**The Government of the Hong Kong
Special Administrative Region**

Development Bureau

Works Project Information Standard

Reference Document

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1 Introduction

1.1 Purpose of the Document

The Works Project Information Standard (WPIS) will standardize the data components of project information domains and the format of the data files of these project information domains.

The WPIS is therefore a set of data standards and protocols. The use of the WPIS will facilitate open, interoperable, efficient and reliable electronic exchange of public works project data, and reliable electronic communications among project participants through the use of electronic files of standardized format.

The WPIS comprises:

(a) The standards of procedures, rules and semantics of data schemas of project information domains, which are stated in this document; and

(b) The library including the catalogue, details, explanatory notes, and semantics of the WPIS Schemas and Templates, which will be distributed in separate releases.

1.2 Applicability

The WPIS is applicable to the exchange of project information data files of construction work projects. The WPIS data files could be exchanged through removable media such as flash disks, CD-R/RW disks, etc. or as attachment to emails.

DEVB will from time to time update the Library of WPIS Schemas and Templates to include revised or new project information domains. However, users are allowed to define his user-defined data domains (UDD) conforming to this document in case that the WPIS Schemas and Templates may not meet requirements of their construction work projects fully. Through the adoption of WPIS, electronic project data that conforming to WPIS can be correctly interpreted, easily transformed and readily reused across different systems in the form of electronic files which can be exchanged through removable media such as flash disks, CD-R/RW disks, etc. or as attachment to emails.

2 Principles Behind the WPIS

2.1 Hierarchy Structure of Data Components and Data Domains

2.1.1 Data Component

Each WPIS data domain is a collection of data components arranged in a hierarchical structure. Each data component may have constraints associated.

Data component itself may be a collection of other or simpler data components. This type of data component is known as complex data component. Some data components may be commonly used among different complex data components of the same or different data domains.

The simpler data component is usually associated to the Government Chief Information Officer (OGCIO) Core Component Type (CCT) as the data type of the data component. That CCT itself is also a complex data type. The list of CCT can be retrieved from the OGCIO web site (http://www.xml.gov.hk/schemas/cct/cct.xsd).

2.1.2 Data Model

The specifications of a data component are collectively referred to as the data model of that data component. A data component model typically covers the definition, usage rules, data types, constraints, etc. that accurately reflect the data component's properties.

The specifications including the hierarchical structure of these data components are collectively known as the data model of the concerned data domain.

OGCIO has provided a modeling spreadsheet for specifying the data model of a document, which is equivalent to the data domain in a common format (http://www.xml.gov.hk/download/bim_v1_0.xls).

2.1.3 Domain and Sub-domain

A data domain may contain variant. The data domain and its variant data domains will form a WPIS data domain (WDD). The variant of a data domain is known as a sub-domain of that data domain.

The following diagram shows the typical dependency between a data domain of a WDD and its sub-domains. A data domain or its sub-domain data schema file may import the Global Common Data Schema (e.g. the schema of the WDD-Common as shown in the diagram) or its Domain Common Data Schema (e.g. the schema of the WDD-4 as shown in the diagram) where appropriate.
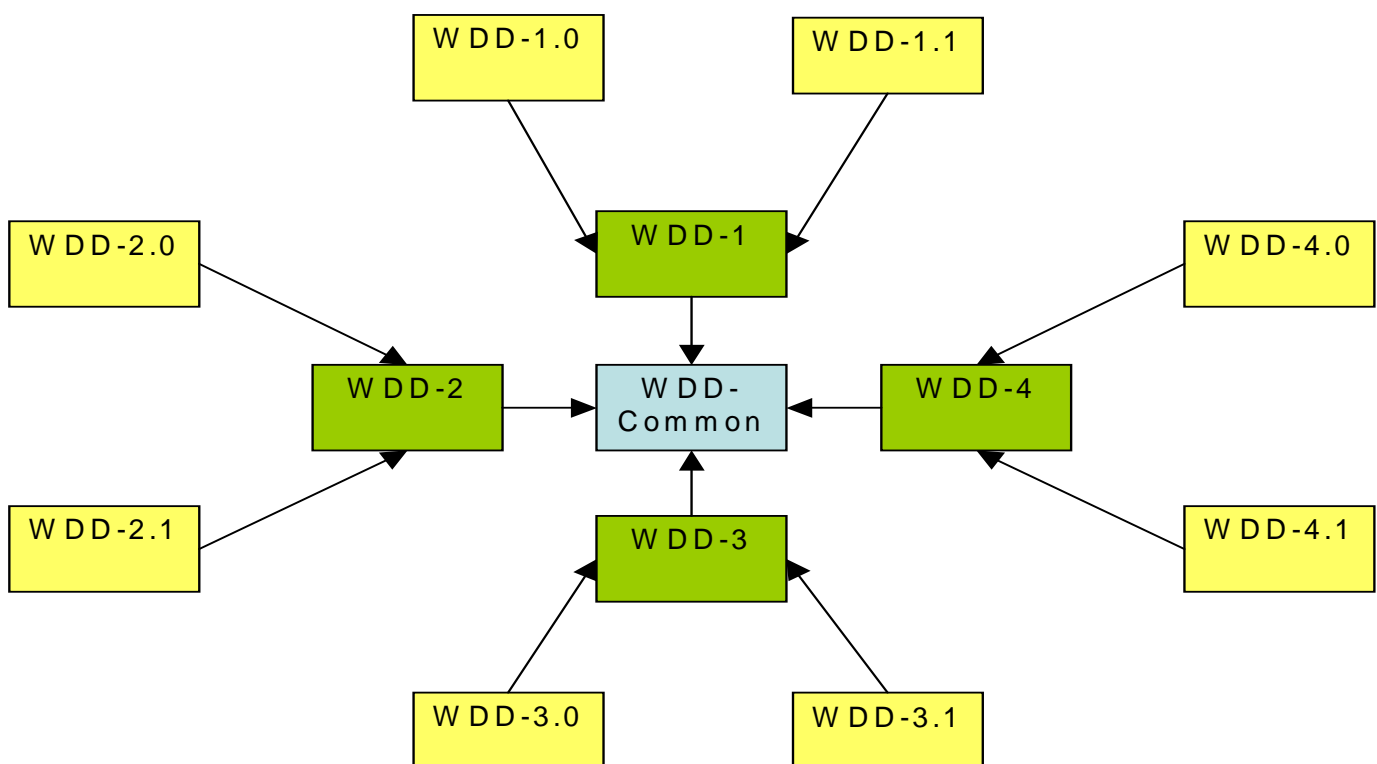
2.1.4 Common Data Components

Some data components appear not only in a data domain of a WDD but also in its sub-domains. These common data components will be modeled as Domain Common Data Components which will be represented by specific data structures known as the Domain Common Data Schema for reuse among the data domain and its sub-domains. In doing so, these common data components will be represented consistently in a data domain and its sub-domains.

Some data components appear not only in one WDD but also in other WDDs. These common data components will be modeled as Global Common Data Components which will be represented by specific data structures known as the

Global Common Data Schema for reuse across different domains. In doing so, these common data components will be represented consistently in different domains.

2.2   XML Schema Design Methodology

The data schema files will be encoded in XML (extensible Markup Language) format.

Design of XML coding of data schemas and their associated files will follow the methodology described in Section 4 and Section 5 of Part II of the XML Schema Design and Management Guide version 1.3 (the OGCIO Guide) under the Interoperability Framework for E-Government provided by OGCIO.

Section 4 of the OGCIO Guide introduces the Business Information Modeling (BIM) methodology. The WDDs have been analyzed using the BIM. The BIM methodology facilitates the breaking down of a document (paper document or data file) into modular data components, which serve as the building blocks for reassembling the corresponding data domain. Complex data components are decomposed into simpler sub-components. Finally, a hierarchical structure of data components is formed to represent the data domain.

Section 5 of the OGCIO Guide provides an XML Schema generation mechanism, where each data component of a data domain has its own complex data type in order to facilitate reusability.

3 Versioning

3.1   This Document

The version numbering of this document shall take the form x.yy.zz :

x   - version no. of this document;

yy   - year of the 1st release of the version x of this document;

zz   - minor version no. for revisions to version x of this document but not justified to increment the version no. x.

3.2   Release of Library of WPIS Schemas and Templates

The version numbering of each release of the Library of WPIS Schemas and Templates shall take the form x.yy.zz :

x   - version no. of the Release of library of the WPIS Schemas and Templates;

yy   - year of the 1st release of the version x of the Release of library of the WPIS Schemas and Templates;

zz   - minor version no. for revisions to version x of the Release of library of the WPIS Schemas and Templates but not justified to increment the version no. x.

3.3   Protocols and WDDs

Schema files of each protocol and WDD (see also Section 5) of a release of the Library of WPIS Schemas and Templates will be assigned a unique version number. In other words, all the schema files and their corresponding code-association files will assume the same version number. The version number of the schema files of a release of the Library of WPIS Schemas and Templates may or may not be the same as the version no. x of the corresponding Release.

4 Agent Responsible Code

Each project participant will be assigned a unique Agent Responsible Code which will have a fixed length of 3 alphanumeric (including ampersands), upper case characters. This code will enable the originator of the data to be identified.

The Agent Responsible Code list will be administered by the CAD Standard for Works Project (CSWP) Working Group. Request for inclusion in the lists shall be submitted to it&sps@devb.gov.hk for consideration.

The list of the Agent Responsible Codes can be downloaded from the Works Branch, Development Bureau,   (DEVB-WB) web site www.devb-wb.gov.hk/cswp .

5 WPIS

The Library of WPIS Schemas and Templates comprises of two protocols ultimately and a set of WPIS Data Domains (WDD):

(a) Protocols –
    (i)   Data conversion protocol
    (ii) Dissemination protocol

(b) Data schemas of the WDDs which are listed in the Release Notes of the Library of the WPIS Schemas and Templates.

The number of protocols, WDDs and their data schemas will be promulgated in the Release Notes of each release of the Library of WPIS Schemas and Templates.

5.1 Protocols

The WPIS comprises two protocol standards, namely the data conversion protocol of protocol ID "DCON" and the dissemination protocol of protocol ID "DISS":

Protocol ID	Protocol Standard
DCON	Data Conversion
DISS	Dissemination

5.1.1 Data Conversion Protocol

The objective of the data conversion protocol is to facilitate the conversion of WPIS compliant data file to proprietary data file (such as PDF e-form, csv file) and vice versa.

The data file of data conversion protocol will contain:

(a) information on the source file and the target file such as WDD/UDD domain schema file name, PDF e-form file name, etc.;

(b) data transformation and mapping rules in W3C XSLT (XML Style Transformation) format. For more details about XSLT specification please refer to http://www.w3.org/TR/xslt. The version of the W3C XSLT will be stated in the data conversion protocol.

As the data conversion protocol may subject to revision, its details will be published in the Release Notes of the Library of WPIS Schemas and Templates.

5.1.2 Dissemination Protocol

The purpose of the dissemination protocol is to allow the automatic dissemination of the received WPIS data files and PDF e-forms at the receiver side if the receiver wishes to disseminate the received files to his backend computer systems automatically. The use of dissemination protocol is not mandatory for compiling WPIS data files.

The data file of dissemination protocol will contain information on sender, receivers, projects, data files to be sent.

Dissemination Protocol will not be roll-out under Batch 1 WPIS. DEVB will conduct questionnaire survey on the needs of automatic dispatch of received WPIS data files in the receiver's organization after the roll-out of the Batch 2 WPIS. If decided to roll-out, details will be published in the Release Notes of the Library of the WPIS Schemas and Templates.

5.2   WPIS Data Domain (WDD)

The details (data components, data types, constraints) of WDDs will be promulgated in the Release Notes of the Library of WPIS Schemas and Templates.

The current release and the previous releases of the Release Notes and Library of WPIS Data Domains will be posted on the WPIS web site www.wpis.gov.hk for free download.

5.3   Naming Convention

Naming convention will be imposed on the schema namespace, schema files and their associated files of the protocols and WDDs:

- Schema namespace
- IDs of protocol and data domains
- Data Schema files of protocol and data domains
- Code-association files of protocol and data domains
- Data files of protocol and data domains
- Data file templates of protocol and data domains

5.3.1   WPIS Namespace

The WPIS namespace, which may be fictitious, provides a mechanism to qualify data components and their attribute names of a data domain. This ensures that different data components, attribute sets and data types assigned with different namespaces would be distinct. The WPIS namespace takes the form of an URL (Universal Resources Location) in the format of

http://www.wpis.gov.hk/wpis/wdd/vn.m where n.m is the version no. of the data schema of protocols and data domains of a Library of WPIS Schemas and Templates.

The data schema files of the WDD version n.m will be deemed published at the URL http://www.wpis.gov.hk/wpis/wdd/vn.m/schema_filename

5.3.2 Naming Convention of IDs of Protocols and Data Domains

The WPIS Protocol Identifier will be:
- o DCON   for data conversion protocol
- o DISS   for dissemination protocol

The WPIS Data Domain Identifier will take the form:
- o WDD-*domain_ID.sub_domain_ID*
  e.g. WDD-3.0, WDD-4.1, etc.

5.3.3 Name Convention of WPIS Data Schema File

The data schema files of WPIS data domains are organized in four groups of data schema files in order to provide a systematic framework for reuse and management of the data domains.

- *Global Common Data Schema*: the schema file that defines the Global Common Data Components.

- *Domain Common Data Schema*: the schema file that defines the Common Data Components specific to the data domain.

- *Domain Master Schema*: the schema file that defines the master message in each domain.

- *Sub-domain Schema*: the schema file that defines a sub-data domain message in a data domain. The sub-data domain usually contains some data components which are at variant to the master data domain.

The naming convention of data schema files of the WPIS protocols and data domains are described as follows:

Schema Type	File Name Syntax of Data Schema file
Global Common Data Components	WDD-Common-[*VER*].xsd e.g. WDD-Common-1.0.xsd
Domain Common Data Components	WDD-[*WDD-ID*] -[*VER*].xsd e.g. WDD-4-1.0.xsd
Domain Master data domain	WDD-[*WDD-ID*].0-[*VER*].xsd e.g. WDD-4.0-1.0.xsd
Sub-domain	WDD-[*WDD-ID*].[*SUB-DOMAIN-ID*]-[*VER*].xsd

	e.g. WDD-4.1-1.0.xsd
Data Conversion Protocol	DCON-[*VER*].xsd
	e.g. DCON-v1.0.xsd
Dissemination Protocol	DISS-[*VER*].xsd
	e.g. DISS-v1.0.xsd

Note: [*WDD-ID*] refers to the master WDD identifier, [*SUB-DOMAIN-ID*] refers to the sub-domain identifier of its master WDD, and [*VER*] refers to the version number of the data schema files of the Library of WPIS Schemas and Templates.

5.3.4 Naming Convention of Code-association File

One of the OGCIO CCT data type is Code. User has to define a list of lookup parameters for the data component of which its data type is Code. In the BIM model, user can associate meaningful descriptions for each of the lookup parameters. However, the corresponding data schema file excludes the descriptions of the lookup parameters.

The code-association file of a data schema file provides a means to encode all the lookup parameters of the data schema file and their descriptions. The code-association file will be encoded in XML format. As the structure of the code-association file may subject to revision, details will be published in the Release Notes of the Library of WPIS Schemas and Templates.

However, the file names of code-association files can be standardized as follows:

Data Schema File Type	File Name Syntax of Code-association File
Global Common Data Schema	WDD-Common-[*VER*]-CodeList.xml e.g. WDD-Common-1.0-CodeList.xml
Domain Common Data Schema	WDD-[*WDD-ID*] -[*VER*]-CodeList.xml e.g. WDD-4-1.0-CodeList.xml
Master Domain Data Schema	WDD-[*WDD-ID*].0-[*VER*]-CodeList.xml e.g. WDD-4.0-1.0-CodeList.xml
Sub-domain Data Schema	WDD-[*WDD-ID*].[*SUB-DOMAIN-ID*]-[*VER*]-CodeList.xml e.g. WDD-4.1-1.0-CodeList.xml

5.3.5   Naming Convention of Protocol Data File and WDD Data File

The file names of the WPIS protocol data files and the WDD data files but excluding the file extension take the form:

AA-BBB-CCC-XXX

Data File Type	File Name Syntax of Data File	Mandatory File Extension
Conversion Protocol Data File	AA-BBB–CCC-XXX.cnv	cnv
Dissemination Protocol Data File	AA-BBB-CCC-XXX.dis	dis
WPIS Compliant WDD Data File	AA-BBB-CCC-XXX.xml	xml

where

Code	Type	Format
AA	Country code	- Optional. 2 characters fixed sized. (Standard ISO 3166 Code lists, the list can be found at ISO web site http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html)
BBB	ARC code	- Optional. - Variable sized. - The list of the Agent Responsible Codes can be downloaded from the Works Branch, Development Bureau web site www.devb-wb.gov.hk/cswp .
CCC	Project ID	- Optional. - Variable sized. - To be assigned by the user.
XXX	Arbitrary file name	- Mandatory. - Variable sized. - To be assigned by the user.

5.3.6 Naming Convention of WDD Data File Template

To facilitate user to compose the WPIS compliant data file by means of an ASCII text editor, e.g. the Notepad, each WPIS data schema file except the data conversion protocol file will have a data file template created and distributed in the library of the WPIS Schemas and Templates.

The file name of a WPIS data file template takes the following form, where x.y is the version no. of the schema:

Schema Type	File name Syntax of Data File Template
Dissemination Protocol of version x.y	DISS-x.y.tplt
Master Data Domain of version x.y	WDD-[*WDD-ID*].0-x.y.tplt
Sub-domain of version x.y	WDD-[*WDD-ID*].[*SUB-DOMAIN-ID*]-x.y.tplt

5.3.7 Versioning

Based on Universal Business Language international standard, the entire set of WPIS data schema files will adopt the same version number n.m. Whenever there is a WPIS XSD file requires changes and a new version is required to be released, the version of all the other WPIS XSD files will also be incremented with the same version number.

6 User Defined Data Domain (UDD)

The WPIS framework would allow user to define his User-defined Data Domain (UDD) in case that the WDDs in the Library of WPIS Schemas and Template could not meet his project usage. Users could associate the OGCIO primitive core component data types or the WDDs or his UDDs as data types to the data components of his UDD.

Under the WPIS framework DEVB has developed, the WPIS File Composer which will be developed and posted on the WPIS web site for free download to guide the user to define his UDD data component element names, to associate the data types with his data components so as to facilitate the composing of the UDD data schema files.

Alternatively, the user could use the OGCIO Business Information Modeling spreadsheet v1.0 (http://www.xml.gov.hk/download/bim_v1_0.xls) and the OGCIO xml data schema generation script v1.1 (http://www.xml.gov.hk/download/schema_gen_scripts_v1_1.zip) with reference to the OGCIO XML Schema and Management Guide version 1.3 (http://www.ogcio.gov.hk/eng/infra/download/g55-2.pdf) to compose and generate his UDD data schema files. The UDD data schema files composed using BIM should be modified to contain the WPIS namespace and language code of UTF8.

A user could define a UDD according to his/her organization standard or practices as long as the data schema file structure of the UDD conforms to the W3C XML Schema Standard.

The dependency of UDD data schema files is recommended to follow that of the WDD data schema files as shown in Section 2.1.3. Of course, a UDD data schema file may import any WDD data schema files or other UDD data schema files when reusing other data schema files is required.

6.1 Naming Convention

Naming conventions on the schema namespace, schema files and their associated files of the UDDs are recommended for users to adopt within the WPIS framework. The UDD naming convention aims at having the UDD associated file names unique as far as possible:

- Schema namespace
- Data Schema files
- Code-association files of the UDD
- Data files of the UDD
- Data file templates of the UDD

6.2   UDD Namespace

The UDD namespace, which may be fictitious, provides a mechanism to qualify data components and their attribute names of a data domain. This ensures that different data components, attribute sets and data types assigned with different namespaces would be distinct.

The namespace of UDD data domains will be determined by the user according to the standard practice of his organization.

However, for the sake of uniformity, the following namespace structure for UDD data domain is recommended as an option for the user to adopt:

(a)   Organization has its web site (say, www.abc.com):

The name space for UDD data domain version $n.m$ would be
http://www.abc.com/udd/v$n.m$

The data schema files of the UDD version $n.m$ will be deemed published at the URL
http://www.abc.com/udd/v$n.m$/schema_filename

(b)   Organization does not have web site:

The name space for UDD data domain version $n.m$ would be
http://www.udd.org.hk/udd/v$n.m$

The data schema files for UDD version $n.m$ will be deemed published at the URL
http://www.udd.org.hk/udd/v$n.m$/schema_filename

6.3 Naming Convention of UDD associated Files

The recommended file naming of UDD data schema files, UDD code-association files, UDD data files and UDD data file templates are shown below:

File Type	File Name Syntax
UDD Data Schema File	UDD-x.y-BBB-CCC.xsd
UDD Code-association File	UDD-x.y-BBB-CCC_CodeList.xml
UDD Data File	AA-BBB-CCC-XXX.xml
UDD Data File Template	UDD-x.y-BBB-CCC.tplt

where

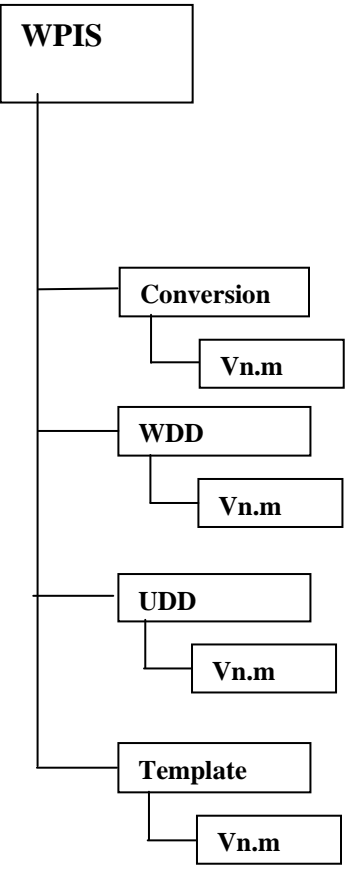| Code	Type	Format
AA	Country code	• Mandatory. 2 characters fixed sized. (Standard ISO 3166 Code lists, the list can be found at ISO web site http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html)
BBB	ARC code	• Mandatory. • Variable sized. • The list of the Agent Responsible Codes can be downloaded from the Works Branch, Development Bureau web site www.devb-wb.gov.hk/cswp .
CCC	Project ID	• Optional. • Variable sized. • To be assigned by the user.
XXX	Arbitrary file name	• Mandatory. • Variable sized. • To be assigned by the user.
UDD	Indicator	• Mandatory to signify User Defined Data Domain.
x.y	Version number	• Optional. • To be assigned by the user to keep track of the UDD version if applicable.

6.4   Convert UDD to WDD

The WPIS Data Domain (WDD) will be administered by the WPIS Working Group. Requests for inclusion of the User Defined Data Domain (UDD) in the Library of WPIS Schemas and Templates shall be submitted to it&sps@devb.gov.hk for consideration.

The submitted UDD, with supported documents will be reviewed by the WPIS Working Group. If the application for the new WDD is approved, the new WDD will be included in the new release of the Library of WPIS Schemas and Templates . The new release of the Library can be downloaded from the WPIS, web site www.wpis.gov.hk .

7 Folder Structure

The WPIS folder that contains the data schema files, templates etc. has "WPIS" as its root directory and various sub-directories in order to provide a systematic framework to manage the data schema files, data conversion protocols etc.

❖ *Vn.m*: The sub-folder of folder name "Vn.m" of the respective file folder holds files of version n.m of the library of the WPIS Schemas and Templates.

	Level	Folder Name	Description
WPIS	**1**	**WPIS**	The **root folder** of the library of the WPIS Schemas and Templates, i.e. Level 1 of the WPIS folder structure.
	2		Different file types of WPIS library are organized in **sub-folders** of the root folder, i.e. Level 2 of the WPIS folder structure.
Conversion — **Vn.m**		**conversion**	Data conversion protocol data files will be stored in the respective "Vn.m" sub-folder of the "conversion" folder.
WDD — **Vn.m**		**wdd**	The WDD data schema files and their associated files will be stored in the respective "Vn.m" sub-folder of the "wdd" folder.
UDD — **Vn.m**		**udd**	The UDD data schema files and their associated files are recommended to be stored in the respective "Vn.m" sub-folder of the "udd" folder for easy and systematic retrieval.
Template — **Vn.m**		**template**	The data file templates of WDDs will be stored in the respective "Vn.m" sub-folder of the "template" folder.
	3	**Vn.m**	The folders of different versions of the concerned files, i.e. Level 3 of the WPIS folder structure.

8 The Library of WPIS Schemas and Templates

The Library of WPIS Schemas and Templates comprises the WDD data schema files and their associated files as well as the data schema files of the WPIS protocol and other files promulgated from time to time under the respective Releases of the library.

In each release of the Library of the WPIS Schemas and Templates, there will be Release Notes covering the Release History, catalogue, details, explanatory notes, rules and semantics of the data schema files and their associated files (i.e. the data schema files, the code-association files, the data file templates, etc.) and composition of the protocol(s) and WDDs.

The current release and the previous releases of the Library of WPIS Schemas and Templates will be posted on the WPIS web site www.wpis.gov.hk for free download.

9 References

The Agent Responsible Codes can be downloaded from the DEVB-WB web site http://www.devb-wb.gov.hk/cswp.

The previous releases and the current release of the Library of WPIS Schemas and Templates can be downloaded from the WPIS web site http://www.wpis.gov.hk . Listing and details of protocol(s) and data domain(s) can be found in the Release Notes of each release of the Library of WPIS Schemas and Templates.