
**Implementation of Data Alignment Measures
for the Alignment
of Planning, Lands and Public Works Data**

**Final Report (Volume 2G)
Maintenance of File Formats Standard**

March 2004

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Volume 2G - Maintenance of File Formats Standard

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1 Introduction

1.1 Purpose

- 1.1.1 Data format interoperability and compatibility issues are some of the major problems encountered in current geospatial data exchange amongst the participating departments (PDs) in DAM. Data format standardization would help mitigate the file format compatibility problem by reducing the need for data conversion and post-processing.
- 1.1.2 This document would be the draft version of the Practice Note which advises on the File Formats Standard for geospatial data and the recommended mode of adoption in PDs in DAM. This Practice Note shall be read in conjunction with HPLB TC No. xx/xx and ETWB TC No. xx/xx.
- 1.1.3 This document covers the following aspects:
- (a) Recommendation of the set of standard file formats to be adopted in future data exchange amongst PDs;
 - (b) Recommended mode of Adoption and programme for adoption of the file formats for exchanging data.

2 File Formats Standard

2.1 Requirements for file formats standards

2.1.1 Data formats are divided into three major categories including the following:

- (a) Geospatial data formats;
- (b) Attribute data formats; and
- (c) Other data formats.

General guidelines

2.1.2 The same guiding principles for defining the technical specifications for each interoperability area in the Interoperability Framework (IF) are adopted for DAM 3 purpose. These include:

- (a) The specifications (file format standards) should be mature and widely adopted, internationally recognized or de facto standard;
- (b) As far as possible, open standards that are vendor and product neutral;
- (c) The number of selected specifications (file format standards) should be minimized but offering an appropriate level of flexibility to the Data Owners and Data Users;
- (d) The selection should take account of local, regional and international developments, initiatives and best practices; and
- (e) The specification should be consistent with current HKSARG standards (e.g. CAD Standard for Works Projects, CSWP).

Requirements of File Formats Standard for GeoSpatial Data

2.1.3 In addition to the guidelines mentioned above, specific characteristics and properties of geospatial data should be taken into consideration. Moreover, in viewing that the strategic objective of the DAM Project is to implement short-term measures and to achieve a quick win solution, another considerable factor is to minimize the resources required by the PDs to implement the standard. There are five requirements of the File Formats Standard summarized below:

- (a) Minimum impacts to PDs Software / Systems;
- (b) Align with industrial and international standards;

- (c) Support geographical data characteristics;
- (d) Data Quality;
- (e) Minimum resources required by PDs.

2.1.4 The following figure illustrates the five areas of requirements for the File Formats Standard. The figure is self-explanatory and details the evaluation criteria under each area of requirement.

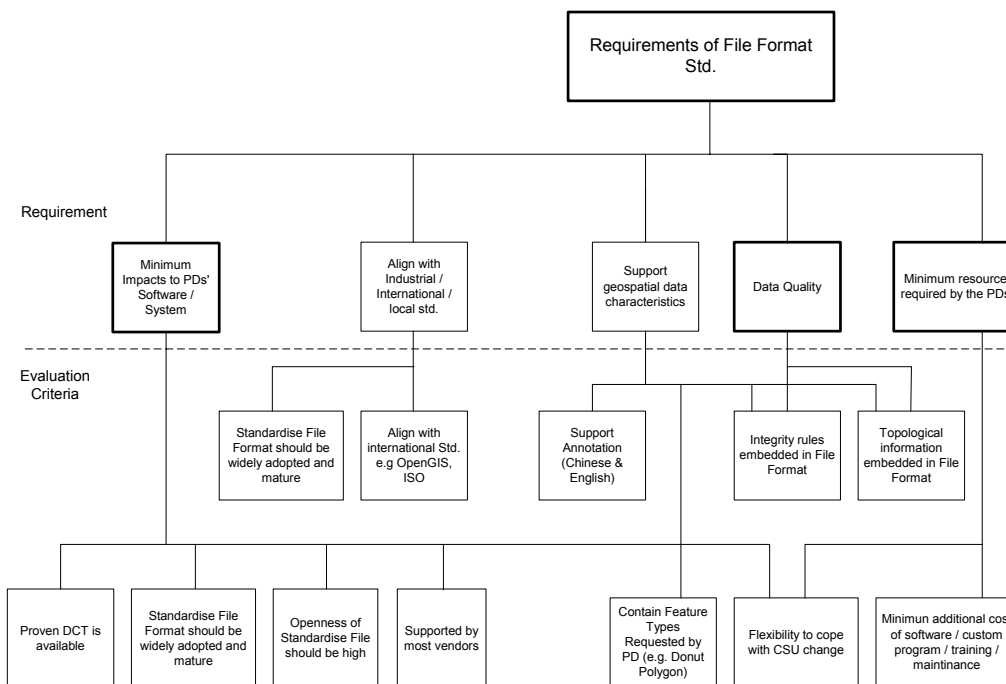


Figure 1 Requirement of File Formats Standard for GeoSpatial Data

2.1.5 The decision on choice of file formats standard would be a compromise decision since choosing to satisfy one requirement might have to compromise with the other one. For example, to meet the requirement “Minimizing the impacts to PDs’ ” might have to compromise with the requirement “Align with industrial / International / Local Standard”.

Requirements of File Formats Standard for Attributes

2.1.6 DAM3 would also recommend the File Formats Standard of attributes associating with geospatial data. Similar to geospatial data, areas of requirements and evaluations criteria are specified according to the guiding principles from IF in the context of DAM. The requirements and evaluation criteria are as follows:-

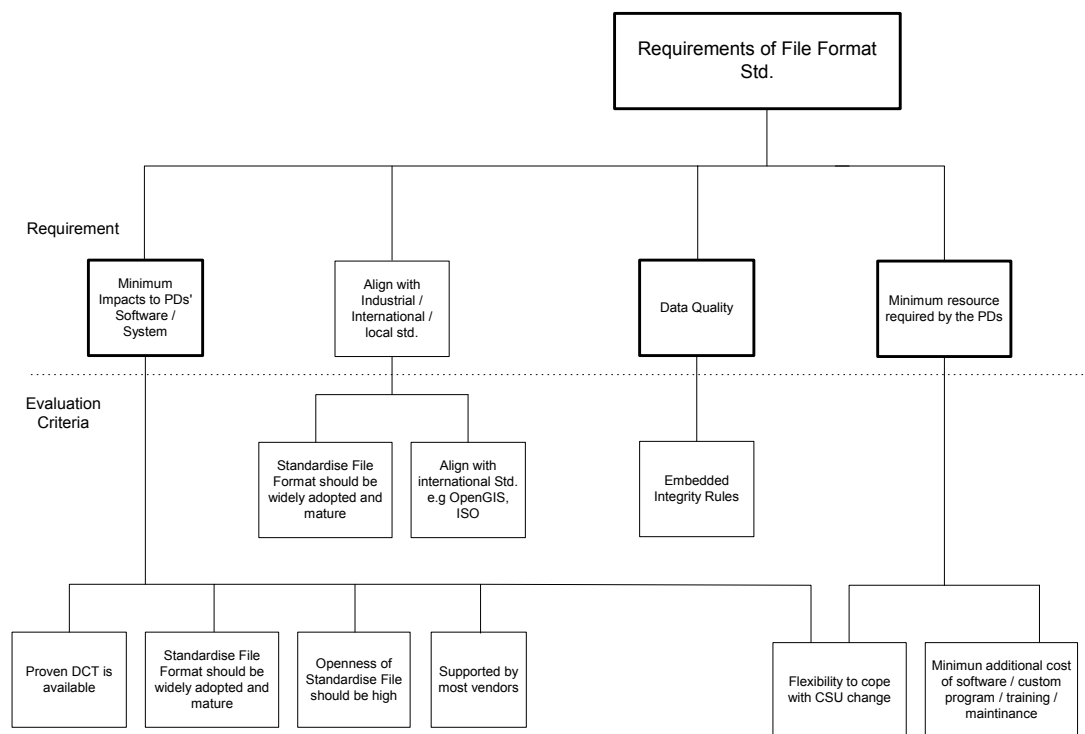


Figure 2 Requirements of File Formats Standard for Attributes

2.1.7 In the context of DAM, the following requirements for the file format standards for both geospatial data and attributes are considered to be high priority:

- (a) Minimum resources required by PDs;
- (b) Data Quality; and
- (c) Minimum impact to the PDs' current systems.

2.2 Specification for file formats standards

2.2.1 The recommended set of standard file formats is as follows:

- (a) E00 (Exported from Arc/Info Coverage Version 7.x)¹;
- (b) DGN v7 (3D²) with attributes storing in separated files;

¹ To minimize the post-processing effort in CSU exchanges, the E00 file is recommended to be a single file (exported from a seamless database) rather than numerous E00s exported from tile-based map data.

- (c) Other specifications:
 - (i) Linking DGN Drawing with attribute file: DGN Drawing should be linked with the attribute files (i.e. dBase IV file) using MSLINK. MicroStation use the field MSLINK to link up a graphic element with a row in the attribute file. Hence, the attribute file must contain a numerical field called MSLINK.
 - (ii) Character Set: As specified in IF, English Characters should be encoded in ASCII or EBCDIC (for mainframe to mainframe data exchange). Chinese Characters (e.g. annotation, attribute) should be encoded in Big 5 or ISO 10646-character set encoded in UTF-8. For further details, please refer to the Character sets and Encoding under Domain 3: Information Access and Interchange of Interoperability Framework (IF) version 1.0.
 - (iii) Coordinate System: Coordinates of geospatial data should be in the Hong Kong 1980 Grid.
 - (iv) Layer Naming for CSU data prepared by Data Agents in DGN format: the layer naming should conform to the published CSWP requirements in layer naming and element codes, when available.

² It is understood that LandsD provides basemap in DGN with settings for three-dimensional (3D) drawings. The setting (i.e. 3D) is for elevation (i.e. z-value) of contour lines. In view that both the LandsD and Works Departments exchange DGN using the settings for 3D, 3D DGN is recommended in the File Formats Standard.

3 Recommended Mode of Adoption (RMA)

3.1 Guidelines from the IF

- 3.1.1 It is recommended that implementation of the File Formats Standard should comply with the principle laid out in the Interoperability Framework (IF). IF defined the Compliance Policy for the new system and existing systems of B/Ds:-
- (a) All new e-government infrastructure systems, new government to public systems, and new inter-B/D systems should be developed based on the IF;
 - (b) All other new systems are strongly recommended to conform to the IF; and
 - (c) All existing systems should conform to the IF only when there is a new requirement for government to public integration or inter-B/D integration, and only in respect of the modifications that specifically related to external interfaces.
- 3.1.2 Existing systems should comply with the IF only when there is a “new requirement” for system integration. Under the scope of DAM Project, the incurred new requirements include:-
- (a) The new CSU data exchange processes would be considered as “new requirement” and PDs’ existing GIS and CAD system should comply with the File Formats Standard CSU data exchange processes between PDs. Nevertheless, the new CSU data exchange processes would apply to the PDs of the DAM Project only.
 - (b) For non-CSU data exchange processes between PDs, the same principle applies:
 - (i) If they need to implement new systems for the data exchange process and the exchange involve only PDs, then compliance with File Formats Standard is required unless there are reasons that it may not be feasible to comply with the recommended standard file format standard due to budget, time, and contractual constraints.
 - (ii) There are situations that file format standards could resolve problems in the data exchange using the existing system. If applicable, PDs are recommended to develop a programme to adopt the file format standard.

Recommended Mode of Adoption of File Formats Standard

- 3.1.3 A decision tree for determining when File Formats Standard should be adopted is presented in Figure 5.
- 3.1.4 The decision tree is applicable to those PLW Data Exchange Processes relating to DAM3, but the decision tree will not apply to those processes that could be handled within the context of CSWP, i.e. processes relating to CAD information exchange for the construction industry should comply to CSWP as per IF requirement. (Please refer to Section 1.2 of CSWP Document for CSWP details.) In the decision tree, there are three Recommended Mode of Adoption (RMA).
- (a) RMA 1 is the mode for the adoption of the File Formats Standard. There are three scenarios in which RMA 1 is recommended (Please also refer to the paths along the thick lines in Figure 5):
- (i) Scenario 1: When the Data Exchange Process is related to CSU data and there is a need for the file format conversion;
 - (ii) Scenario 2: When a PD develops a new system for non-CSU data exchange process;
 - (iii) Scenario 3: When there is a problem in the exchange of non-CSU data between existing systems of PD, and the problem could be solved by File Formats Standard.
- (b) RMA 2 is the mode to maintain their current practices. RMA 2 is recommended when the Data Exchange Process is related to non-CSU data and such process involves only existing systems and there is no file format conversion problem in the process
- (c) RMA 3 is the mode recommended for PDs to solve the data exchange problem by other means. RMA 3 is recommended when there is file format conversion problem in a non-CSU data exchange process using existing systems, but the problem is due to other causes that could not be resolved by the File Formats Standard.

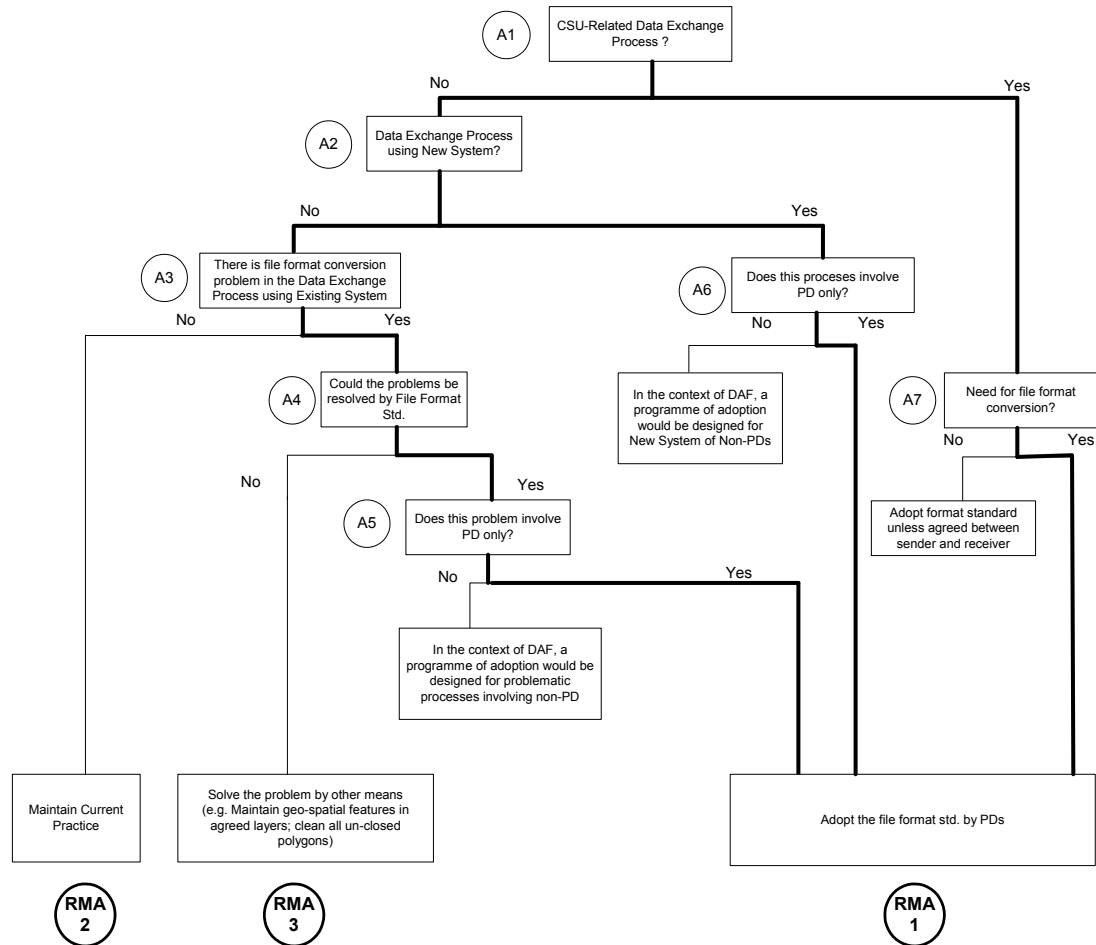


Figure 3 Decision Tree for the adoption of File Formats Standard

Adoption of File Formats Standard

3.1.5 The above decision tree analysis suggests that File Formats Standard recommended in DAM3 should be adopted under the following scenarios (for RMA 1):-

- (a) Scenario 1: CSU data exchange processes;
- (b) Scenario 2: Non-CSU data exchange processes between PDs using new systems; and
- (c) Scenario 3: Non-CSU data exchange processes between PDs using existing systems and there are file format compatibility problems in these processes.

3.2 Programme of Adoption

3.2.1 Programme of implementing the Recommended Modes of Adoption (RMAs) is summarized as below (please refer to Appendix B for details about the programme of adoption for the PDs in the DAM project):-

RMA 1: Adopt the File Formats Standard

3.2.2 RMA 1 is recommended to all CSU Data Exchange Processes. The implementation programme of RMA 1 should follow the schedule of implementing the CSUs, i.e. CSU Data Exchange Processes should comply with the File Formats Standard upon the rollouts of the CSUs.

RMA 2: Maintain current practice

3.2.3 For non CSU data exchange processes, PDs could continue to maintain their current practices. The compliance requirement to the File Formats Standard would apply when new systems are developed or existing systems are enhanced.

RMA 3: Tasks relating to issue which cannot be resolved by the standard

3.2.4 Such processes could have been improved by some other means, i.e. the problems inherited in those processes are due to causes that cannot be resolved by the File Formats Standard.

Summary

3.2.5 File Formats Standard recommended in DAM 3 would be implemented as follow:

- (a) In the situations where PD develops a new system for non-CSU geospatial PLW data exchange process, File Format Standards (recommended in DAM 3) should be adopted in the development of new systems that will interact with the systems of other PDs, with effect from 2 July 2004.
- (b) In the situations where the data exchange processes are related to CSU data (unless otherwise agreed between sender and receiver). File Format Standards (recommended in DAM 3) should be adopted as per the implementation schedule of the respective CSUs.
- (c) In the situation where PDs encountered data conversion problems in exchanging non-CSU geospatial PLW data produced from the existing systems of PD, and the problem could be resolved by File Formats Standard, PDs are encouraged to adopt File Format Standard in the data exchange processes. There is no set time frame for this.
- (d) When the Data Exchange Process is related to non-CSU geospatial PLW data and such process involves only existing systems and there is no file

format conversion problem in the process, File Format Standard compliance is not applicable, i.e. maintain current practice.

- (e) Similar to (d) above, File Format Standard compliance is not applicable in the situations when the data exchange problem needs to be resolved by other means.

Appendix A - Requirements of File Formats Standard

A.1 Requirements and Criteria of File Formats Standard

GeoSpatial Data

A.1.1 In viewing that the strategic objective of the DAM Project is to implement short-term measures and to achieve a quick win solution, a considerable factor in determining the File Formats Standard is to minimize the resources required by the PDs to implement the standard. There are five requirements of the File Formats Standard summarized below:

- (a) Minimum impacts to PDs Software / Systems;
- (b) Align with industrial and international standards;
- (c) Support geographical data characteristics;
- (d) Data Quality;
- (e) Minimum resources required by PDs.

A.1.2 The following figure illustrates the five areas of requirements for the File Formats Standard. The figure is self-explanatory and details the evaluation criteria under each area of requirement.

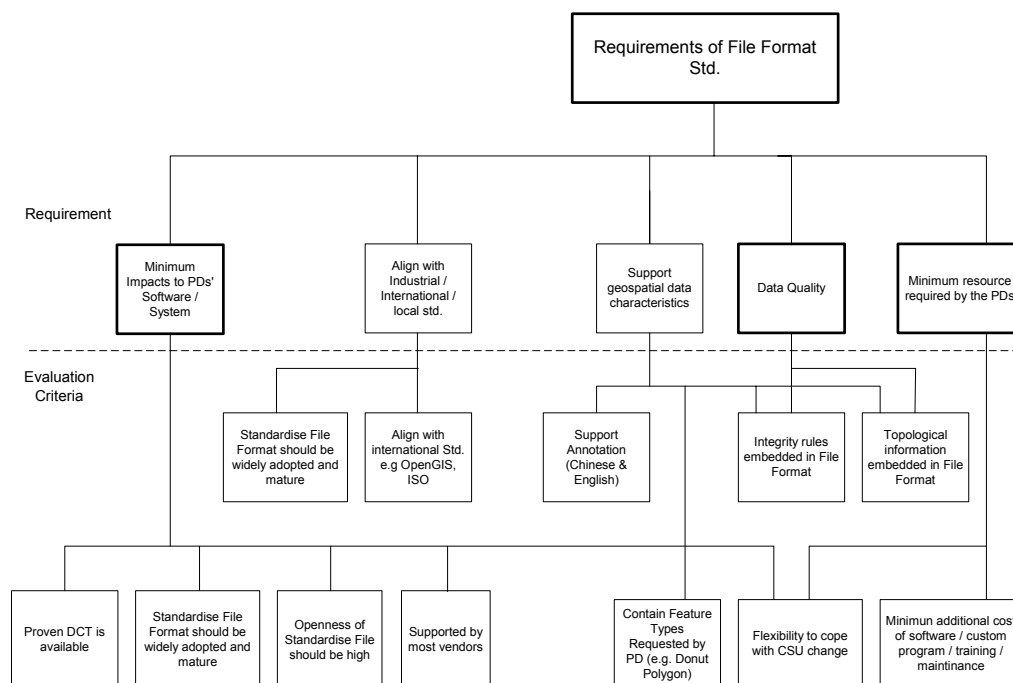


Figure 4 Requirement of File Formats Standard for GeoSpatial Data

A.1.3 The decision on choice of file formats standard would be a compromise decision since choosing to satisfy one requirement might have to compromise with the other one. For example, to meet the requirement “Minimizing the impacts to PDs’ ” might have to compromise with the requirement “Align with industrial / International / Local Standard”. In the DAM context, the following requirements are considered to be high priority:-

- (f) Minimum resources required by PDs;
- (g) Data Quality; and
- (h) Minimum impact to the PDs’ current systems.

Attributes Associated with Geospatial Data

A.1.4 Similar to geospatial data, areas of requirements and evaluations criteria for the File Formats Standard of attributes associating with geospatial data are specified according to the guiding principles from IF in the context of DAM. The requirements and evaluation criteria are as follows:-

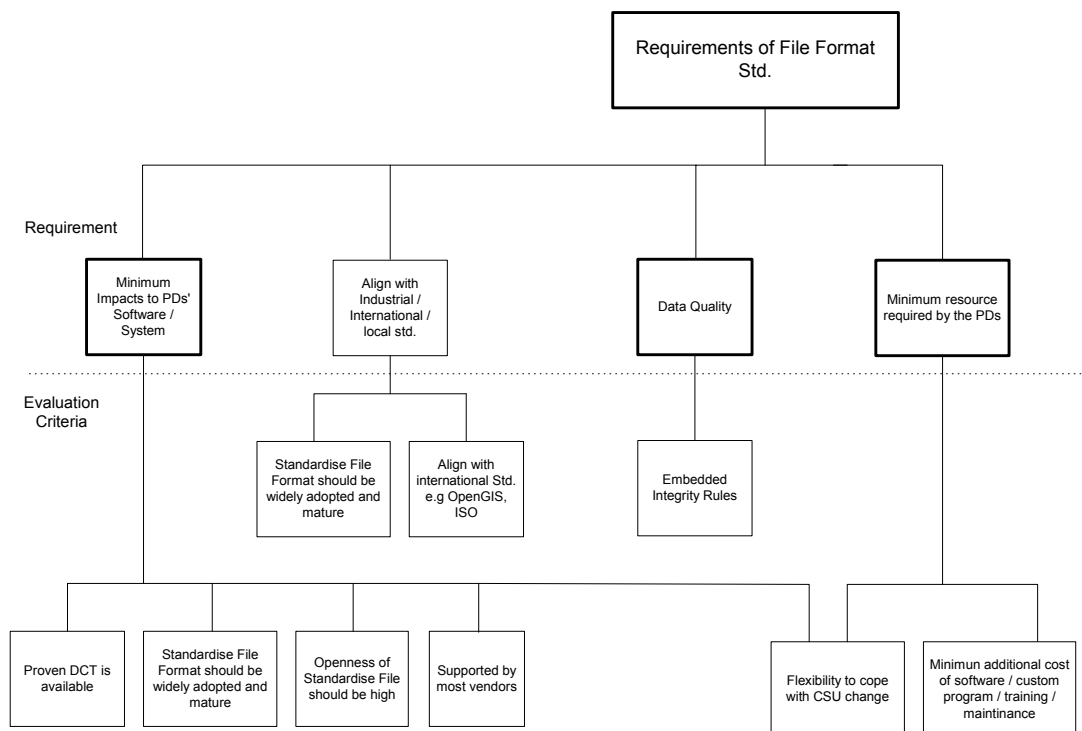


Figure 5 Requirements of File Formats Standard for Attributes

A.1.5 Similar to Geospatial data, the following requirements for attributes are considered to be high priority:

- (a) Minimum resources required by PDs;

- (b) Data Quality; and
- (c) Minimum impact to the PDs' current systems.

A.2 Candidates of File Formats Standard

A.2.1 Data formats are divided into three major categories including the following:

- (a) Geospatial data formats;
- (b) Attribute data formats; and
- (c) Other data formats.

A.2.2 Recommended the candidates of File Formats Standard include the following:-

- (a) Candidates of File Formats Standard for geospatial data:-
 - (i) Geography Markup Language (GML);
 - (ii) Arc/Info Interchange Format (exported from Arc/Info Coverage, hereinafter referred to as E00);
 - (iii) ArcView SHAPEFILE;
 - (iv) DXF (with attributes stored in separate attribute data files in standard file format files) and
 - (v) DGN (with attributes stored in separate attribute data files in standard file format files)
- (b) Attributes are associated with DXF and DGN. Candidates of File Formats Standard for attribute data:-
 - (i) ASCII (i.e. CSV)³;
 - (ii) DBase IV⁴; and

³ CSV is the most commonly used structured format of ASCII and most software directly supports this format.

⁴ DBase IV is the most commonly used DBF file amongst PD. The file format is supported by most CAD software such as AutoCAD r14, AutoCAD 2000i, MicroStation 95, MicroStation SE and MicroStation J whilst other version of DBF such as dBase V, Visual FoxPro, Visual dBASE and Paradox are not widely supported.

(iii) MDB of Microsoft Access '97⁵ (hereinafter referred to as MDB).

A.2.3 The candidates of File Formats Standard are international open and industry de facto standards. The candidates are widely recognized throughout the industry. The Government is not recommended to develop a specified geospatial data exchange standard (similar to the US Spatial Data Transfer Standard). It is not only because of the IF's recommendations but also the considerable cost implications for the Government to develop specific data conversion tools for the developed standard. Moreover, there are international and de facto standards in place in the industry locally. There is no genuine need for the Government to develop and assume the costs of maintaining a localized exchange standard.

A.2.4 The recommended File Formats Standard does not cover formats for other data files. Except for metadata standard which is recommended in DAM5, file formats for other textual data that do not link with geospatial data should follow the recommendations of the Interoperability Framework (IF).

A.3 Evaluation of File Formats Standard

A.3.1 Adhering to areas of requirement specified in A.1.5, the candidates of File Formats Standard were evaluated. File formats for geospatial information and attributes were evaluated separately. The evaluation is supported by the information extracted from the stock taking of data exchange processes in DAM as detailed in the Final Report of DAM:-

- (a) Inventory of file formats;
- (b) Inventory of data conversion tools; and
- (c) Inventory of GIS / CAD Software.

⁵ MDB of Microsoft Access 97 is supported by most versions of Microsoft Access (e.g. 97, 2000, XP etc.) currently used by PDs.

File Formats Standard for Geospatial Information

A.3.2 The following table summarizes the results of the evaluation in DAM:

	GML	E00	ArcView SHAPEFILE	DXF with Attribute	DGN with Attribute
Minimum impacts to PDs' Software System	Low Compliance	High Compliance	High Compliance	Low Compliance	High Compliance
Minimum resource required by PD	Non-Compliance	Full Compliance	Low Compliance	Low Compliance	High Compliance
Data quality and completeness	High Compliance	High Compliance	High Compliance	Low Compliance	Low Compliance
Align with Industrial / International / Local Standard	High Compliance	High Compliance	High Compliance	Low Compliance	Low Compliance
Support geospatial characteristics	Low Compliance	High Compliance	Low Compliance	Low Compliance	Low Compliance
		Recommended			Recommended

Table 1 Evaluation of File Formats for Geospatial data

A.3.3 E00 and DGN are the recommended initial set of File Formats Standard for geospatial information. Key rationale and benefits of the recommended standard are highlighted as follows:-

- (a) Both GIS and CAD data could be handled in the recommended standard. This combination complies with the IF's guideline that the number of selected specifications should be minimized but offering an appropriate level of flexibility to the both GIS-user PDs and CAD-user PDs.
- (b) ArcView SHAPEFILE is a commonly used file formats for geospatial data. Though this format could be used directly in most GIS platforms, one major drawback of ArcView SHAPEFILE is that it does not support annotation. As part of the map production process, cartographers would usually need to use human judgment and spend considerable human effort to "custom make" annotation (e.g. the cartographer would choose to re-position the annotation from a centroid of a polygon to the interior of building outline; he could also choose to improve the "look & feel" of the annotation on the map layout.) One possible remedy with SHAPEFILE is to re-generate the annotation using GIS packages that come with powerful label placement capabilities, but the produced results might be different from the original annotation. The effort spent by the map producing PDs could not be salvaged for other PDs use. In viewing that the File Formats Standard of DAM3 should support exchanges of all PLW Data in the

processes document in the current environment description, annotation should not be excluded and as such ArcView SHAPEFILE is not recommended to be included in the standard.

- (c) E00 and DGN are the dominant file formats (the combination is supported by most PDs) of GIS-user and CAD-user PDs. Most PDs could adopt the standard easily without significant additional resource implication. Comparing with Arc/Info Coverage, E00 is a better file format for data exchange. E00 is an Arc/Info Coverage that had been converted to an ASCII text file. It is accessible to Arc/Info systems on different platforms. Moreover, E00 offers better integrity of data than Arc/Info Coverage files since all sub-files of an Arc/Info Coverage are wrapped into a single E00 file.
- (d) GML is a promising file format for geospatial data exchange. GML complies with international standard and indicates no preference on any proprietary software. However, we would not recommend to include GML as a standard at this stage. One reason for not recommending GML as a Standard File Format is that it is an emerging standard currently under development and is not widely supported with adequate DCTs for use by PDs. The new version of GML 3.0 (just recently released) supports topology and when compared GML 2.0, the file size is smaller. Despite the improved capabilities in GML 3.0, it does not support annotation. We recommend the DAM Management Committee should keep in view of the development of GML until it comes to a mature stage that GML can be fully supported by GIS software platforms currently used by the PDs.

File Formats Standard for Attributes Associating with Geospatial data

A.3.4 Attributes associating with Geospatial data can be stored in files separated from the spatial and georelational data files of the GIS (e.g. DGN and E00 respectively). That is most CAD and GIS platforms leverage Microsoft's Open Database Connection Technology (ODBC) to relationally join via a common key field to relate attribute data records stored in external files with spatial data records of the native CAD and GIS data file formats. This section suggests the file format for such collections of attribute data. The following table summarizes the results of the evaluation. The following requirements are made throughout the evaluation:-

- (a) The file format should be supported by GIS / CAD / DBMS software commonly used by the PDs;
- (b) The file format should facilitate the linkages of the attributes with graphic information in GIS-based geospatial datasets and CAD drawings; and
- (c) The evaluation considers the most commonly used CAD software of PDs, which are AutoCAD and MicroStation.

A.3.5 The evaluation of the three candidates is summarized in the table below.

	Dbase IV	ASCII (i.e. CSV)	MDB
Minimum impacts to PDs' Software System	Full compliance	Low Compliance	High compliance
Minimum resource required by PD	Full compliance	Low Compliance	Low compliance
Data Quality	High compliance	Low compliance	Full compliance
Align with Industrial / International	Low compliance	Non- compliance	Low compliance
	Recommended		

Table 2 Evaluation of file formats for attributes

A.3.6 MDB is a widely accepted file format adopted by PDs. When compared with DBF IV and ASCII (i.e. CSV), the MDB format offers better data integrity since all database tables as well as the relationships are wrapped into one single database file. Moreover, many current and future versions of GIS support MDB, and therefore it could be a good candidate of the File Formats Standard. However, MDB might not be supported by older versions of GIS software and software running on UNIX platform (e.g. Arc/Info 6.x of LandsD; Arc/Info 7.x of PlanD and WSD). Resources needed to revamp the PDs' existing systems to support MDB would be huge. Hence, MDB is not recommended.

A.3.7 ASCII (i.e. CSV) is widely adopted to exchange textual information amongst PDs. However, CSV is neither supported by AutoCAD nor MicroStation to associate attributes to geospatial data in CAD drawings. To establish the association between attributes and CAD drawing, CSV should be connected via ODBC or be converted to other formats such as DBF or MDB. These extra procedures incur additional workload to PDs. Moreover, data quality is not guaranteed using CSV. CSV does not contain information of data structure such as number of fields, field names and field types for quality checking purpose. Hence, CSV is not selected as the File Formats Standard.

A.3.8 DBF IV is a rather "old" format, but it is still a de facto industry standard and has been widely adopted by PDs in the data exchange (CAD-user and GIS-user PDs are able to import / export DBF with no requirement for additional resource. Dbase IV (DBF) is recommended as the initial set of File Formats Standard for the attributes associating with geospatial data.

A.3.9 Whilst E00, DGN and DBF are recommended as the File Formats Standard, this section recommends the specified versions of the file formats. The recommended version of file format should be supported by most of (if not all) the PDs' Systems and Software. The inventory of PDs' software platforms are summarized below:

PD	System	Software	Version	Supported Versions of E00 and DGN
ArchSD	CAD	AutoCAD	2000	N/A
C&SD	Digital Mapping System	Arc/Info	8.1	E00 (exported from Arc/Info Coverage version 7.x)
CED	Slope Information System	MicroStation	J	DGN v7.0
	Geological Modelling System	ArcGIS	8.x	E00 (exported from Arc/Info Coverage version 7.x)
	Computerised Slope Register and Location Plan System	MicroStation	J	DGN v7.0
		Geographics		DGN v7.0
		ArcView	3.2a	E00 (exported from Arc/Info Coverage version 7.x)
DSD	AM/FM	Framme	04.00.06.07	DGN v7.0
EMSD	Pilot GIS	ArcView	3.2a	E00 (exported from Arc/Info Coverage version 6.x & 7.x)
HyD	Road Data Maintenance System	Arc/Info and ArcSDE	8.1.2	E00 (exported from Arc/Info Coverage version 7.x)
		MapInfo	5	E00 (exported from Arc/Info Coverage version 7.x)
LandsD	Computerised Land Information System (CLIS)	AutoCAD	2000I	N/A
		MicroStation	J	DGN v7
		Arc/Info	6.x	E00 (exported from Arc/Info Coverage version 6.x)
	SMRIS	Arc/Info	8.x	E00 (exported from Arc/Info Coverage version 7.x)
PlanD	Town Planning Information System	Arc/Info	7.1.2	E00 (exported from Arc/Info Coverage version 7.x)
		ArcMap	8.1	E00 (exported from Arc/Info Coverage version 7.x)

PD	System	Software	Version	Supported Versions of E00 and DGN
RVD	Property Master System (PMS) and Interim Valuation System (IVS)	Arc/Info and ArcSDE	8.2	E00 (exported from Arc/Info Coverage version 7.x)
WSD	Digital Mapping System	Arc/Info	8	E00 (exported from Arc/Info Coverage version 7.x)
		SDE	3.2	E00 (exported from Arc/Info Coverage version 7.x)
		ArcView 3.2a	3.2A	E00 (exported from Arc/Info Coverage version 7.x)

Table 3 Supported Versions of E00 (Arc/Info Coverage) and DGN by PDs' current CAD and GIS Systems

Appendix B - Recommended Mode of Adoption

B.1.1 This section focuses on the conversion requirements and the options of implementing the File Formats Standard in the CSU data exchange processes.

Geospatial data and attribute data

B.1.2 In viewing that the recommended File Formats Standards are commonly used by most of the PDs, only CED and LandsD would require a new DCT. No extensive system revamp would be required by the PDs for standard file format compliance purpose. According to the inventory of PDs' GIS / CAD system, the follow table highlights the compliance of the PDs' current practices with the File Formats Standard.

	E00	DGN	DBF IV	Remark
Data Agent (Data Agent should comply with All the File Formats)				
LandsD	✓	✓	✓	LandsD might require a DCT or system revamps to provide data in E00 (Exported from Arc/Info Coverage Version 7).
PlanD	✓	✓	✓	PlanD could provide / receive data in E00, DGN and DBF as of current practices
CED	✗	✓	✓	CED might require a DCT to provide data in E00
Data Owner (Data Owner should provide data conforming to at least one recommended File Formats Standard)				
ArchSD				ArchSD could provide building information in DWG format. Separate consent already sought from LandsD.
BD				BD would provide textual information to LandsD. Please refer to section 6.2.4.
LR				LR would provide textual information to LandsD. Please refer to section 6.2.4.
RVD				RVD would provide textual information to LandsD. Please refer to section 6.2.4.
HyD	✓	✓		HyD would provide slope information to CED in DGN or E00.
TDD	✗	✓		DSD would provide slope information to CED in DGN only.
WSD	✓	✓		WSD would provide slope information to CED in DGN or E00.
DSD	✗	✓		DSD would provide slope information to CED in DGN only.
Data User (Data User should comply with at least one file format)				
ArchSD	✗	✓	✓	ArchSD might require a DCT to receive

	E00	DGN	DBF IV	Remark
				building data in DGN or E00. For slope data, the slope division could accept DGN.
BD	N/A	N/A	N/A	BD's GIS is under development
EMSD	N/A	N/A	N/A	EMSD is not the Data User of CSU data.
HyD	✓	✓	✓	HyD could accept either E00 or DGN as in current practices.
DSD	✗	✓	✓	DSD could accept DGN as in current practices.
TDD	✗	✓	✓	TDD could accept DGN as in current practices.
C&SD	✓	✗	✓	C&SD could accept E00 as in current practices
RVD	✓	✗	✓	RVD could accept E00 as in current practices
WSD	✓	✓	✓	WSD could accept E00 or DGN as in current practices

Table 4 Adoption of File Formats Standard by Data Agents, Data Owners and Data Users.

(a) Data Agents:-

- (i) For PlanD, they already include the recommended File Formats Standard in the current practices. If any, the efforts required to implement the standard would be minimal.
- (ii) Being the Data Agent of Slope CSU, CED should disseminate Slope CSU in both E00 and DGN. In viewing that CED does not have a suitable DCT to convert DGN to E00, CED might need to implement a new DCT.
- (iii) For LandsD, data is currently provided in DGN and Arc/Info Coverage Version 6, LandsD might need a new DCT or revamp the existing system to comply with the standard (i.e. E00 exported from Arc/Info Coverage Version 7). This should be reviewed in the Supplementary Feasibility Study of the Data Dissemination System.

(b) Data Owners:-

- (i) File format is not an issue for the Data Owner of TPU/SB and Road Centreline CSU since the Data Agent is the Data Owner.
- (ii) All Data Owners (except ArchSD) are able to provide data conforming to at least one File Formats Standard. (Please refer to

section 6.2.3 and for textual data, please refer to Section 6.2.4) For ArchSD, separate agreement already sought from LandsD that ArchSD could submit building data in DWG format.

(c) Data Users:-

- (i) All Data Users (except ArchSD in receipt of building information) could accept either E00 or DGN without major modification to the existing systems. For ArchSD, they are required to convert building data from DGN / E00 to AutoCAD-compatible format.

Other Data Formats

- B.1.3 The File Formats Standard does not cover the file formats for other data. Exchanges of the other data (e.g. textual data) should comply with recommendations of IF. Under IF, XML v1.0 is the default documents / message formatting language. Hence, to comply with IF, textual data should be exchanged using XML.
- B.1.4 In the context of CSU, according to IF, RVD, LR and BD might submit textual data to LandsD using XML. In viewing that LandsD is currently the only recipient of the textual data, the exchanges would be conducted in the LandsD's future Data Dissemination System (DDS) and the mechanisms to import and export the XML documents would be specified in the implementation phase of the DDS.