

<b>Amendment History</b>				
<b>Change Number</b>	<b>Revision Description</b>	<b>Pages Affected</b>	<b>Revision Number</b>	<b>Date</b>

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## 2.3 USER REQUIREMENTS

### CLIS DDS

Lands Department (LandsD) currently maintains the digital map and land record information in the Computerised Land Information System (CLIS). This system is currently used by the following group of users:

- Survey & Mapping Office (SMO) and Lands Administration Office (LAO)
- Other Government departments and their external consultants (including Trading Fund and Autonomous Organization)
- Private sector (including Business Partners, Value Added Resellers (VAR), Internet Map Permittees (IMP) and all other types of private companies)
- General public
- Academic

Statistics on the sale of digital map data indicate that the demand for the digital map data from the LandsD has increased dramatically over the last five years. It is anticipated that such demand will continue to accelerate in the near future which is in line with a general trend towards more widespread adoption of spatial data processing and Geographical Information System (GIS) techniques and in response to the Government of the Hong Kong Special Administrative Region (HKSAR) 's initiatives to promote effective use of IT in the private sector and among the general public in Hong Kong.

Procedures for fulfilling requests for digital map data from the LandsD are heavily reliant on manual processing and are coming under increasing pressure as demand increases. The majority of data dissemination processes have remained largely unchanged since the inception of CLIS in LandsD. In addition, the existing setup will fail to meet the additional demands of the digital map data. Previous Feasibility Study aims to review and suggest a viable business and technical option to LandsD to improve the digital map ordering and dissemination process in order to cope with the increasing demand of the digital map data.

The section below details the User Requirements on which the business options will be based. The User Requirements are derived from the review of documentation and statistics provided by LandsD and a series of interviews conducted both internally within LandsD and with other Government departments. Interviews were completed in 2000.

### CSU DDS

Apart from the user requirements for the CLIS DDS, this section will discuss the User Requirements for the CSU DDS. Interviews, conducted with both LandsD and PDs, were completed in January 2004.

### 2.3.1 Required System Description

#### 2.3.1.1 System Objectives

The major objectives of the proposed LandsD DDS are described as follows:

- To set up a multi-format digital map and land record database and a data communication infrastructure such as Wide Area Network (WAN) for the dissemination of the required digital map and land record data in the appropriate data format to the computer system of the client departments, private sector and general public;
- To shorten the queuing and processing time for the data conversion and delivery of digital map and land record data in the user required data format;
- To optimize the staff resources required to carry out the data format conversion;
- To reduce the operation and administration cost of disseminating digital map and land record data; and
- To provide facilities to manage data exchange activities between Data Owner (DO), Data User (DU) and Data Agent (DA).

#### 2.3.1.2 System Overview

The proposed solution aims to set up a web-based system to provide a centralized database for online ordering and data dissemination system for LandsD; and to provide data provision from DO, data manipulation and data dissemination to DU for CSU data.

The major functionality of the proposed system is summarized as follows:

- To provide facility to extract the up-to-date digital map data from CLIS and convert it into a number of commonly used formats for data dissemination;
- To provide facility to maintain the customer profile, online order, undertaking and data license record information;
- To provide facility to facilitate the handling of off-line payment process;
- To provide facility to renew license and maintain cessation information;
- To provide online/offline dissemination facilities of digital map data to customers;
- To establish and provide technical support information to improve the customer support services of LandsD;
- To provide facility to allow the user to perform ad-hoc analysis on customer and sales record information;
- To provide facility to allow DO to submit the CSU data;
- To provide facility to allow DA to manipulate the CSU data; and
- To provide facility to allow DO and DU to retrieve the CSU data.

Details of the requirements are described in other sections of this Supplementary Feasibility Study Report.

### 2.3.2 Requirements Catalogue

The Requirement Catalogue describes the user requirements in detail. These requirements are classified under two major contexts: "Business Objectives" and "Audit, Control and Security".

"Business Objectives" category indicates a change requirement in function or process. A decision to fulfil a business objective requirement may ultimately require a change or upgrade in technology.

"Audit, Control and Security" category indicates requirement in the system related functions in the proposed system.

Within these two major contexts, the requirements are broken down into four categories. They are:

- System (SYS) – developments in support of the overall system configuration
- Data (D) – developments of data stores required by dissemination demands
- DAM (DAM) – developments in supporting DAM related functions
- Audit, Control and Security (ACS) – developments of system related functions

These categories serve the purpose of establishing the Requirement Reference ID used throughout this and subsequent documents. Requirement ID is produced based on the following format: REQ + [Category] + [Sequence].

As not every item in the Requirement Catalogue will be implemented initially, it will be necessary to decide the importance of each. Hence the requirements will be prioritised into the following categories.

- High - H
- Medium - M
- Low – L

Table 2.3.2-1 provides a summary lists of identified user requirements which are described in more detail in the following sections.

Table 2.3.2-1. LandsD DDS Requirements List

Context		Requirement ID	Priority	Requirement Description
Business Activities	CLIS Source Data Management Activities	REQ-SYS003	M	Provision of updated features
		REQ-D002	H	Minimise the disruption to LandsD digital map operational database
	Ordering and Payment Activities	REQ-SYS001	H	Provide efficient methods on online ordering of digital map data from LandsD
		REQ-SYS002	M	Expand the current selection criteria on selecting required digital map data
		REQ-SYS005	H	To generate demand note online
		REQ-D001	H	Offer a wide range of data formats to users
	Customer Profile, License and Sales Record Activities	REQ-SYS008	H	To maintain the customer and license details
	Data Conversion Activities	REQ-SYS004	H	Provide enhanced range of data conversion tools for LandsD digital map data
		REQ-D003	H	Storage of LandsD digital map data in a number of commonly used formats
	Data Dissemination Activities	REQ-SYS006	H	Provide an efficient method in the automatic extraction of required digital map data
		REQ-SYS007	H	Provide a range of effective digital map data delivery and dissemination methods
		REQ-SYS011	M	To provide regular updates to large private sector customers
		REQ-D004	L	Dissemination of digital data provided from other Government departments
		REQ-D005	L	Dissemination of historical digital map data
	License Renewal and Cessation Activities	REQ-SYS010	H	Provide facilities to renew license and maintain cessation information

Context		Requirement ID	Priority	Requirement Description
	Customer Supporting Activities	REQ-SYS009	H	Provide technical support information to the customers
	Data Provision from DO Activities	REQ-DAM001	M	Interface for CSU Data Provision from DO
		REQ-DAM002	H	Validation for CSU Data Provision from DO
		REQ-DAM003	M	Transaction Log for CSU Data Provision from DO
		REQ-DAM004	L	Acknowledgement for CSU Data Provision from DO
	Data Manipulation Activities	REQ-DAM005	H	CSU Data Manipulation
		REQ-DAM006	M	Task Management for CSU Data Extraction
		REQ-DAM007	H	Extract CSU Files to conform to file format standards
		REQ-DAM008	M	Transaction Log for CSU Data Manipulation
		REQ-DAM009	L	Acknowledgement on receipt of data from DAMin/DAMout
	Data Dissemination Activities	REQ-DAM010	H	Interface for CSU Data Dissemination to DU
		REQ-DAM011	M	CSU Files Package
		REQ-DAM012	M	Transaction Log for CSU Data Dissemination to DU
		REQ-DAM013	L	Acknowledgement for CSU Data Dissemination to DU
	Reports	REQ-DAM014	M	Generate Management Reports
		REQ-DAM015	M	Generate User Reports
	Metadata Maintenance	REQ-DAM016	H	Maintain Metadata of CSU
	System Parameters Maintenance	REQ-SYS012	M	Maintain code table and system parameters
		REQ-SYS013	M	Synchronization of system date and time
Audit, Control and Security		REQ-ACS01	H	Track login, logout and system details information
		REQ-ACS02	H	Track activities of users
		REQ-ACS03	H	Verify conversion errors encountered during data conversion process

<b>Context</b>	<b>Requirement ID</b>	<b>Priority</b>	<b>Requirement Description</b>
	REQ-ACS04	H	Manage user accounts and access rights
	REQ-ACS05	H	Physical access and system security
	REQ-ACS06	H	Provide secure measure on transmission of digital map data
	REQ-ACS07	H	Monitoring of system performance and usage
	REQ-ACS08	H	Perform system backup and archiving

2.3.2.1 REQ-SYS003 Provision of updated features

Priority: Medium

Functional Requirement:

To provide facilities that allow customers to order only updated features.

The proposed system should allow customer's to purchase only changed features within a map sheet rather than the entire map sheet. The data transmitted to the customer will contain only those features that have been modified, added or deleted since the customer's last purchase.

This has the potential for significantly reducing the data volumes to be transmitted.

This would assist the customers to maintain their digital map data with ease.

Frequency of Use:

50 provision processes on the updated digital map data per day

Non-functional Requirements:

Nil

Proposed Solution:

The current CLIS does not provide feature level versioning. At this stage it is not possible to meet this requirement. However, it is understood that versioning is recommended in the Feasibility Study of the Enhancement of Computerized Land Information System (ECLIS). Therefore, this requirement should be considered in the ECLIS.

As an interim measure, prior to the customer's purchases, information on what layers within a sheet being revised should be provided.

2.3.2.2 REQ-D002 Minimise the disruption to LandsD digital map operational database

Priority: High

Functional Requirement:

The proposed system is to extract and store a copy of the digital map data from the master set of current mapping libraries in Computerized Land Information System (CLIS) from which all data conversion will be based.

This will avoid any interruption to the daily operation of CLIS and reduce the chance of digital map data under development being released to the customers.

Frequency of Use:

1 batch copying process executed per day

Non-functional Requirements:

Nil

Proposed Solution:

Establish a Source Spatial Data Hub to extract changed or updated layers from CLIS. The extracted copy of the digital map data in the Source Spatial Data Hub is used to convert into a predefined number of multiple data format products for sale or dissemination. The extraction process is proposed to execute in batch mode on a daily basis.

2.3.2.3 REQ-SYS001 Provide efficient methods on online ordering of digital map data from LandsD

Priority: High

Functional Requirement:

To provide an efficient method on ordering of digital map data from LandsD.

Required system should:

- Provide the price list and other relevant costs of the digital map data for sale
- Provide information on the mapping products available for sale or dissemination e.g. scales, formats, product description and perhaps testing samples
- Help users in defining the area of interest and selecting map sheets covered by the area of interest
- Help users to check revision detail of current datasets
- Allow users to place orders for the selected data
- Able to access via internet
- Continue the current ordering facility i.e. Completion of hardcopy order form or internal government requests

Frequency of Use:

50 ordering processes per day

Non-functional Requirements:

Nil

Proposed Solution:

A web site should be established to allow online ordering facility. The same web site should also be accessible to the sales counter in order to handle the ordering of digital map data via the current method i.e. received the order via hardcopy order form and Government requests.

The web site should provide the following facilities:

Capture of Information	<ul style="list-style-type: none"> <li>• Capture the customer and ordering information</li> <li>• Provide automatic retrieval functions for existing customers e.g. customer profile and account information should be retrieved automatically by an entry of user name or an account number</li> </ul>
Selection of Digital Map data	Selection of digital map data by providing the following: <ul style="list-style-type: none"> <li>• Co-ordinate pairs indicating point or area of interest</li> <li>• Entry of sheet reference number</li> <li>• On screen selection by user defined polygon of area of interest</li> </ul>
Revision Detail	<ul style="list-style-type: none"> <li>• Point at a sheet and receive current revision date</li> <li>• List the revision dates of currently selected sheets</li> </ul>

	<ul style="list-style-type: none"><li>• To improve the current update frequency of the revision date i.e. on monthly basis on the existing web site. The revision dates on the proposed web site should be updated on a daily basis to align with revision dates of the digital map data that are available for sale to the general public</li></ul>
Other facilities	<ul style="list-style-type: none"><li>• Pan and zoom functionality over a base map displaying index sheet of different products and basic geographic features including roads, place names, outline of built up area etc. which will be sufficient to give customer an indication of current map location</li><li>• For the same customer, function is required to compare currently selected sheets with previous sales record on the digital map data to identify the updating history of map sheets since the last time of purchase</li><li>• Able to accept the electronic or hardcopy format of order form/memo for purchasing of digital map data</li><li>• Provide wizards to guide users to select the appropriate digital map data</li></ul>

2.3.2.4 REQ-SYS002 Expand the current selection criteria on selecting required digital map data

Priority: Medium

Functional Requirement:

To enhance the selection criteria to facilitate the customers in the selection and purchase of digital map data from LandsD

Required system should allow selection and purchase of digital map data based on customer defined areas instead of on a 'map sheet' basis which is currently being adopted by LandsD. With the current sheet by sheet basis, redundant digital map data may be purchased by the customers. Due to this reason and also the customers' system requirements, the customers are required to undertake some filtering process before the digital map data can be used in their systems.

Consequently, the interviewed customers have identified the following selection criteria as being desirable in this study:

- By defining area of interest
- By geographic unit or administrative zone (e.g. District Board or Street Block)
- By feature type (i.e. only Buildings or Roads layers)
- By attribute selection within a feature type
- By updated feature (i.e. those features that had been added or modified since the customer's last purchase)

As the result of the above criteria, the selected digital map data could be disseminated to the customers as a seamless digital map instead of on a sheet by sheet basis.

This would overcome current difficulties faced by customers which are summarised as follows:

- Need to merge layers within sheets to recreate seamless database
- Need to process/clip the area of interest from the digital map data
- Need to purchase multiple sheets (e.g. building developments) if the area of interest falls on a number of adjoining sheets
- Need to extract the required layers when the area of interest is in a specific layer

Frequency of Use:

70 selection processes on the required digital map data per day

Non-functional Requirements:

The introduction of more flexible selection procedures and a new payment structure could significantly increase the complexity on the customers account administration as well as the data license issue.

Proposed Solution:

With the exception of 'selection by updated feature', it is currently technically feasible to allow the kind of flexible selection of digital map data by spatial extent or geographic area that is required in this function. However, this would require considerable application

enhancement based on the existing data models and software for this to be done. It has been considered that significant changes are to be introduced in both data models and software with the ECLIS. It is suggested that these requirements are to be met once the ECLIS has been established (adoption of Object Relational Database Management System (ORDBMS) technology in the ECLIS will also simplify provision of this functionality).

‘Selection by update feature’ cannot currently be undertaken as the CLIS was not designed to cater for feature level versioning. It is understood that versioning is recommended in the Feasibility Study of the ECLIS. Therefore, this requirement should be considered after the development of the ECLIS.

As an interim measure, the selection of specific layers within a map sheet could be considered. If this measure is considered prior to ECLIS implementation, layer based purchase should be based on certain commonly used layers, for example those containing:

- Buildings (including building polygons, lines and annotation)
- Elevation (including contour and spot heights)
- Facility
- Transportation (including Road and Railways)

The map sheet should continue to be the standard unit in which layer information is sold and supplied.

Likewise, more information should be provided on what has been updated in a map. It is possible to track and display what layers have been updated at this stage.

The current payment policy is based on the dissemination of digital map data on map sheet basis. A decision on whether the payment policy should be amended to accommodate flexible data selection in this form must be made before any steps are taken towards meeting these requirements. Evaluation on such a revised payment policy is beyond the scope of this feasibility study.

2.3.2.5 REQ-SYS005 To generate demand note online

Priority: High

Functional Requirement:

The proposed system should be able to generate and send the demand note online once the customer completed the purchasing order of the digital map data. The demand note must conform to the Treasury Department standard.

Frequency of Use:

50 processes per day

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system could automatically generate and send a Demand Note to customers online which could settle the payment with the Treasury Department as in the current practice.

2.3.2.6 REQ-D001 Offer a wide range of data formats to the users

Priority: High

Functional Requirement:

Offer a wide range of data formats to users to facilitate better use of digital map data from LandsD.

The proposed system should provide the digital map data in a number of popular formats initially and continue to provide other formats as required. The system should be able to support at least the following data formats in addition to those handled at present:

- Arc/Info Native
- Arc/Info E00
- Spatial Data Engine (SDE) compatible format
- ArcView Shapefile
- Intergraph MGE
- MicroStation DGN
- AutoCAD DWG and MAP formats
- MapInfo MIF and Table formats
- common raster formats (TIFF, ECW and MrSID)

Additional requirements were noted by large number of customers in the interviews requesting LandsD to supply:

- DGN in 2D and as well as 3D data
- Provide data in other basis rather than on a sheet by sheet basis only, for example in feature basis

Frequency of Use:

70 selection processes for required data formats per day

Non-functional Requirements:

Nil

Proposed Solution:

Whatever approach is selected for the data conversion facility (enhance existing conversion routines or obtain a COTS solution), the provision of additional data formats will require considerable investment to ensure that the facility can provide accurate and reliable conversion of the digital map data. Such investment must be carefully assessed against the revenue stream which will be generated from the availability of the new data. It is therefore recommended that whilst there is a recognised long term requirement to support all of the above formats, initially six data formats (the existing E00, ASCII, DGN, DWG, DXF and TIFF) are seen as essential and should be supported (please refer to REQ-D003 for the reasons of recommendation of these six data formats). ECW and MrSID format only support orthophoto data which is supplied from the corresponding unit of LandsD. For any other requested formats, the customers are expected to perform their own conversion making use of the six formats mentioned above.

2.3.2.7 REQ-SYS008 To maintain the customer and license details

Priority: High

Functional Requirement:

A facility is required to record and monitor customer and license details. A database may need to be established to:

- Store customer and license related information
- Provide searching facilities on customer and license information

It is also required to establish a log facility to record and manage those orders for digital map data which cannot be fulfilled immediately (i.e. not able to fulfil via either direct connection or Internet download).

Expect to have an interface with the Customer Profile and Sales Database already in place in LandsD.

Frequency of Use:

50 maintenance processes per day

Non-functional Requirements:

Nil

Proposed Solution

Customer and Sales Record Subsystem is required to handle and maintain the following information:

- Customer profile
- Order records
- Payment records
- Data license records
- Undertaking and cessation information from government consultants

This Subsystem should record and maintain the online ordering and payment activities. To streamline the workflow and avoid the management and maintenance of two similar systems/databases, the Subsystem needs to incorporate and enhance the existing Customer Profile and Sales Database. The following functions are proposed to be provided:

- Tracking the order fulfilment
- Monitoring license expiry
- Identifying which map sheets are currently held by customers and to determine whether the customers require updating

As customers have access to the functions related to ordering, therefore robust security, firewall, system resilience and disaster recovery should be considered.

2.3.2.8 REQ-SYS004 Provide enhanced range of data conversion tools for LandsD digital map data

Priority: High

Functional Requirement:

To provide data conversion tools that have the following characteristics:

- Support of wide variety of digital map data formats which are commonly used within Government and private sector
- Automate the conversion process
- Minimise the requirement for user maintenance on the conversion process

The data conversion tools should ideally support the following:

- Full and complete geometric and cartographic conversion between LandsD Arc/Info 7 data format and SDE, ESRI Export (E00), ArcView Shapefile and Ungenerate formats; Bentley DGN format (MicroStation, Geographics); Intergraph MGE, AutoCAD DWG, MAP and DXF formats; MapInfo MID/MIF ; Common raster formats (TIFF)
- Full and complete geometric and cartographic conversion between LandsD MicroStation J data format and Arc/Info Native, SDE, ESRI Export (E00), ArcView Shapefile and Ungenerate formats; Bentley DGN format (MicroStation, Geographics); Intergraph MGE, AutoCAD DWG, MAP and DXF formats; MapInfo MIF; Common raster formats (TIFF, ECW and MrSID)
- Proven support for full conversion of Chinese including Hong Kong Supplementary Character Set (HKSCS) between Big5, Extended Unix Code (EUC) and Unicode formats (ISO10646 standard)
- Support for both ad-hoc and automated batch mode data conversion
- Allow linkage to web technology to allow ad-hoc conversion to be launched from web applications
- Support conversion of selected features or layers within a file as well as the conversion of the entire file
- Automatic production of error log files
- Validation and verification functionality
- Establishment of a wide international user base and a secure upgrade path
- Record of the number of sheets converted daily and the time spent will be kept. Useful statistics can be drawn from these records for system management purpose.

Conversion tools must be based on a standard open operating systems and also provide a user friendly interface and help facility.

Frequency of Use:

Estimate 470 conversion processes for the updated digital map sheets per day

Non-functional Requirements:

Nil

Proposed Solution:

Two approaches can be considered in addressing this requirement:

(a) Current Developed Conversion Routines

Enhance the existing conversion routines to provide:

- Additional data formats (if required)
- Web enable
- Support automated data conversion process
- Provide error log and verification functionality
- Full data attributes and cartographic presentation

With this approach, it means that the benefit on the earlier investments of these routines will continue to be realized.

(b) Commercial Off-The-Shelf (COTS)

A Commercial Off-The-Shelf (COTS) spatial data conversion package could be adopted, which will provide error logging, web enable and automation conversion process.

The adoption of COTS technology will provide a more secure upgrade path than the present custom-built conversion routines, and would facilitate the support of a far greater range of data formats and versions. COTS conversion packages will still require considerable fine-tuning to ensure compatibility between symbol sets and fonts in different file formats. Function for verifying the converted data should be provided or added into the COTS solution.

The above mentioned two approaches will be investigated in the current study. Whichever approach is adopted, the approach should be integrated into digital map data dissemination process and should be able to provide an efficient and accurate automatic conversion of selected digital map data into a wide range of standard targeted data formats that need to support the up-to-date Multi-format Spatial Data Hub.

2.3.2.9 REQ-D003 Storage of LandsD digital map data in a number of commonly used formats

Priority: High

Functional Requirement:

The proposed system should be able to store LandsD digital map data in a number of commonly used formats. These multi-format digital map data should be kept up-to-date and consistent with the master set digital map data in CLIS. They will facilitate efficient extraction and dissemination of these formats to customers by overcoming the following issues:

- The need to undertake data conversion of the required digital map data when the data is ordered
- The limitation on the current disk storage in storing all the converted data formats
- Conversion of a single batch containing large numbers of files may prone to error and failure
- Complicates the quality control process as a separate conversion process is conducted on each request

Frequency of Use:

470 conversion processes for the updated digital map sheets per day

Non-functional Requirements:

Nil

Proposed Solution:

A Multi-format Spatial Data Hub is proposed to store the digital map data from the Source Spatial Data Hub in a number of commonly used formats which are ready to disseminate to customers. Only those updated layers in the Source Spatial Data Hub will be converted into the Multi-format Spatial Data Hub in batch mode on a daily basis to ensure data consistency. The request for the different formats of digital map data will be served directly from this Multi-format Spatial Data Hub.

To conduct the conversion on daily basis will minimise the number of files to be converted at any one time. Subsequently, this will reduce the time taken to complete the conversion process and reduce the risk of failure and errors. Routine Quality Assurance should be conducted to verify the result of the conversion routines and to ensure the quality of the multi-format digital map data.

The Multi-format Spatial Data Hub should be established only for the commonly used digital map data and formats. Based on the findings of interviews conducted in this study and the user survey from the LandsD project, "Consultancy Services to Enhance the Geographical Data Model", conducted by Atkins China Limited in 2000, the most commonly used formats are: AutoCAD (DXF, DWG) 49% , MicroStation (DGN) 40%, ESRI (E00) 35%, TIFF 13% and ESRI (ASCII) 7%.

According to LandsD statistics from October 2002 to September 2003, the percentage of data formats provided to the public and the Government Departments are as following table

	Government Departments	Public
ArcInfo Native	46%	1%
ArcInfo E00	23%	27%
DGN	26%	50%
DWG/DXF	4%	10%
ASCII	1%	10%
TIFF	0%	2%

It is therefore recommended that initially the Multi-format Spatial Data Hub should comprise of the following:

- B1000 - E00, ASCII, DGN, DWG, DXF
- B5000 - E00, ASCII, DGN, DWG, DXF, TIFF
- B10000 - E00, ASCII, DGN, DWG, DXF, TIFF
- B20000 - E00, ASCII, DGN, DWG, DXF, TIFF
- C1000 - E00, ASCII, DGN, DWG, DXF
- G1000 - E00, ASCII, DGN, DWG, DXF

Other formats should be considered when justified.

2.3.2.10 REQ-SYS006 Provide an efficient method in the automatic data conversion and extraction of required digital map data

Priority: High

Functional Requirement:

The proposed system should provide automatic loading of the requested digital map data to physical media for delivery

Frequency of Use:

50 data extraction processes per day

Non-functional Requirements:

Nil

Proposed Solution:

Establish automatic/semi-automatic digital map data extraction processes, to facilitate the dissemination of the requested digital map data to the customers via either Internet or leased line. The required hardware and network facilities to support this function will be identified in the Technical System Option.

Routines to process the extraction, validation and loading of digital map data to the physical media should be automated to improve the current manual process.

The technical solutions on automatic loading of digital map data to physical media will be needed for study in the Technical System Option. If no viable solution is found for the auto loading of digital map data, then the current manual practice will need to be continued.

2.3.2.11 REQ-SYS007 Provide a range of effective digital map data delivery and dissemination methods

Priority: High

Functional Requirement:

To provide an effective method to disseminate digital map data to customers.

The proposed system should allow delivery of data through the following methods:

- Download over the Internet
- Download through the GNET
- Direct connection to LandsD Multi-format Spatial Data Hub
- Delivery through HK Post Office or courier
- Counter Collection

This will overcome the following limitation with current dissemination arrangement

- Requirement for the customers to collect the digital map product from the sales counters
- Inconvenience arrangement to handle international order of digital map product
- Lower bandwidth on existing lease line connections which hinder the effectiveness of download
- Existing device will fail to meet the additional demands

Frequency of Use:

50 delivery processes per day

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system shall consider the following download options:

- Download over the Internet
- High speed direct connection to LandsD Multi-format Spatial Data Hub
- Delivery through HK Post Office or courier
- Counter Collection

### Internet Download

The ability to download LandsD digital map data over the Internet was identified as an important requirement by most users. Download facility should be integrated with the online ordering facility. Users will be able to identify and pay for the required data, and the system will select (from Multi-format Spatial Data Hub) those selected digital map data and download to the customers' computer system.

The size of data transmitted via the Internet remains relatively restricted as speed and volume of transmission will depend on server technology and the bandwidth currently available in the market. Therefore, to avoid unreasonable time delay in transmitting the digital map data via the Internet, restrictions on the quantity of digital map data to be downloaded in any one session will have to be imposed.

### Direct Connection via leased line

To provide direct connection to LandsD digital map data to allow customers to either retrieve data as and when required, or be sent by LandsD on a regular basis. With this approach, it should enable the customers to update their spatial databases more frequently.

Initially direct access to LandsD digital map data should continue to be restricted to large Government users, though the possibility of expanding it to large private sector users could be considered once the system has been fully established. (Large Government users and also consultants working for them will account for the vast majority of requests). LandsD will need to provide and maintain the required hub and routers. User departments should bare their own cost on the hardware set-up of their departments.

Dissemination of the digital map data over leased lines may consider the following two approaches:

- Push method – the proposed system would transmit only the updated digital map data in the required format to the specified customers over the leased line on a regular basis. This means that customers should have sufficient storage capacity to store the updates on the digital map data. With this method, it has the following advantages:
  - The number of external access to LandsD digital map data can be controlled
  - LandsD is in close control on what digital map data has been sent to customers
  - Ensure up-to-date digital map data is routinely downloaded to the customers, hence only the required amount of digital map data is provided to the customers
- Pull method – customers are able to download data on a request basis. This provides flexibility to the customer as to what and when they require to extract the digital map data. LandsD has limited control on what digital map data is requested and the frequency of request. In addition, the proposed system has to have a capacity to handle unexpected large number of requests of huge volume of digital map data at the same time.

The efficiency of both methods would be significantly enhanced if only the layers that had been modified were disseminated instead of on a static map sheet basis.

Postal and Counter Collection

Distribution on CD-ROM, tape and diskette should continue to be supported. This will be facilitated by automated/semi-automated extraction of digital map data and storing onto physical media (REQ-SYS006). As noted in REQ-SYS005, payment policy should be reviewed to include the charges of standard courier (only trustworthy courier should be considered) or postage. Counter collection service should continue to be available to cater for traditional demands.

2.3.2.12 REQ-SYS011 To provide regular updates to large private sector customers

Priority: Medium

Functional Requirement:

Updating the digital map data should be provided to large private sector customers, e.g. utilities and transport companies, on a regular basis by either through distribution of update media or direct connection to LandsD digital map data hubs. The proposed solution would improve the administrative procedure required for purchasing updated sheets by the private sector customers.

Frequency of Use:

20 regular update processes per day

Non-functional Requirements:

Demand for this requirement is apparent, but is linked to the cost of the overall package. It is anticipated that with the establishment of the Multi-format Spatial Data Hub (REQ-D003), the costs involved in LandsD to fulfil this requirement will reduce, however the costing needs to be carefully gauged prior to implementation.

Proposed Solution:

Updated digital map data should be provided on a regular basis to large private corporations which currently have large amounts of digital map data. These updates could be provided by means of electronic transmissions or CDROM. At this stage routine delivery of digital map data by LandsD, on a monthly basis for example, should fulfil current requirements.

In addition, a brief technical bulletin should be distributed by electronic mail to customers to maintain direct contact with licensed customers and to raise awareness of the information provided on the technical support web page. Current technical support telephone assistance should be maintained.

2.3.2.13 REQ-D004 Dissemination of digital data provided from other Government departments

Priority: Low

Functional Requirement:

The proposed system should be able to co-operate with other Government departments on sales and dissemination of digital data created by these departments.

Currently, customers also use other digital data created by other Government departments in conjunction with the LandsD digital map data. The provision of these digital data requires contacting individual responsible government department. It would be more efficient if these could be obtained from a single central source within the Government of HKSAR. LandsD currently agrees to distribute some of the data originating from other Government departments, namely PlanD Outline Zoning Plan (OZP) in hardcopy.

Frequency of Use:

10 ordering processes per day

Non-functional Requirements:

Requires the commitment of concerned government departments in order to proceed.

Proposed Solution:

The proposed system should cater for the dissemination of the digital data from other Government departments. The proposed system should cater for ordering, purchase and distribution of these data in a way similar to LandsD digital map data. However, LandsD should be only responsible for serving the digital data provided by the other Government departments and should not be responsible for the maintenance and updating of these data.

Initially, the proposed system can be setup to distribute Traffic Aids Drawing from Transport Department. As the enhanced dissemination system is established, it is anticipated that the demand from users for this requirement will increase (currently relatively low) and other Government departments will be able to consider this approach of providing the digital data to the general public.

2.3.2.14 REQ-D005 Dissemination of historical digital map data

Priority: Low

Functional Requirement:

The proposed system should be able to provide improved access to existing historical digital map data. Currently users requiring archived material need to make inquiries through direct contact with the sales counter.

Frequency of Use:

Rare

Non-functional Requirements:

Nil

Proposed Solution:

Demand for historical digital map data is small and it is suggested that the current procedures are sufficient to meet the requirement. However, if additional information on the availability of the historical information (both digital and hardcopy) should be provided, the LandsD existing web pages should be enhanced to contain this information.

2.3.2.15 REQ-SYS010 Provide facilities to renew license and maintain cessation information

Priority: High

Functional Requirement:

The proposed system should consider to provide the following facilities:

- Automatic issue of license
- Expiry reminders
- Renewal of license
- Handling of update fees
- Keeping track the undertakings and cessation information in using LandsD digital map data

Frequency of Use:

50 renew license and cessation maintenance processes per day

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system should provide the following facilities:

- Customers are able to view the status of their current license records online
- Customers are able to view the percentage of relative changes of each survey sheet from their last purchase
- Licenses and expiry reminders will either be generated and handled as current practice or issued automatically to the customers via electronic mail
- Customers should be able to renew licenses and data updating online
- Handle licence renewal and updating digital map data
- Allow to input, enquire, and print the information of Undertakings and Cessation
- Generate cessation reminder automatically to the corresponding Government departments to enforce the cessation clause after the completion of project by the Government consultants

2.3.2.16 REQ-SYS009 Provide technical support information to the customers

Priority: High

Functional Requirement:

The proposed system should consider the following:

- Provide information of existing products, proposed new products and other technical details to customers
- These information are to be maintained and updated on regular basis
- Improve the delivery mechanism on the provision of these information

Improving technical support information should overcome the following issues:

- Data dictionary available to customers is not kept up-to-date
- Limited information is provided to customers on the future development of digital map data in LandsD which may have impact on customers' business planning
- Increasing number of customers requiring support on technical issues which currently being handled by means of telephone calls. Subsequently, they are putting up pressure on the limited resources available in the LandsD

Frequency of Use:

550 browsing processes per day

Non-functional Requirements:

Nil

Proposed Solution:

The technical support web page(s) should be restricted to customers with valid licenses only. This web page(s) should act as a central point on providing the following information:

- Technical information about LandsD digital map data
- Allow read access to all up-to-date data dictionaries (access only allow to those customers that have purchased the original copy of the data dictionary and have a valid license)
- Detailed product descriptions
- Metadata – hyperlink to Metadata Catalogue System<sup>1</sup> (MCS)
- Future development, sales policy and products available from LandsD
- A Frequently Asked Question (FAQ) facility can be provided to handle the feedback on LandsD digital map data

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<sup>1</sup> Metadata Catalogue System is hosted in LandsD that facilitates the search of various metadata documents provided by Government Departments.

2.3.2.17 REQ-DAM001 Interface for CSU Data Provision from DO

Priority: Medium

Functional Requirement:

The proposed system should provide an upload facility for authorized DO to submit CSU data in batch via GNET/Internet. A user-friendly interface should be provided for the authorised DO to perform either single record upload or multiple record upload. The submitted data must conform to respective CSU specification. The status of the upload (whether successful or failure) will be displayed right after the completion of the upload process. For failure upload, corresponding error message will be displayed.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Useful contact point information such as telephone number of corresponding DO, DA and DU should be listed for access if help is needed.

Proposed Solution:

A web-based user interface would be provided for CSU data provision from DO and could only be accessed by authorized PDs. The interface would allow the DO to browse, attach or remove a file or a list of files for upload. It would accept XML, DGN, and E00 files in CSU format only and allow user to input data description information.

The upload process is activated by a 'Submit' button on client side's Internet browser. The recommended upload protocols are FTP or HTTP.

The captured file(s) would then be validated as describe in the "Validation for CSU Data Provision from DO" process. After the validation, the system will return an on screen acknowledgement for file received to DO as mentioned in the "Acknowledgement for CSU Data Provision from DO" process with the time stamp assigned in the "Validation for CSU Data Provision from DO" process.

2.3.2.18 REQ-DAM002 Validation for CSU Data Provision from DO

Priority: High

Functional Requirement:

The proposed system should provide the validation for the received CSU data file. Basic validation will be performed immediately after the data has been received. Then, the date and time will be stamped. This validation will validate the structure, Chinese characters sets, and syntax of the submitted data as per defined CSU specification and ensure that the submitted data is free from logical error for subsequent data manipulation.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The validation process is activated by the “CSU data provision from DO” process when a CSU data file has been received successfully. The data items, to be verified, include CSUID, date and time, ownership of the update fields etc. Those information related to the data structure, Chinese characters sets and syntax of submitted CSU data file(s) which could be extracted from the header of the available XML schema would also be examined.

Upon completion of the validation process, the system will assign a time stamp to the CSU submitted. If error occurred during the validation, the whole CSU file will be rejected and an acknowledgement will be returned to the DO who provided the CSU data.

According to the file format specification in DAM 3, the Chinese characters sets must be conform to Big5 or Unicode formats (ISO10646 standard). So, DO should conform to the format specification and perform necessary data conversion process before submitting the CSU data. It is assumed that the data conversion of Chinese characters for those CSU data provided by LandsD should be handled in the DAMin/DAMout module.

2.3.2.19 REQ-DAM003 Transaction Log for CSU Data Provision from DO

Priority: Medium

Functional Requirement:

The proposed system should be able to log the transaction and the activities of the received CSU data from DO. The transaction log will be kept for tracking records.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

Activity logs of all activities related to CSU data provision from DO which include validated, rejected, accepted and abandoned transactions would be logged in the system. The corresponding management or user reports generation function could then be provided by retrieving these records in accordance with specified criteria. The system should be able to handle the error logged by data validation process.

2.3.2.20 REQ-DAM004 Acknowledgement for CSU Data Provision from DO

Priority: Low

Functional Requirement:

The proposed system should provide acknowledged information after received CSU data from DO. Acknowledgement of received data will be sent to the sender if it is received properly, or special handling should be applied for errors detected. Therefore, the sender will be notified whether the data is submitted successful or failure right at the time after submission. If error occurred during data provision, DO should be notified with proper error message.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system would provide acknowledgement for CSU Data Provision from DO after validation. The acknowledgement is an online message to notify DO either the file transmission is successful or any abnormal case is detected with specified error message.

2.3.2.21 REQ-DAM005 CSU Data Manipulation

Priority: High

Functional Requirement:

The proposed system should be able to manipulate submitted CSU Data from DO. The manipulation includes matching each of the submitted record with the existing CSU record having the same CSUID, then updating that existing record with submitted data. For those CSU records without CSUID, the proposed system should provide facilities to handle the data of this kind. The data update would mean textual data update except when the data is from LandsD.

The proposed system should be able to manipulate submitted CSU from LandsD who could choose to interface the LandsD DDS with their - DAMin/DAMout, either to insert a new spatial record or delete the existing spatial record and update spatial entities accordingly.

Data validation should be included as a mandatory step in CSU Data Manipulation. This function should be able to validate updated CSU data by defined rules. The system administrator of DA is able to maintain the data ownership schema.

It will assign a time stamp for related field/s in every CSU record, when update process has successfully complete.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The CSU data manipulation process is a background update process activated on successful validation of the data submitted from DO.

Not only textual data, but also spatial data update through GIS applications connection is also supported. A Spatial Database Server is required to be established for storing both spatial and textual data. It is a RDBMS, capable to handle standard SQL and spatial query.

The system should be able to matching spatial data record and textual data from incoming XML with CSUID, and then update related textual data fields correspondingly. For those CSU records without CSUID, the proposed system should generate a temporary ID for the data submitted by the DO. LandsD should follow up accordingly on receipt of data with temporary IDs and process the data outside the system.

2.3.2.22 REQ-DAM006 Task Management for CSU Data Extraction

Priority: Medium

Functional Requirement:

The proposed system should be able to manage CSU data extraction by a schedule base control process. The CSU data Extraction process will be activated by the scheduled timetable of CSU delta data manipulation. A timetable planning function for CSU delta data production should be provided to allow system administrator of DA to plan and update the production timetable (minimum able to handle two years), based on the category of CSU and update frequency as user required. Furthermore, a rules definition tool is also available for administrator to define criteria for data extract process. For example, an incomplete CSU data will not be extracted.

Frequency of Use:

Category of CSU	Frequency
Building	12 times yearly
Lot	4 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The task management function is an organizer feature, with calendar like interface, for DA to plan or schedule the processing time and period for CSU data extraction activity which is described in the “Extract CSU Files to conform to file format standards” process.

It also provides planning aids tool for user:

- to input working calendar;
- to highlight available time slots of office hour and after office hour for selection;
- to plan by product category, office hour, public holidays, estimate process duration and production time interval automatically; and
- with time schedule-editing functions including insert, copy, delete, move and slide.

2.3.2.23 REQ-DAM007 Extract CSU Files to conform to file format standards

Priority: High

Functional Requirement:

The proposed system should be able to extract delta data from CSU Spatial Database Server and convert to CSU exchange formats according to DAM3 specification (E00 and DGN) file. The proposed system should also ensure the quality of converted CSU data (e.g. data loss, dislinkage of spatial and attribute data, etc.) on completion of data conversion. Those CSU files will be stored in delta data dissemination area for CSU Delta Data Dissemination. The data extraction and conversion should be an automatic process. The activated CSU data manipulation process should also support manual control in ad-hoc case, e.g. conversion to a format other than E00 and DGN under special circumstances.

The CSU file structure and standard were clearly defined by DAM already. All files output from data extraction function must conform to CSU of DAM.

Frequency of Use:

Category of CSU	Frequency
Building	12 times yearly
Lot	4 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The CSU data extraction process is a background process activated by the production timetable, which is scheduled in the “Task Management for CSU Data Extraction” process.

It will extract data from the Spatial Database and then converts the extracted data into the required CSU format files as recommended in the DAM3 specification.

DAM3 recommended the Standard File Formats for geospatial data exchange and the exchanges of CSU Data should conform to latest available recommended standard:

1. Arc/Info Coverage 7.0 (in Arc/Info Export Format, i.e. E00);
2. MicroStation DGN (two-dimensional) version 7.0 (with attributes stored in separated dBase IV Files);

Additionally, conversion of other data formats, such as SDTS, AutoCAD DWG/DXF and MapInfo TAB/MIF should also be supported. It could be either a stand-alone package or a translator bundled with the proprietary product, but must be customizable to meet the conversion requirements.

The package should be able to support data conversion via the said proprietary formats; and conduct the data conversion with high quality with respect to geometric accuracy of spatial

feature, correctness and completeness of features converted, correctness of attribute information associated with geometry converted. The linkage between graphic entity and attribute information must be maintained correctly and completely.

A data extraction record tracking function will keep track of the CSU data extraction process and provide basic information for data dissemination. The data extraction tracking record should contain usable information like category, data owner, date time of generation, numbers of record, and file size etc.

2.3.2.24 REQ-DAM008 Transaction Log for CSU Data Manipulation

Priority: Medium

Functional Requirement:

The proposed system should be able to manage data transaction between DO, LandsD DDS and DAMin/DAMout. A transaction log function should be provided to keep all data in and out activities. Error handling and logging functions also be provided for data manipulation process.

Frequency of Use:

Category of CSU	Frequency
Building	84 times yearly
Lot	60 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

Activity logs of all CSU data updated, extracted, converted, rejected, accepted and abandoned transactions during the "CSU Data Manipulation" process shall be logged. The system should be able to integrate with the error logged by data conversion program and related application software. The corresponding management or user reporting function shall also be provided to retrieve these records in accordance with specified criteria.

2.3.2.25 REQ-DAM009 Acknowledgement on receipt of data from DAMin/DAMout

Priority: Low

Functional Requirement:

The proposed system should provide acknowledged information on receipt of CSU data from DAMin/DAMout. Validation to be set rules on the format will be carried out. Acknowledgement of received data will be sent to the DAMin/DAMout server if it is received properly, or corresponding error message for the acknowledgement will be sent if errors detected.

Frequency of Use:

Category of CSU	Frequency
Building	12 times yearly
Lot	4 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system would able to provide validation check on the received CSU data from DAMin/DAMout. Acknowledgement message will be sent to the DAMin/DAMout server.

2.3.2.26 REQ-DAM010 Interface for CSU Data Dissemination to DU

Priority: High

Functional Requirement:

The proposed system should be able to provide CSU Delta Data Dissemination function for authorized DU to download the converted CSU standard formats (E00 and DGN) file.

The system should provide an up-to-date list of current CSU delta data to user. Time period and version of the delta data should be clearly stated to allow user to select delta data that needed to be retrieved. It also allows authorized DU to select items for download from the historical list manually. After authorized DU selected the items from the list, the system will generate CSU package file by the CSU files package module and produced a hyperlink of the file for download by authorized DU. Then, authorized DU can download the package file.

The CSU delta data listing function is also able to provide searching criteria for historical data. The system should provide options for display order of the list.

The proposed system should also be able to provide data dissemination on CSU ID and relevant textual attribute of each CSU for PDs if they require accessing the latest set of CSU ID to validate and to maintain the mapping between departmental information with CSU data set.

Useful contact point information such as telephone number of corresponding DO, DA and DU should be listed for access if help is needed.

Frequency of Use:

Category of CSU	Frequency
Building	60 times yearly
Lot	72 times yearly
Road Centreline	60 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system would cater for the dissemination of the manipulated CSU data from DO to authorized DU. A web-based interface with data selection lists are provided for authorized DU to choose the available CSU delta data and historical delta data for download. The data selection lists are retrieved from data extraction records mentioned in the “Extract CSU Files to conform to file format standards” process.

The data dissemination interface would allow user to search or sort the CSU delta data by above criteria. The proposed interface should provide a multi-selection list for user to select CSU delta data for download. A submission of user selection list is an order and the system would keep record for each order. The order record should contain usable information like order ID, DA ID, order date and time, order details, data format ordered by DU and a time

stamp at time of acknowledgement (REQ-DAM013) etc. Reporting function shall also be provided to retrieve these records in accordance with specified criteria.

The proposed system would also cater for the dissemination of XML format data with CSU ID and relevant textual attributes for PDs if required.

2.3.2.27 REQ-DAM011 CSU Files Package

Priority: Medium

Functional Requirement:

The proposed system should be able to prepare a file package method or function tools to package multiple files into a single file for download. The package file should be archived in a common format (e.g. ZIP) which allows let the end-user extract it back to original files easily. Terms and conditions on the use of CSU data as well as the copyright notice must be embedded in the package file and authorized users are required to accept them before the files can be decompressed from the package file. Checksum mechanism should be employed in the CSU packing feature for reconciling the number of files packed. The CSU packaging process will be based on the user selected items at the Interface for CSU Data Dissemination to pack those files into a single file, and then place it into the delta data dissemination area and provide a hyperlink for user to download.

Each download activity is treated as an order. A unique order ID will be assigned to every user request. The package process will be based on this order ID to name the package file by the system for user to download.

The entire download package files in delta data dissemination area will be removed, based on the expiry period defined system administrator of DA. So, scheduling functions for cleaning out-date download package files should be provided.

Frequency of Use:

Category of CSU	Frequency
Building	60 times yearly
Lot	72 times yearly
Road Centreline	60 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

As considering the size of download files for ordering and the loading of network traffic flow, a file packing function is recommended for CSU data dissemination to prevent the bottleneck that caused by network traffic flow. This function is aimed to reduce the size of CSU files for download and increase the efficiency of CSU data dissemination by packing those files into a single file.

The file packing process is activated by the “Interface for CSU Data Dissemination to DU” process and is based on the order detail information to pack files as request.

In addition, the file packing tool can also provide security functions and features. User can input a password in the data dissemination process and open the packed CSU data files upon receive. DA can also assign individual key or public key to DUs for CSU data retrieval.

2.3.2.28 REQ-DAM012 Transaction Log for CSU Data Dissemination to DU

Priority: Medium

Functional Requirement:

The proposed system should be able to manage transaction log on data dissemination.

A transaction log should be able to keep all data access activities. Every download activity by DU was treated as an order. System will assign a unique order ID for it. So, the package file for download is recommended to use the order ID as the file name. Also, we have to keep the log for every order transaction.

Frequency of Use:

Category of CSU	Frequency
Building	60 times yearly
Lot	72 times yearly
Road Centreline	60 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

Activity log of all CSU data dissemination ordered, rejected, accepted and abandoned transactions shall be logged. The system should be able to integrate with the error logged by file packing process. The corresponding management or user reporting function shall also be provided to retrieve these records in accordance with specified criteria.

2.3.2.29 REQ-DAM013 Acknowledgement for CSU Data Dissemination to DU

Priority: Low

Functional Requirement:

The proposed system should be able to provide acknowledgement on data dissemination.

The system will return an on-screen acknowledgement with date and time of acknowledge to DU and an e-mail acknowledgement with hyperlink of selected map data to DU for CSU Delta Data Dissemination. Error handling and logging functions for data dissemination process also be required.

Frequency of Use:

Category of CSU	Frequency
Building	60 times yearly
Lot	72 times yearly
Road Centreline	60 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

An acknowledgement function should be provided to send messages to predefined e-mail accounts of DU for the readiness of CSU data dissemination orders. The acknowledgement message contains order ID, packing status, hyperlink reference etc. This feature provides an alternative way for DU to download the ordered package again, in case of download failure.

2.3.2.30 REQ-DAM014 Generate Management Reports

Priority: Medium

Functional Requirement:

The following reports are required by DA, DO and DU to facilitate PDs to perform the monitoring activities.

1. Report for update frequency and number of records for each provision.
2. Report for successful / failure CSU data transfer.
3. Report for CSU data release delta versions and details.

Frequency of Use:

Report	Frequency
1.	24 times yearly for each accessible PDs
2.	48 times yearly for each data provision from DO
3.	24 times yearly for each accessible PDs

Non-functional Requirements:

Nil

Proposed Solution:

In order to facilitate monitoring CSU activities, the following reports would be provided:

1. Report for provision update frequency. (available to DA and DO)
2. Report for successful / failure CSU data transfer. (available to DA, DO and DU)
3. Report for CSU data release delta versions. (available to DA and DU)

2.3.2.31 REQ-DAM015 Generate User Reports

Priority: Medium

Functional Requirement:

The following reports are required by DA, DO and DU to facilitate PDs to monitor and administer users.

1. Report on User Information and Access Right for PDs.
2. Report on User Activities.

Frequency of Use:

Report	Frequency
1.	24 times yearly for each accessible PDs
2.	24 times yearly for each accessible PDs

Non-functional Requirements:

Nil

Proposed Solution:

In order to facilitate monitoring and administer user activities, the following reports would be provided:

1. Report on User Information and Access Right for PDs. (available to DA, DO and DU)
2. Report on User Activities. (available to DA and also available to DO if needed such as Lands Registry)

2.3.2.32 REQ-DAM016 Maintain Metadata of CSU

Priority: High

Functional Requirement:

The proposed system should provide metadata maintenance tools which could automate the metadata editing process. The generated metadata must comply with Federal Geographic Data Committee (FGDC) requirement or conform to the latest standard adopted by the HPLB.

The editing tools should also allow user to create, update and delete the CSU metadata while the descriptive metadata can be input manually. Updating the metadata will be synchronized with the change of spatial properties/contents of the CSU data and it will be an automatic process (e.g. increase in polygon count). The updated metadata of CSU data should then be automatically submitted to the MCS (i.e. trigger the metadata submission process of the MCS as if LandsD is a PD of the MCS). In addition, validation of the documentation of CSU metadata in compliance to the required standard should be provided.

Frequency of Use:

Category of CSU	Frequency
Building	12 times yearly
Lot	4 times yearly
Road Centreline	4 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

The proposed system shall provide an automated tool that facilitates maintenance (create, update and delete) of the CSU metadata. The tool shall also facilitate the production of documentation of each CSU metadata (Building, Lot and Road Centreline) conforming to American Society for Testing and Materials (ASTM) Specification, "Standard Specification for Content of Digital Geospatial Metadata" and the International Organisation for Standardisation (ISO) Standard on Metadata when it is formally launched and subsequently adopted by the Bureau. The CSU metadata documentation shall be updated automatically with the change of spatial properties/contents of the CSU data. Facility would be provided such that the submission of CSU metadata documentation to the MCS would be auto triggered on schedule basis (like the facilities provided for schedule-based CSU Data Extraction) and if procedure permits, facilities would be provided to allow auto log-in to the MCS and submission of updated CSU metadata documentation.

2.3.2.33 REQ-SYS012 Maintain code table and system parameters

Priority: Medium

Functional Requirement:

The proposed system should enable system administrator of DA to maintain the code table so that the system administrator can insert, update and delete the code table information.

The proposal system should also able to allow system administrator to define and maintain the system parameters such as retention period of the historical data, report printing frequencies, etc.

Frequency of Use:

2 times yearly

Non-functional Requirements:

Nil

Proposed Solution:

A function would be provided for system administrator, DA of CSU, to insert, update or delete relevant code table information.

2.3.2.34 REQ-SYS013 Synchronization of system date and time

Priority: Medium

Functional Requirement:

The date and time of the proposed system should be synchronized with the published date and time from the Hong Kong Observatory.

Frequency of Use:

Once per day

Non-functional Requirements:

The Hong Kong Observatory operates a Network Time Server to enable synchronization of computers with the Hong Kong Observatory standard time. The public can now access the time service through the Internet Time Server of the Observatory at [stdtime.gov.hk](http://stdtime.gov.hk).

Proposed Solution:

To make use of the time service, a system server supports NTP, SNTP, Time and Daytime Internet protocols would be established to connect the Internet Time Server of the Observatory and a synchronization software has to be installed on the system server. A list of popular synchronization software can be found at <http://www.ntp.org/index.html>.

Among these software, the following packages had been tested and confirmed to work with the Observatory time server:

- Dimension 4
- JSNTP
- Automachron

Developer can visit the Hong Kong Observatory Time Service page for more information: <http://www.weather.gov.hk/wservice/tsheet/timeserv.htm>.

### 2.3.3 Audit, Control and Security Requirements

#### 2.3.3.1 REQ-ACS01 Track login, logout and system details information

Priority: High

Functional Requirement:

The proposed system should be able to capture the user ID, login or logout date and time, and should allow the System Administrator to keep track the login, logout and system details of all users. Online enquiry and reporting functions should be provided to show all unsuccessful login attempts within a specified time range.

Only the System Administrator should have the authority to access these records. These records should be kept online for 3 months and kept in offline storage media for a further period of 21 months, making a total retention period of 24 months.

Frequency of Use:

Estimate 1 checking process for the audit log records per day

Non-functional Requirement:

Nil

Proposed Solution:

Activity log of all system login, logout, rejected, accepted and abandoned transactions shall be logged for audit trail. Reporting function shall also be provided to retrieve these records in accordance with specified criteria.

2.3.3.2 REQ-ACS02 Track activities of users

Priority: High

Functional Requirement:

The proposed system should be able to keep track of online activities such as user ID, function activated and updates transaction to the database. Online enquiry and reporting facilities should be provided to monitor the corresponding audit log records in full or by specifying criteria of user ID and date / time range.

Only the System Administrator should have the authority to access these records. These records should be kept online for 3 months and kept in offline storage media for a further period of 21 months, making a total retention period of 24 months.

Frequency of Use:

Estimate 1 checking process for the activities log records per day

Non-functional Requirement:

Nil

Proposed Solution:

Activity log of all system online , rejected, accepted and abandoned activities shall be kept for audit trail. Reporting and online enquiry function shall be provided to retrieve audit log records in accordance with specified criteria.

2.3.3.3 REQ-ACS03 Verify conversion errors encountered during data conversion process

Priority: High

Functional Requirement:

The proposed system should be able to verify the conversion errors encountered in data conversion process. It should prompt alert messages when a data conversion process fails to complete properly and permit online enquiry to monitor the corresponding error log records.

The data conversion error log should be able to keep online for 3 months and keep in offline storage media for a further period of 21 months, making a total retention period of 24 months.

Frequency of Use:

Estimate 1 checking processes for the each of conversion process per day

Non-functional Requirement:

Nil

Proposed Solution:

The proposed system should be able to automatically log the conversion failures or error in the error log, including job number, date, time, and file that failed. The proposed system should prompt alert when failure occurs. Online enquiry and reporting function will also be provided to retrieve and review error log records.

2.3.3.4 REQ-ACS04 Manage user accounts and access rights

Priority: High

Functional Requirement:

The proposed system should allow the System Administrator to maintain user accounts, system access rights for users and their corresponding accessible features by individual user/customer account and user/customer group. Each user/customer should have a user/customer profile such as user/customer id and user/customer title. Access control should be built according to different user/customer accounts and user/customer groups.

Furthermore, the proposed system should be able to manage CSU Data User accounts and their corresponding information includes user category, accessible CSU attributes and e-mail account for acknowledgement function.

Frequency of Use:

Estimate 1 maintenance activity for the user access right records per day

Non-functional Requirement:

1 to 3 user accounts will be provided for CSU DDS login for each PDs depends on the needs.

Proposed Solution:

Username and password shall be maintained in a database for authenticating users. Each user will be assigned a unique account ID for accessing the proposed system. Associated with each user account is a password which is used for authentication purpose. The system shall enforce the user to change his/her password on a periodical basis. Authority levels will be assigned to each user accounts to govern his/her access rights to the proposed system.

The advanced access controls offered in RDBMS shall provide referential and restricted access controls to the extent deemed mandatory by LandsD.

2.3.3.5 REQ-ACS05 Physical access and system security

Priority: High

Functional Requirement:

Access to the computer room in which proposed system located should be restricted to authorised personnel only. All the storage media including CD-ROM, magnetic tapes and cartridges, should be kept in a secure place.

Frequency of Use:

Estimate 1 checking activity for the security facilities per day

Non-functional Requirement:

Nil

Proposed Solution:

The system shall conform to the established ITSD guidelines and standards on computer room access and security.

2.3.3.6 REQ-ACS06 Provide secure measure on transmission of digital map data

Priority: High

Functional Requirement:

The proposed system should be able to ensure secure transmission of digital map data from LandsD to the customers. Digital map data being disseminated by the proposed system is valuable and should be protected. Data protection, encryption and security passwords should be provided.

Frequency of Use:

Estimate 1 checking activity for the security functions per day

Non-functional Requirement:

Nil

Proposed Solution:

The feasibility and cost implications of encrypting data transmitted over the Internet shall be considered in the Technical System Option. It is anticipated that dissemination on leased line and traditional media will not require special encryption facilities.

However, all the transmitted digital map data shall be encoded in with a unique tag for protection against illegal distribution.

2.3.3.7 REQ-ACS07 Monitoring of system performance and usage

Priority: High

Functional Requirement:

The proposed system should be able to include tools to produce statistics on CPU, memory, disk I/O, disk space utilisation and usage of database resources. This information can be used to analyse and identify any bottleneck and project the growth and usage of the proposed system.

The system should also provide reports on the network and system usage time on user basis that will help future system designs.

Frequency of Use:

Estimate 1 monitoring and 1 reporting activity for the system performance per day

Non-functional Requirement:

Nil

Proposed Solution:

General system performance and usage monitoring shall be considered in the proposed system.

2.3.3.8 REQ-ACS08 Perform system backup and archiving

Priority: High

Functional Requirement:

All data should be backed up to a reliable media on a regular basis. However, the Multi-format Spatial Data Hub is not suggested to be backup as it is suggested to reactivate the conversion routines by reconvertig the data from the Source Spatial Data Hub.

Frequency of Use:

Estimate 1 system backup process executed per day

Non-functional Requirement:

Nil

Proposed Solution:

All the data and system files should be backed up on regular basis. The Technical System Option will contain all the necessary hardware and software to undertake back up procedures. Back up procedures will follow LandsD and ITSD standards.

#### 2.3.4 Constraints List

A constraint list identifies any possible constraints and impacts to the system design and/or implementation of the proposed system.

##### 2.3.4.1 Use of Equipment

The proposed system should comply with the standards of the Government System Architecture (GSA). Existing hardware equipment will be utilised by the proposed system if applicable.

##### 2.3.4.2 Interface with Other Systems

The proposed system will need to interface with a number of external systems e.g. with CLIS and ideally the proposed ECLIS, 3<sup>rd</sup> party payment gateway and Customer Profile and Sales Database. It should also be noted that certain requirements will not be achievable until ECLIS is implemented. However, interim measure has been proposed for these requirements.

##### 2.3.4.3 Manual and Clerical Procedures

The proposed system may involve changes in administrative procedures and potentially pricing policy involved in data dissemination and delivery. Such changes could be significant if layer or feature level data delivery is adopted.

##### 2.3.4.4 Business Organisation and Policy

Departmental and other Government regulations will have to be conformed. As the system will be based on an Internet solution, the Electronic Transaction Ordinance should be adhered to. Also, the "Guidelines on Internet Gateway Security (G50)" by ITSD will have to be conformed before the on-line ordering and dissemination of CLIS and/or CSU data via the Internet can be realised.