integration of National Digital Cadastral Data Base (NDCDB) & National Digital Topography Data Base (NDTDB)

- Organizational
- Legal

CCS : THE MALAYSIAN PERCEPTION

CCS – THE MALAYSIAN PERCEPTION

COORDINATES

BEARING & DISTANCE

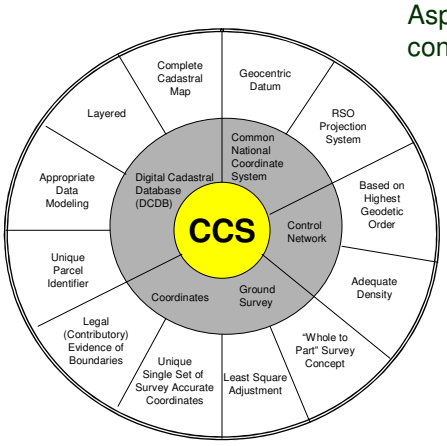
Coordinated Cadastre as a coordinate-based cadastral system with the coordinates being given greater emphasis. The prominence of measured bearing and distances are reduced whereby they are considered as only a means by which the final adjusted coordinates are derived. The foundation of the concept is the geocentric geodetic datum, a single projection system for the whole country and the application of least-square adjustment technique in the distribution of survey errors.

PROJECTION SYSTEM

DATUM

LEAST SQUARE ADJUSTMENT

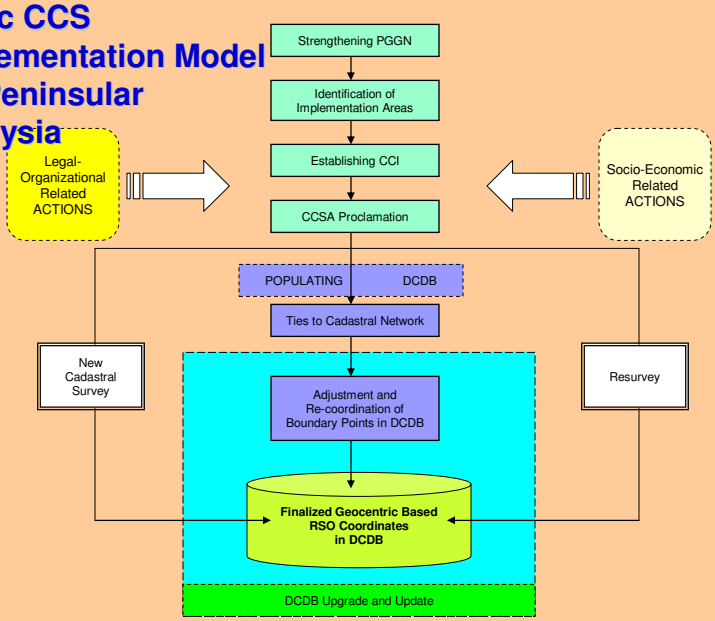
CONCEPTUAL MODEL OF CCS FOR PENINSULAR MALAYSIA



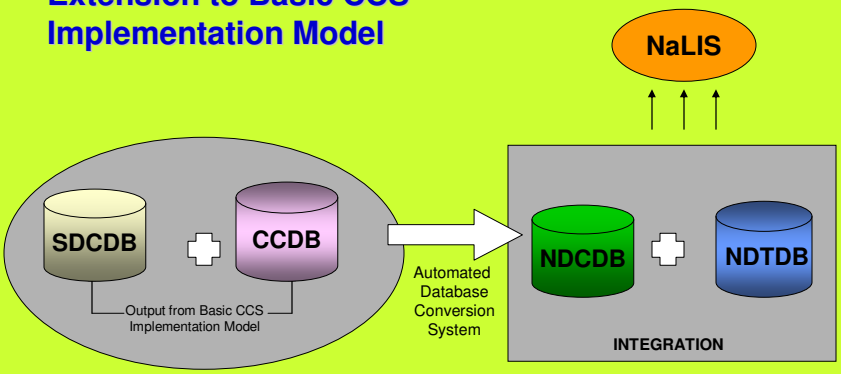
Aspects taken into account for the conception are:

- the widely accepted perception of the coordinated cadastre
- the underlying features of a coordinated cadastre as indicated by DSMM
- the future direction of the cadastre
- the existing cadastral system and its needs
- the important elements that should be available in a modern cadastre

Basic CCS Implementation Model for Peninsular Malaysia



Extension to Basic CCS Implementation Model

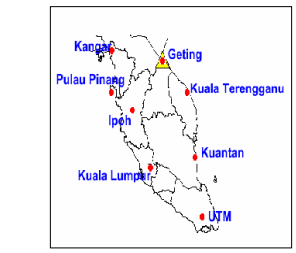


NOTE

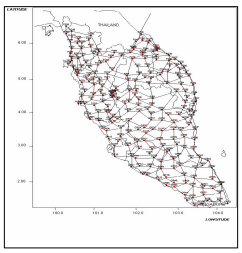
SDCDB State Digital Cadastral Database
CCDB Cadastral Control Database
NDCDB National Digital Cadastral Database
NDTDB National Digital Topographic Database
NaLIS National Land Information Infrastructure System

DEVELOPMENT OF GEOCENTRIC BASED CADASTRAL CONTROL INFRASTRUCTURE

Development of A Geocentric- Based Cadastral Control Database



Zero Order Geodetic GPS Network (MASS Stations)



First Order Geodetic GPS Network (30km Network)

Cadastral Control Infrastructure
- 10km,2.5km,0.5km
- Ties to Cadastral Network

Computation of Geocentric Cassini & RSO Coordinates

Design & Analysis Of CCDB

Cadastral Control Database

CCDB

Transformation Parameters from PGGN2000 to PGGN95

COMPONENT	*PARAMETER*	STD. DEV
DX	Refer to DSMM	
DY	Refer to DSMM	
DZ	Refer to DSMM	
RX	Refer to DSMM	
RY	Refer to DSMM	
RZ	Refer to DSMM	
SCALE	Refer to DSMM	

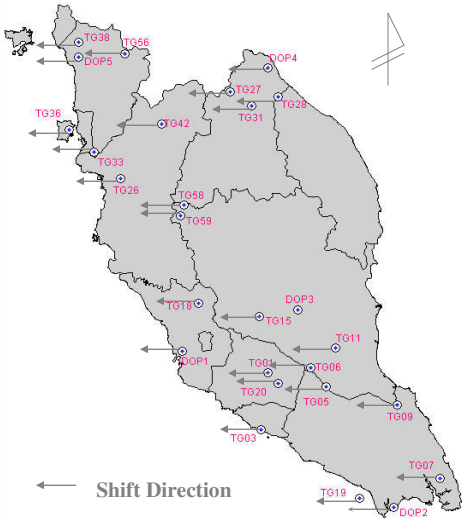
GEOCENTRIC
CASSINI & RSO PROJECTIONS

- Geocentric Cassini coordinate is computed direct from latitude and longitude using exact formulae
- RSO projection parameters have been modified for the computation of RSO coordinate from geocentric latitude and longitude

RSO Parameters

	RSO_{local}	$RSO_{geocentric}$	Remark
Ellipsoid Parameters			
Ellipsoid	Modified Everest	WGS84	
Major axis, a	6377304.063 m	6378137.000 m	
Flattening, 1/f	300.8017	298.25722	
Category I – Defined Parameters.			
Latitude of Origin, ϕ_o	4° 00' 00"		
Longitude of Origin, λ_o	102° 15' 00"		
Azimuth, α	- $\sin^{-1}$ (0.6)		
Scale factor, k	0.99984		
False Origin (Easting)	40,000 Chains E		
False Origin (Northing)	Nil		
Category II - Parameters that related to ellipsoid change			
Parameter A	Refer to DSMM		
Parameter B			
Parameter C	Refer to DSMM		
Basic Longitude. ω_o			

Shift between RSO_{MRT} and $RSO_{PGGN2000}$



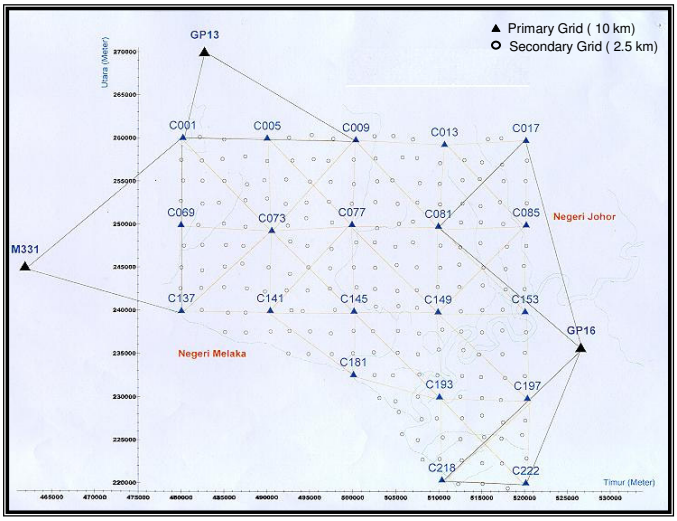
The differences between RSO_{MRT} and $RSO_{PGGN2000}$

	Δ E (m)	Δ N (m)
Min	-193.75	6.09
Standard Deviation, σ	0.73	0.47
RMS	0.72	0.47

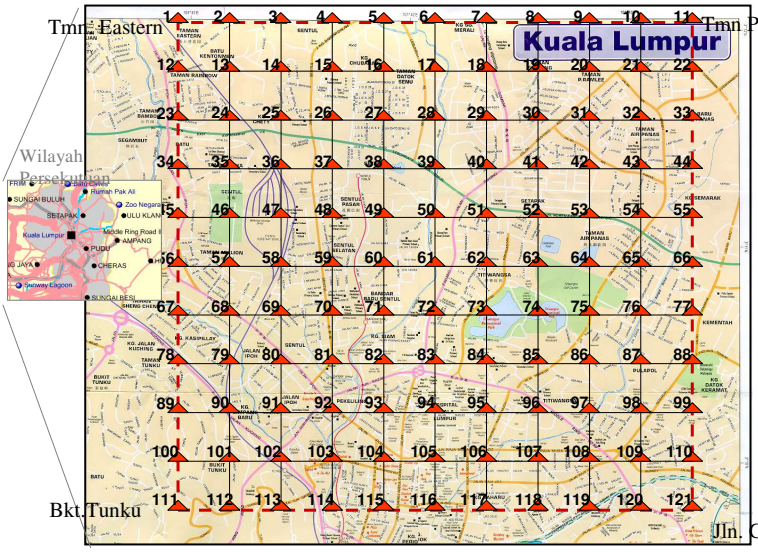
Direction = 271° 31' 25"
Magnitude = 193.82 m

ESTABLISHMENT OF CADASTRAL CONTROL INFRASTRUCTURE

ESTABLISHMENT OF CADASTRAL CONTROL INFRASTRUCTURE: MELAKA & JOHOR

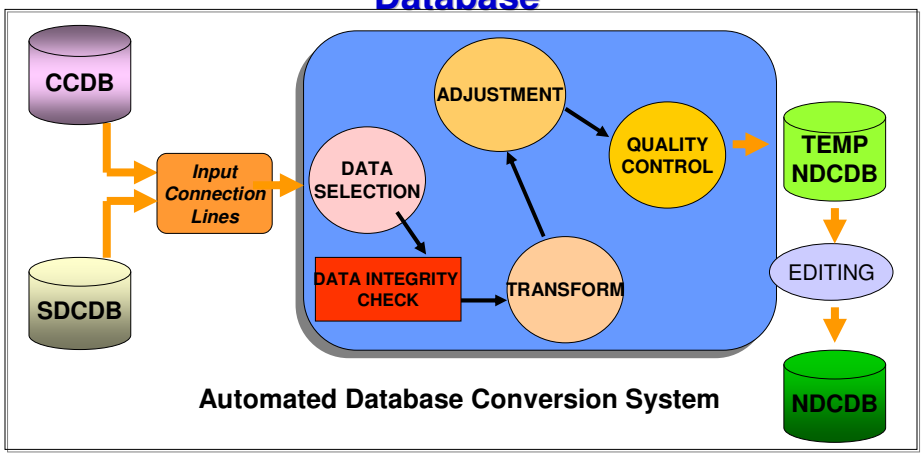


ESTABLISHMENT OF CADASTRAL CONTROL INFRASTRUCTURE: MELAKA & JOHOR



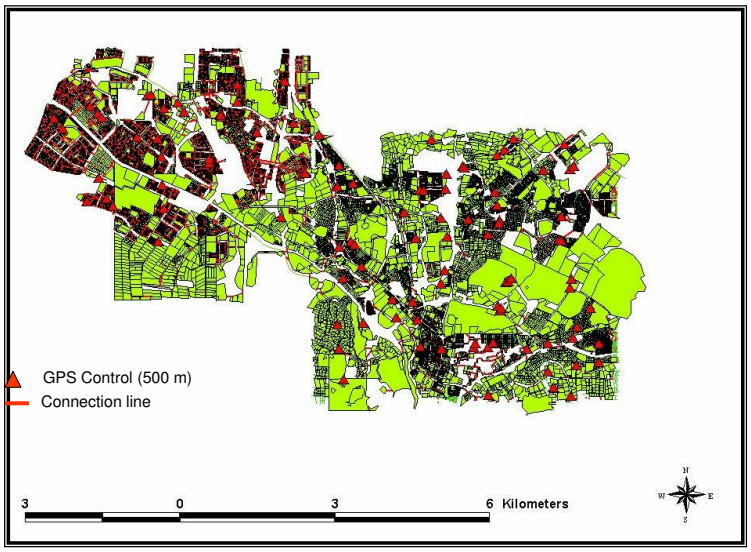
REPOPULATING DCDB WITH HOMOGENOUS & SURVEY ACCURATE COORDINATES

Development of A National Digital Cadastral Database



CCDB : Cadastral Control Database
SDCDB: State Digital Cadastral Database

DIGITAL CADASTRAL DATABASE FOR STUDY AREA # 1: WILAYAH PERSEKUTUAN KUALA LUMPUR



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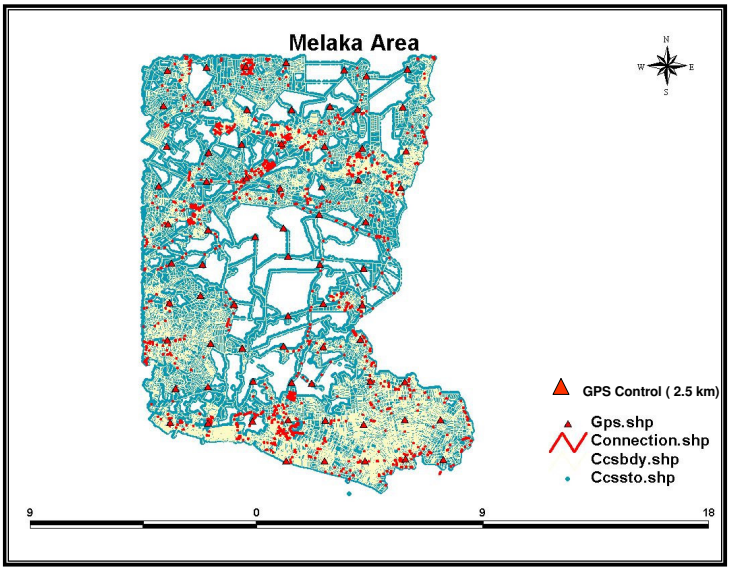
DIGITAL CADASTRAL DATABASE FOR STUDY AREA # 2: MELAKA



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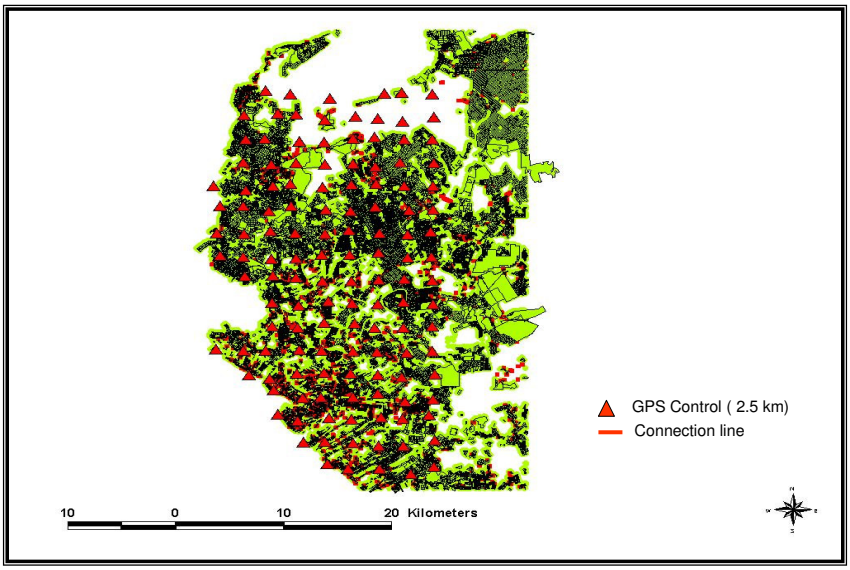
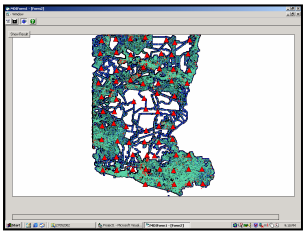
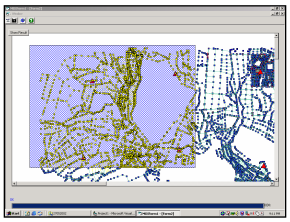
DIGITAL CADASTRAL DATABASE FOR STUDY AREA # 2: JOHOR

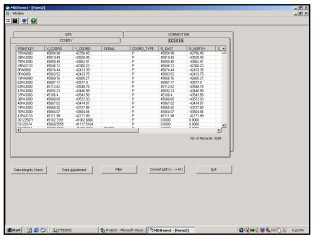


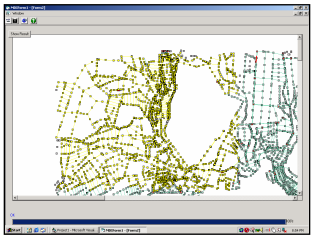
AUTOMATIC DATABASE CONVERSION SYSTEM

DATA SELECTION PROGRAM









ADJUSTMENT OF MELAKA TEST AREA

Example : The Residuals And Standard Deviations Of The Melaka Block Adjustment

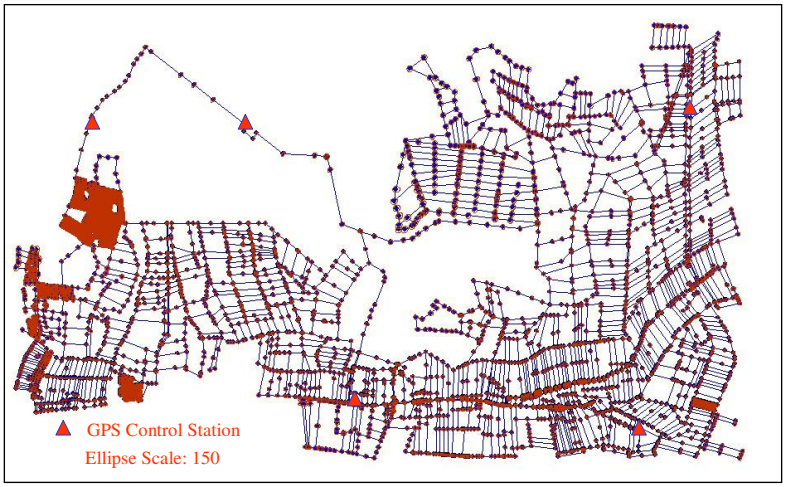
CASSINI SYSTEM

	(Fixed GPS Control Point at 2.5 km Interval) GPS Control Station:931020653, 10104385, 71020653, 53PA3141, 23PA10920, 5PA13105			
	Residual		Stn.Coord Std.Deviations	
	Bearing	Distance (m)	N (m)	E (m)
MAX	1'54"	0.039	0.092	0.084
MIN	-2'00"	-0.040	0	0
MEAN	0"	0	0.041	0.039
RMS	21"	0.013	0.042	0.041

Statistical Summary

Number of Stations : 4954
Error Factor : 1.729 (Standard error factor = 1.00)
Distance for max bearing residual : 74 m
Distance for min bearing residual : 43 m

Error Ellipse for Adjusted Cadastral Network

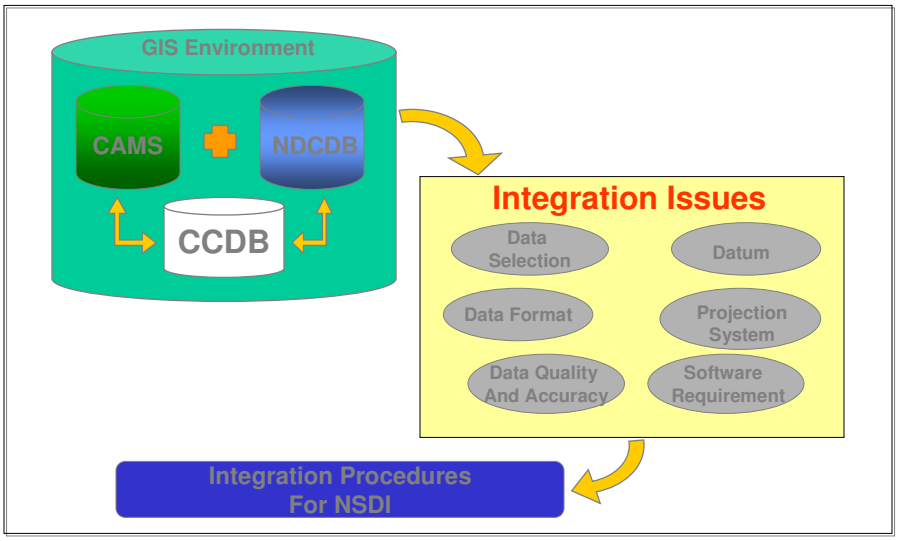


Summary of The 47 Adjustment Blocks: Melaka (Cassini System)

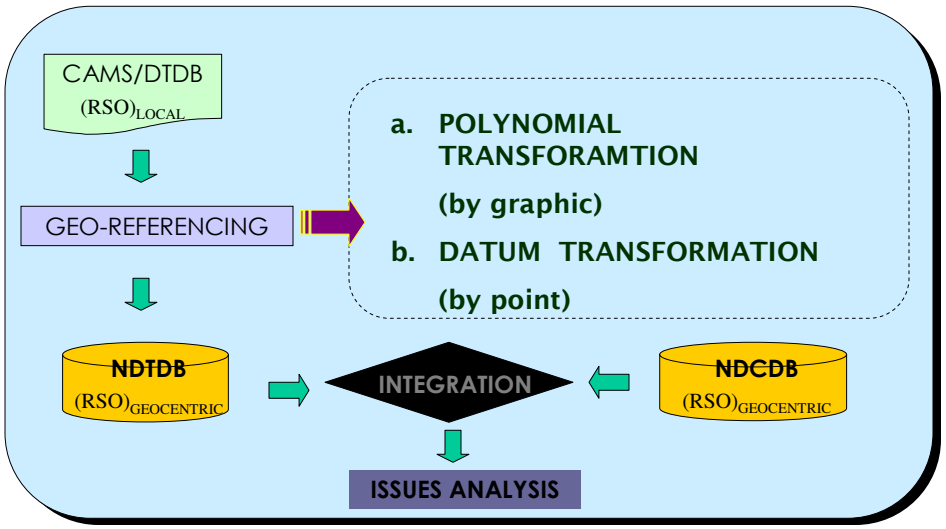
	Results Statistic							
	CASE 1				CASE 2			
	GEODETIC				GEOCENTRIC			
	MAX	MIN	MEAN	RMS	MAX	MIN	MEAN	RMS
Bearing	2'03"	-2'03"	0"	20"	2'01"	-2'01"	0"	20"
Distance	0.040	-0.048	0	0.007	0.040	-0.040	0	0.007
Coordinate (N/S)	0.151	0	0.053	0.057	0.141	0	0.053	0.056
Coordinate (E/W)	0.148	0	0.056	0.057	0.152	0	0.056	0.057

INTEGRATION WITH CAMS DATA

Techniques For Integrating The Digital Coordinated Cadastral Data With Mapping Data



METHODOLOGY OF INTEGRATION



INTEGRATION ISSUES ANALYSIS

DATA STRUCTURE

A. Data Format:
- I) CAMS format need to be converted in to GIS format (GIS Ready)

B. Map Scale
- I) Large scale map give higher geometric accuracy .
- II) Better integration between NDCDB and NDTDB for equivalent scale

REFERNECE SYSTEM
- I) Final integration will be in RSO
- II) Better integration between NDCDB and NDTDB for equivalent scale

DATA INPUT ACCURACY/QUALITY

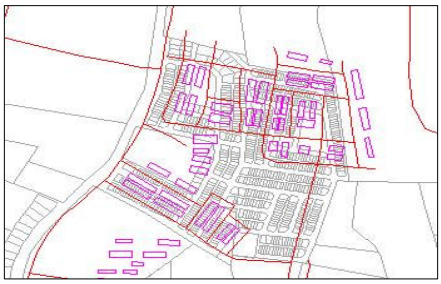
A. Absolute Accuracy
- I) Absolute accuracy of CAMS data depends on scale and the degree of generalisation. Urban area show better absolute accuracy.

B. Relative Accuracy
- I) Subject to graphic presentation and cartographic process.
- II) Relative accuracy effected by generalization and simplification.
- III) Different carthographic level for urban and rural areas.

Example of the National Digital Cadastral Database (NDCDB) and National Digital Topography Database (NDTDB) Overlay Process

NDCDB = 1:8,000

NDTDB = 1:5,000



NDCDB = 1:8,000

NDTDB = 1:25,000

SUMMARY

1. The CCS implementation model has been developed
2. A highly accurate Zero Order Geodetic Network (MASS) and PGGN 2000 defined in ITRF 2000 epoch 00.0 have been established
3. Seven transformation parameters between PGGN 2000 (ITRF 2000) and PGGN95 (WGS84) have been accurately determined
4. Geocentric datum and the associated plane projection (Cassini & RSO) computations have been stated
3. Methodology to repopulate DCDB with new survey accurate and homogenous coordinates has been outlined
4. Integration Issues between NDCDB and NDTDB have been experimented