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**Reports on achievements in surveying, mapping and
charting in addressing national, subregional, regional
and global issues, including applications**

The Malaysian digital cadastral database

**Submitted by the Federation of Land Surveying and Geomatics of
the Association of South-East Asian Nations****

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THE MALAYSIAN DIGITAL CADASTRE DATABASE

Issues and Strategies

By

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One of the oldest govt depts in Malaysia (c. 1885)

Modernisation Strategy: (wef 1986)

- ~ use of total stations + data loggers in field
- ~ computerise data processing in office
- ~ role of the private sector
- ~ revise SOP / Land Surveyors Act / Survey Regulations, etc
- ~ consultancy with consortium of international experts

SPDK / Cadastral Database Management System

~ implemented wef 1999 to date

Problem statement

≈ 6 Million parcels

≈ 3.5 Million Qualified Titles

≈ 500,000 Certified Plans

≈ 10 Million records

⇒ of various scales, accuracies & epoch

Problem statement

- 12 regional offices
- Cassini Soldner, each with own origin
- Geodetic network }
Rectified Skew
- GPS network }
Orthomorphic Projection
nationwide

The CDMS Project

- Implemented in 12 States
 - » *At Headquarters & district levels*
- Pilot at KL & Selangor offices
- RM 50 Million budget
- Final acceptance January 2000
 - *12 months implementation period*

The Project Components

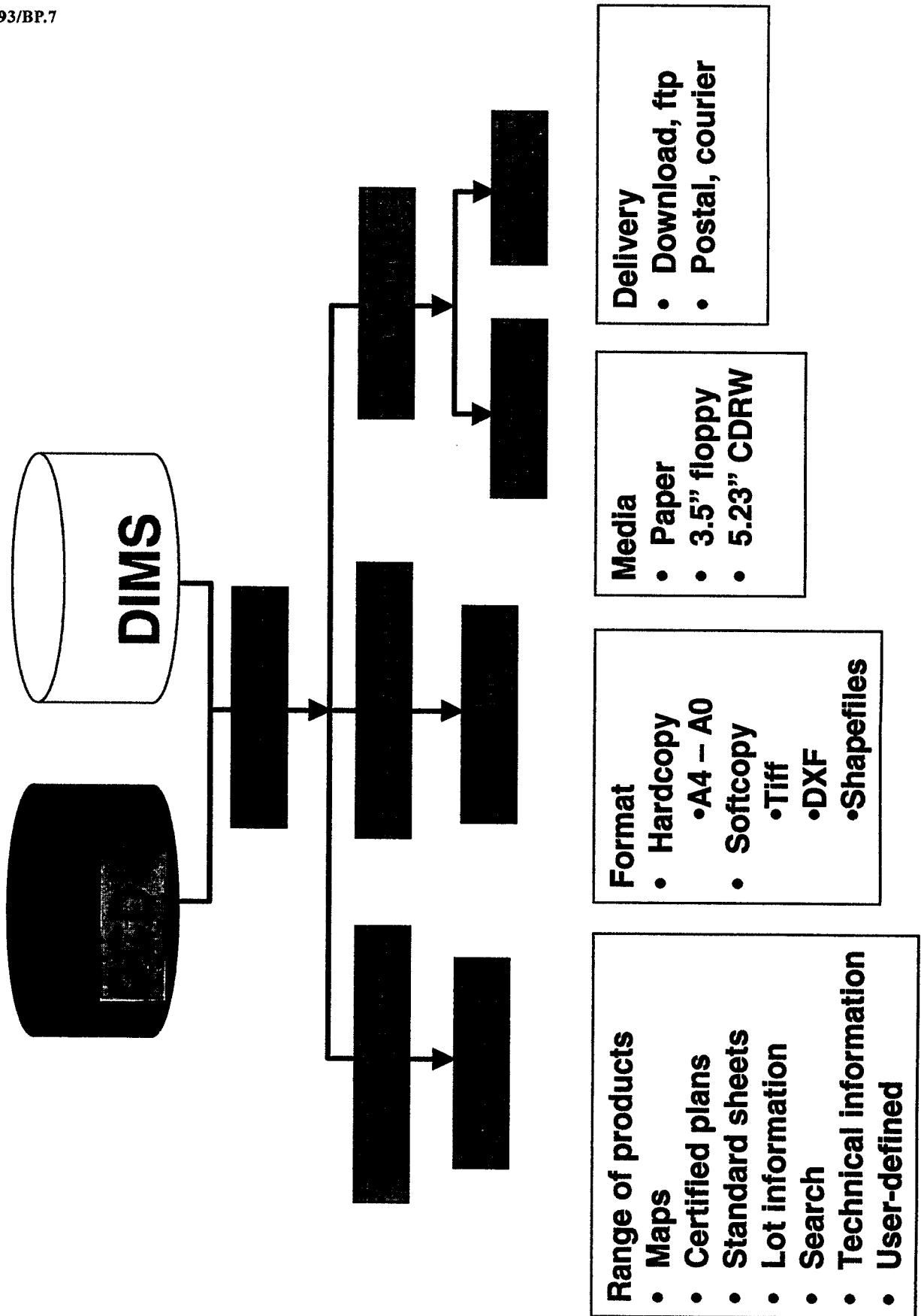
- Quality Assurance System
- Digital Imaging Management System
- Improved Counter Service
- Remote & Internet access ~ e-commerce
- Outsource to the private sector

Components of CDMS

- Hardware
 - ❖ Database/Web Server , Interactive Graphic Workstation, Desktop PC, Plotter, Printer, Scanner, Storage Media (SCSI Disk, Disk Array, CD Writer) and Networking & Internet Access

- Software
 - ❖ Open System, Networking Software, Application Software for DIMS, Counter Service Software, Microsoft OA Software for PC, Application Software for QAS, CPS software, GIS software/RDBMS* Software and Web Software

* *ArcInfo, ArcView, MapObjects, ArcSDE*



Databases being created in the Dept:

1. Digital Cadastral Data Base (DCDB):

~ at the State level (12 states)

2. CAMS data base (Digital Topographic Data Base) :

~ at the national level

ACCURACY OF SPATIAL DATA BASES

• DATA QUALITY

- “fitness for use “: reliable, accurate, current, relevant, complete, timeliness, precise....
 - conveniently handled, adequately protected, metadata
- α *Accuracy, Precision, Error*

ACCURACY:

~ level of accuracy α objectives of application

PRECISION:

~ hardware dependent

α scale, unit of measurement, objectives of application

ERROR:

~ gross, systematic or random errors

UNCERTAINTY:

~ “lack of total confidence in use of the data “: incomplete knowledge of data

SOURCES OF ERRORS (in geographic data) :

- INHERENT ERRORS:

~ occur naturally in geographic data no matter what instruments or procedures used for data acquisition, management & application

- OPERATIONAL ERRORS:

~ “ processing errors “ α imperfections in instruments and methods used for data acquisition, management & application

Errors occur all the time & may be carried over to subsequent stages of processing !

COMPONENTS OF GEOGRAPHIC DATA QUALITY *

1. *Lineage*
2. *Positional accuracy*
3. *Attribute accuracy*
4. *Logical consistency*
5. *Completeness*
6. *Temporal accuracy*
7. *Semantic accuracy*

* US National Committee for Digital Cartographic
Data Standards , International Cartographic
Association.

ASSESSMENT OF DATA QUALITY

1. EVALUATION OF POSITIONAL ACCURACY

Planimetric accuracy

Height accuracy

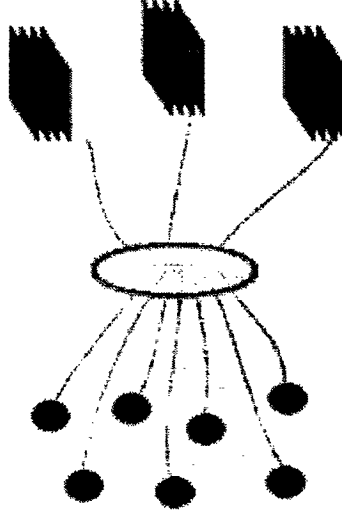
2. EVALUATION OF ATTRIBUTE ACCURACY

Compare sample data with reference data via field verification, sources of data of higher accuracy

Data Catalogue

Data Portal

- Know where you have data
- Know what data you have
- Get access to you data
- Make your data work



“Fitness for Use”

- Digital data can be wrong!
- Database is only as good as the lowest quality data layer.
- Mistakes can have deadly consequences.
- Data rules and education of the users is crucial.

SPATIAL DATA INTEGRATION ISSUES

DCADB: high internal & relative accuracy

1:80K 1st Class, 1:40K 2nd Class svys

VB interface: GEN + ArcView shape files

CAMS: mapping data, multiple layers

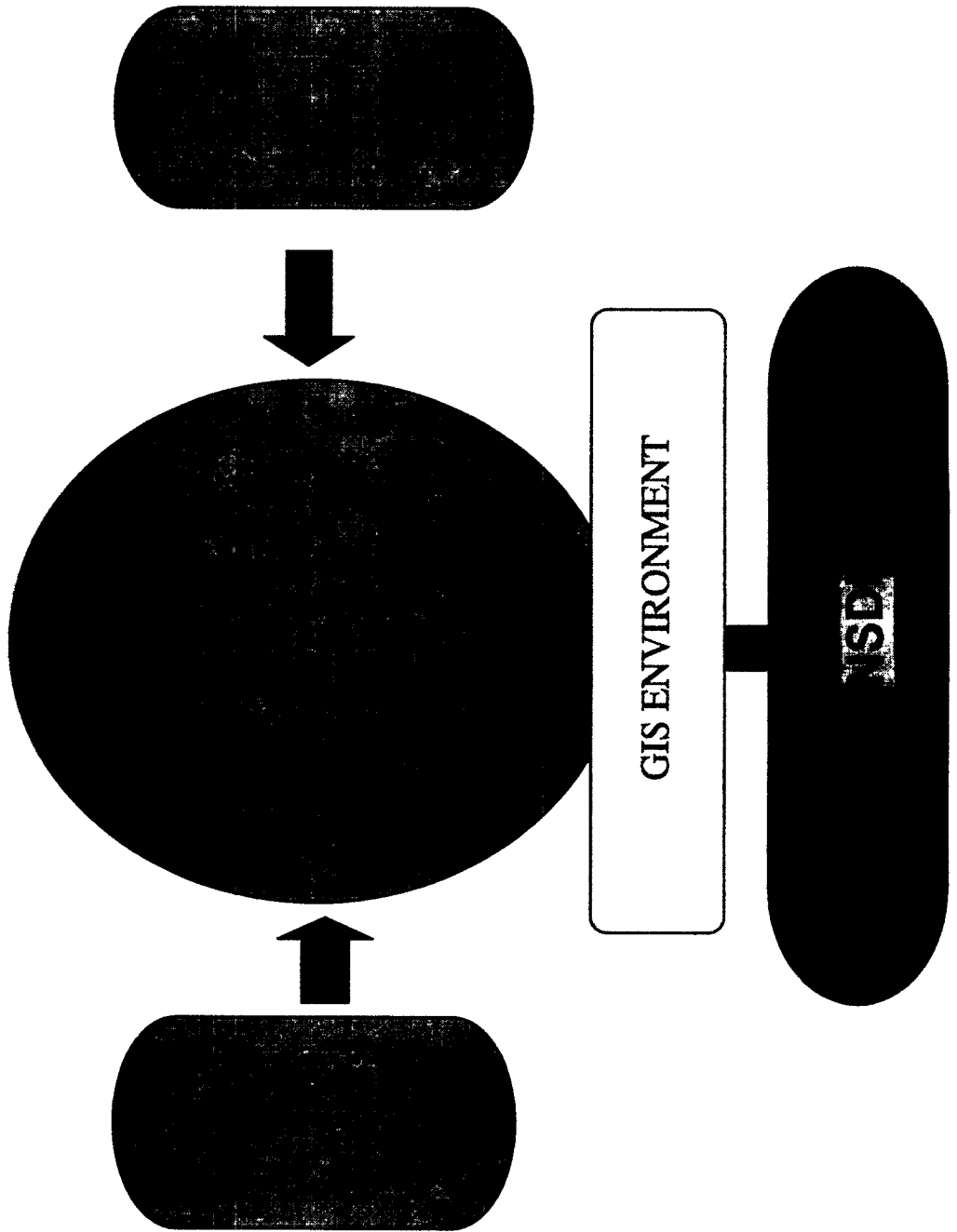
1:40K → 1: 5K

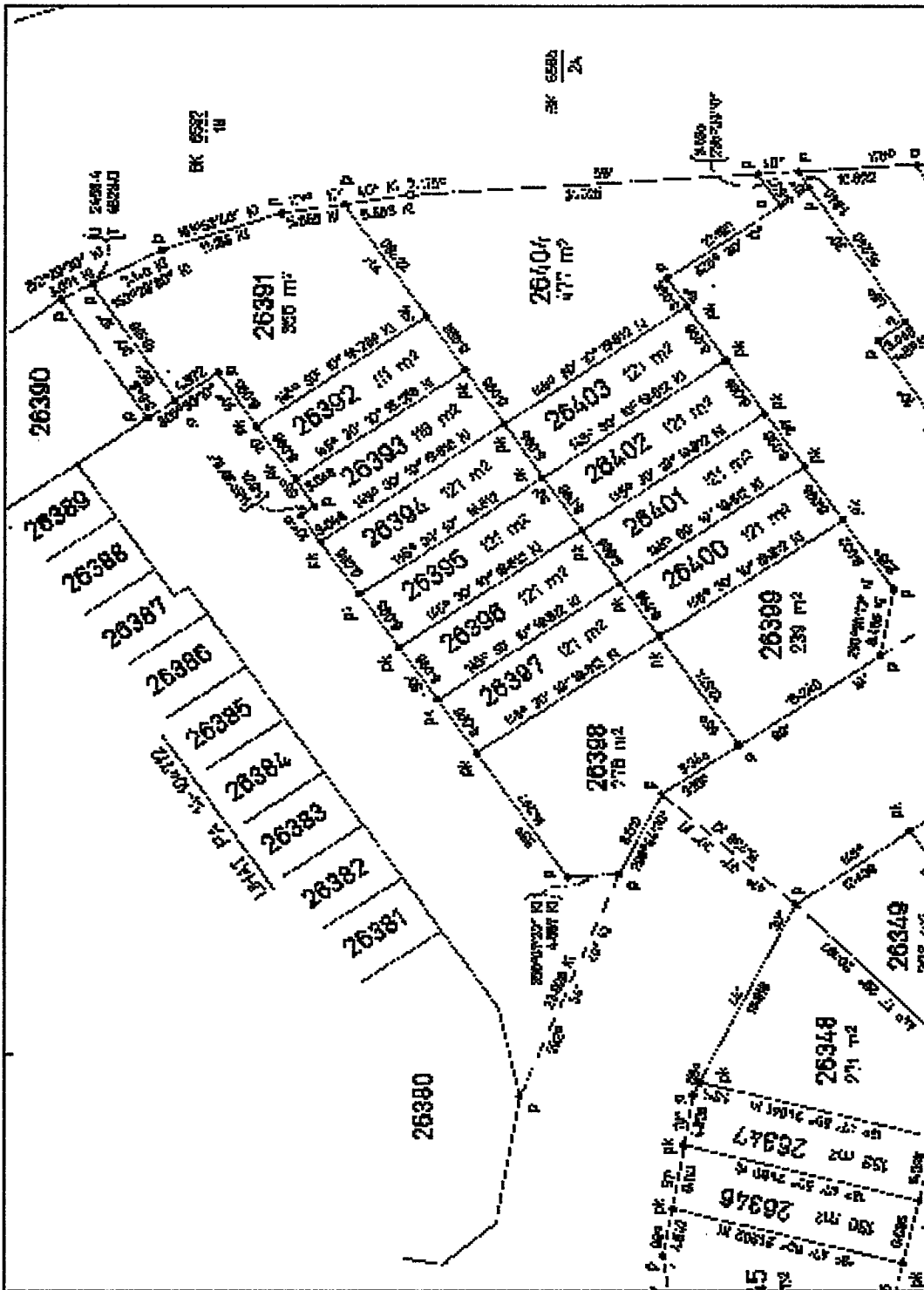
lower internal acc.

good absolute acc.

CAD - not GIS ready

SPATIAL DATA INTEGRATION ISSUES





SAMPLE OF CAMS DATA



- Prepared in CAMS format
- Data in Layer form
- Map Scale 1:25,000

Spatial Data Integration Issues..

- Referencing:
 - Cadastre : Cassini
 - CAMS : RSO (Oblique Mercator)
 - CCS : geocentric, WGS 84 ~ ITRF + velocities
- CAMS: not comparable with DCDB map scales, geometric acc, data acquisition strategy, etc

Strategies & future direction...

- Strategy for integration:
 - Fully GIS ready db within a small test area
 - CAMS map with DCDB map overlay
 - Appropriate scale for integration
 - New product (orthophoto imageries) line for CAMS?

Strategies & future directions...

- The SPDK / CDMS project:

Towards a Cadastral Vision

- National Cadastral Data Infrastructure:

- a cadastral toolkit at the state level

- ability to integrate with other databases

Strategies and future directions...

- Institutional arrangements:

Political acceptance

Stakeholders: common vision

Common infrastructure

- Sustainability:

*RM50 Million + RM 80 M
allocation 8MDP (2001-6)*

*Geo-processing staff: in-house
+ outsource*

Strategies and future directions....

- database development

Integrated, holistic approach : in-house + outsourcing strategy

LONG TERM VISION

- manpower related issues:

In house core group

User / developer close interaction + learning

National & International recognition...

- Finalist in Prime Minister's Quality Award
- Winner of PIKOM Malaysia's Innovation award (1999)
- ESRI Special Achievement in GIS (SAG) Award July 2000