Terms of Reference
For

Design, develop, deploy and maintenance of the eLand Registry Document Management System
(ICTA/GOSL/CON/QCBS/2017/21)

1. Introduction

The Register General's Department (RGD) which is operated under the Ministry of Home Affairs was initially established in 1864 with the purpose of registering lands and legal documents pertaining to properties. From 1867 onwards up to date this department is supposed to register Births, Marriages and Deaths of the Sri Lankan populace and thus operating with a view of safeguarding their fundamental rights.

While land registration processes are being carried out in 45 Land Registries that has been established on district level, the civil registration activities has been decentralized to all Divisional Secretariats (DSs) island wide.

The Government of Sri Lanka (GoSL) has recognized ICT as a tool, which the social integration, peace and growth can be fostered and the poverty could be reduced by the means of improving the reach and responsiveness of public services, to reduce transaction costs of businesses, making government more transparent, accountable and addressing the urgent needs of poverty - stricken communities and isolated regions.

2. Background

Currently there are 45 land registries across the country and it is estimated that over 20Mn land folios have been stored in those registries. Lawyers and Notaries are finding it difficult to find the land related information due to the problem of accessing registers and lack of space in land registries in general. Also safety of the registers against ageing, excessive handling, damages by termites and even by natural disasters is also an integral problems. Mass destruction of land documents due to terrorist of similar activities has been a general global issue. Removal of pages and alterations of records have also been longstanding problems and safeguarding these registers from such abuses also a critical requirement.

Therefore, Registrar General's Department with the technical assistance of ICT Agency of Sri Lanka (ICTA) to be developed a Document Management System for minimizing the problems.

3. Concise statement of the objectives

This project envisages to hire a firm for acquiring a robust and scalable Document Management System to achieve the below stated brief scope of services within a period of four (4) months, conforming to the industry standards, implementing, integrating with internal applications and providing support and maintenance for a period given under the scope of work.

a) To develop a solution that is capable to work as per the Scope of the Work.

b) To deploy the solution in the Lanka Government Cloud.

c) To train the users of all offices of related organizations as trainers.

4. Scope of Work

4.1 Conduct a system requirement study of the current and enhancement processes of the eLand Document Management System.

4.2 On completing the above, submit a requirement verification report to the review committee appointed by ICTA.

4.3 Study, design, develop, deploy and maintenance of Document Management System for Registrar General's Department of Sri Lanka, upon obtaining ICTA approval for the above point.

4.4 High level functions (not limited to) of the eLand Document Management System are;

√ Upload Folio

√ Data Entry Folio

√ Edit Folio

√ Delete Folio

√ Print Folio

√ Approve / Edit/ Reject Folio for Data Entry Users

√ Approve / Edit/ Reject Folio for Data Validation Users

√ Approve / Edit / Reject Folio for RGD Officers

√ Generate reports such as Uploaded, Data Entry, Audited and Deleted summary report

4.5 Consultant shall configure and setup server requirements including system certificates /security.(eg: SSL, HTTPS, etc)

4.6 Consultant shall request for required servers from ICTA to create the staging environment and production environment based on the deployment architecture.(Annexure D)

4.7 Once the servers are allocated for the project consultant shall create the staging environment and production environment for the system.

4.8 Upon obtaining ICTA approval for the above consultant shall carry out iterative design and development related activities in relation to each iteration such as use cases of the selected processes for the iteration, detailed design, prototyping, client approval for the prototype, test cases for detailed requirements, development, releasing of tested system for quality audits by the client in staging environment, training manual, user training, user acceptance test related support, development of test data, release note, deployment of the system in production environment.

4.9 All system deployment related activities shall be carried out by the consultant including server operating systems.

4.10 Implement the system in collaboration with the 'Software Process Audit (SPA)' consultants appointed by ICTA, or review committee and facilitate the SPA specified by ICTA. (Refer Annex C)

4.11 Maintain project source code in the ICTA Source Code Management system (SCM).

4.12 Maintain all issues in the Issue tracking system maintained by ICTA.

4.13 Consultant shall adopt a proper application release procedure to release the eLand Registry Document Management System to ICTA during the deployment in the staging / production environments iteratively.

4.14 Participate for Project Review Committee meeting and Project Implementation Committee (PIC) Meetings as a member.

4.15 Obtain User Acceptance (UAT) for the implemented processes iteratively.

4.16 Consultant shall deploy into production environment at Lanka Government Cloud (LGC).

4.17 Once the third iteration is completed in the staging server, shall be tested by SLCERT to identify system security vulnerabilities. The consultant shall fix all security related recommendation as per the report submitted by SLCERT.

4.18 Consultant shall provide support and maintenance services, from the date of launch to an agreed time period as system warranty period.

4.19 Consultant shall adhere to the Service Level Agreement, during the support and maintenance phase (SLA) indicated in Annex B.

4.20 Consultant shall adherence to e-Government Policy of Sri Lanka (Please refer– References section)

4.21 Adherence to Web 2.0 concepts, open standards and Service Oriented Architecture (SOA) principles.

4.22 Consultant shall adherence to LIFe standards (Please refer– References section)

4.23 Work collaboratively with ICTA and other stakeholder organizations

4.24 ICTA or its designated entity (end user) shall have the ownership rights to client specific components arising from the requirements specified in the DSRS.

4.25   The ICTA may consider shared ownership rights to such components provided there is a cost benefit to ICTA or its designated entity (end user) at the discretion of the ICTA.

4.26   ICTA or its designated entity (end user) should have the right to access, modify, further develop and enhance the system at no cost to ICTA or its designated entity (end user).

4.27   The evaluation and the selection of the successful Bidder will be based on Total Cost of Ownership to ICTA or its designated entity (end user).

4.28   The developer should refer the existing DSRS report (Annex E) as a supporting document and current requirements raised by the stakeholder organization to prepare a new specification by translating such current requirements into a software requirement specification and should prepare a new DSRS according to the current requirements.

4.29   Refer following Annexes which form a part and partial of the "Terms of Reference.

Annex A - Non-Functional Requirements
Annex B - Service Level Agreement (SLA) for Support and Maintenance Services
Annex C - Software Project Audit Process
Annex D – Proposed System Architecture of eLand DMS
Annex E – Existing Detail Software Requirement Specification (DSRS)

5. Final outputs, Reporting Requirements, Time Schedule for Deliverables;

Project duration is four (4) months including requirement Verification, designing, developing and deploying the system.

Consultancy firm is required to submit the following list of deliverables for the Design, develop, deploy and maintenance of the eLand Registry Document Management System.

No	Deliverables	Phase
5.1	Implementation Proposal 5.1.1 Inception report 5.1.2 Requirement verification report 5.1.3 Detailed project plan including QA test plan 5.1.4 Detailed Requirement specification to be completed iteratively 5.1.5 Implementing schedule 5.1.5 Acceptance criteria for the UAT and test cases for all use cases 5.1.7 Proper maintenance of issues in the Issue tracking System	Inception
5.2	5.2.1 Design and Architecture Document and to be updated iteratively (DSTD) 5.2.2 Data migration and integration plan (if applicable) 5.2.3 Release Management plan (including staging, production and support and maintenance)	Elaboration

	5.2.4 Proper maintenance of issues in the Issue tracking System	
5.3	5.3.1 Iteration one release note 5.3.2 Iteration two release note 5.3.3 Iteration three release note 5.3.4 Proper maintenance of source code in SCM for all three iterations 5.3.5 Proper maintenance of issues in the issue tracking System	Construction
5.4	5.4.1 Solutions deployment and installation guide 5.4.2 Online help and the User manual for back office application 5.4.3 Administrator Manual 5.4.4 Proper maintenance of issues in the Issue tracking System 5.4.5 Successful UAT acceptance of the system 5.4.6 Production deployment confirmation report	Transition

6. Preferred Qualifications of the Key Consultants

<u>Minimum Qualifications;</u>

- **System implementing team**

Key Professional Staff	Academic Qualification	Experience in the **PROPOSED ROLE**	Experience in working in SOA / web services / integration projects	Exposure SQA Process
Project Manager	B. Sc or equivalent	5 years	2 years	2 years
Software Architect	B. Sc or equivalent	3 years	2 years	2 years
Technical Lead	B. Sc or equivalent	2 years	1 years	2 years
Business Analyst	B. Sc or equivalent	3 years	1 years	2 years
Quality Assurance Lead	B. Sc or equivalent	2 years	1 years	2 years
Software Engineer	B. Sc or equivalent	2 years	1 years	1 years
UI Engineer	B. Sc or equivalent	2 years	1 years	1 years
QA Engineer	B. Sc or equivalent	2 years	1 years	1 years
DB Specialist	B. Sc or equivalent	3 years	2 years	1 years
IS Security Specialist	B. Sc or equivalent	3 years	1 years	1 years

▪ **Support and Maintenance team**

Key Professional Staff	Academic qualification	Experience in the **PROPOSED ROLE**	Experience in working in SOA / web services / integration projects	Exposure SQA Process
Technical Lead	B. Sc or equivalent	2 years	1 years	2 years
Software Engineer	B. Sc or equivalent	2 years	1 year	1 year

7. Services and Facilities Provided by ICTA

      7.1 Web-based access to the ICTA SCM system

      7.2 Designs of the existing system

      7.3 Access to staging/ production servers

      7.4 Issue Tracking System

      7.5 SQA dashboard

8. References

[1]   e-Government Policy Approved by Cabinet of Sri Lanka – http://www.icta.lk/index.php/en/e-governement-policy

[2] Lanka Interoperability Framework - http://www.life.gov.lk/

9. Review Committees and Review Procedures

The Software Development Service Provider is required to work closely with the ICTA Technology Team and the Software Process Audit (SPA) consultants or the review committees such as SAGE – Software Architecture Group of Experts.

All versions of deliverables will be reviewed by/either the SPA consultants, SAGE, or ICTA Technology Team.

All the deliverables must be verified and confirmed to be accurate and complete by the Project Implementation Committee (PIC) or the Project Management Committee (PMC). Deliverables must be formally endorsed by the PIC or PMC or CTO or Head of Technology Team.

Annex (A)
Non-Functional Requirements

1. Workflow based operations

A workflow is activated when an initiating event occurs. The workflow would guide a user in actioning an event. It would define the requirements to initiate a workflow. Once initiated, the processing should be controlled as to the sequence of activities, and the officers who execute it.

Some key terms and concepts of workflow based operations are:
- Task: Work performed to effect a single change. A workflow would consist of several tasks. In workflow construction, the task definition is a template for action. The task must be associated with an actual event in order to carry out the action.

- Activated Task: When an action is required, and a task is associated with a specific item which must be actioned, the task is instantiated and a single instance of the task is created. It is the instance of a task (ie- Activated Task) which can be executed. (Note: This is not a standard workflow term, and has been adopted for clarity).

- Work Item: A workflow-item moving through a work process. A work item would be associated with a single instance of a workflow, and Activated Tasks within the workflow.

  Refer Annexure A1.1 for more supporting services

2. **Security**
   1. User authentication and authorization
   An administrative application need to be developed wherever applicable.

   2. Availability
   The system should be developed to ensure "High Availability" to remain the system available all the time. (e.g. Portlets clustering capability should be taken into consideration in the development)

   3. Non-repudiation
   The system should ensure non-repudiation by having standard audit-trails and provisions to have WS-Security using digital signatures.

3. **Audit Facilities**
Wherever applicable, an audit trail of all activities must be maintained. On a service or operation being initiated, the system should log the event, creating a basic 'audit log entry'. It should not be possible for the operation to be executed without the log entry being made.

The information recorded in the audit trail depends on the type of activity which takes place. Each service would be responsible for logging detailed information. The different types of operations are -
   1. Data Capture & Maintenance
   2. Creation of an entry / item
   3. Modification an item
   4. Deletion
   5. Control (or status change)
   6. Process execution
   7. Data synchronization
   8. Print (only selected item)

9. Retrieval
10. Monitor

Detail logging may be enabled or disabled for each type of operation, and/or for each business object. It should be possible to configure which attributes of a data item should be traced at the detail level. Tracing of some attributes may be considered mandatory, and they should not be turned off.

4. Backup and Contingency Planning

The main contingencies that should be considered and the training with regards to these shall be given to the relevant staff -

11. Equipment failure
12. Physical / natural Disaster
13. Messaging or communication facilities.
14. Changes in operations and policy
15. Sudden absence of key personnel
16. Breach in Security

Automatic Backups daily, weekly and monthly should be taken. All the backup procedures and backups needs to be tested regularly for restoration.

5. Performance

Following performance criteria is provided as a guideline only. If the actual performance is falling below the stipulated figures, the consultant is to justify the reasons. However, the performance level must be accepted by the technical evaluation committee appointed by the client.

The bandwidth is assumed at 512kbps (shared) (point to point between LIX and the Department web service) with 1,000 concurrent users (50% load factor) in total.

Item	Performance
Screen Navigation: field-to-field	< 10 milliseconds
Screen Navigation: screen-to-screen	< 5 seconds
Screen Refresh	< 3 seconds
Screen list box, combo box	< 3 seconds
Screen grid – 25 rows, 10 columns	< 5 seconds
Report preview – (all reports) – initial page view (if asynchronous)	< 60 seconds in most instances. It is understood that complicated / large volume reports may require a longer period
Simple enquiry – single table, 5 fields, 3 conditions – without screen rendering	< 5 seconds for 100,000 rows
Complex enquiry – multiple joined table (5), 10 fields, 3 conditions – without screen rendering	< 8 seconds for 100,000 rows
Server side validations / computations	< 10 milliseconds
Client side validations / computations	< 1 millisecond
Batch processing (if any) per 100 records	< 120 seconds
Login, authentication, and verification	< 3 seconds
Daily backups (@ Dept.) – max duration	1 hour (on-line preferred)

Total Restore (@Dept) – max duration	4 hours

Annex (B)

SERVICE LEVEL AGREEMENT *for*
SUPPORT AND MAINTENANCE SERVICES

1. Introduction

The aim of this agreement is to provide a basis for close co-operation between the Client and the Consultant for support and maintenance services to be provided by the Consultant, thereby ensuring a timely and efficient support service is available. The objectives of this agreement are detailed in Section 1.1.

This agreement is contingent upon each party knowing and fulfilling their responsibilities and generating an environment conducive to the achievement and maintenance of targeted service levels.

1.1 Objectives of Service Level Agreements

1. To create an environment conducive to a co-operative relationship between Client, Consultant and Client's representatives (government organizations) to ensure the effective support of all end users.
2. To document the responsibilities of all parties taking part in the Agreement.
3. To define the commencement of the agreement, its initial term and the provision for reviews.
4. To define in detail the service to be delivered by each party and the level of service expected, thereby reducing the risk of misunderstandings.
5. To institute a formal system of objective service level monitoring ensuring that reviews of the agreement is based on factual data.
6. To provide a common understanding of service requirements/capabilities and of the principles involved in the measurement of service levels.
7. To provide for all parties to the Service Level Agreement a single, easily referenced document which caters for all objectives as listed above.

1.2 Service Level Monitoring

The success of Service Level Agreements (SLA) depends fundamentally on the ability to measure performance comprehensively and accurately so that credible and reliable information can be provided to customers and support areas on the service provided.

Service factors must be meaningful, measurable and monitored constantly. Actual levels of service are to be compared with agreed target levels on a regular basis by both Client and Consultant. In the event of a discrepancy between actual and targeted service levels both Client and Consultant are expected to identify and resolve the reason(s) for any discrepancies in close co-operation.

Service level monitoring will be performed by Client. Reports will be produced as and when required and forwarded to the Consultant.

1.3 Support Levels

The consultant must provide support and maintenance services during Support Levels

mentioned below;

Support Level: **High**
Component/ Service   Core Components of Lanka Gate
Support Hours   24 hours a day, all days in the week
                                        (including public and mercantile holidays)

Support Level: **Medium**
Component/ Service 1   Government Interface and related backend services (deployed at Government organization site)
Support Hours   From 08:00 AM to 05:00 PM Monday to Friday (excluding public holidays)

Component/ Service 2   For front-end portlets and supporting back-end applications (web services, etc.. deployed at Lanka Government Cloud (LGC))
Support Hours   From 08:00 AM to 09:00 PM, all days in the week (including public and mercantile holidays)

1.4   On-Call Services Requirements

Consultant MUST make at least ONE qualified personnel available to the Client by telephone and email for the reporting and resolution of non-conformities or other issues, defects or problems. Dedicated telephone numbers and emails should be available for reporting issues. Client will nominate the personnel who are authorized to report non-conformities or other problems with the system from the departments. Reporting of non-conformities includes requests by the Client to apply critical software updates or patches.

Table-1 shows the response priority assigned to faults according to the perceived importance of the reported situation and the required initial telephone response times for the individual priority ratings. All times indicated represent telephone response time during specified Support Levels. The indicated telephone response time represents the maximum delay between a fault/request being reported and a Consultant's representative contacting the Client by telephone. The purpose of this telephone contact is to notify the Client of the receipt of the fault/request and provide the Client with details of the proposed action to be taken in respect of the particular fault/request.

Support Level	Business Critical	Business Critical	Non-Business Critical	Non-Business Critical
	Fatal	Impaired	Fatal	Impaired
High	60 minutes within Support Hours	90 minutes within Support Hours	90 minutes within Support Hours	120 minutes within Support Hours
Medium	120 minutes within Support Hours	150 minutes within Support Hours	150 minutes within Support Hours	180 minutes within Support Hours

Table-1: Response Priority

Note:

Fatal   - Total system inoperability
Impaired   - Partial system inoperability
Business Critical - Unable to perform core business functions
Non-Business Critical   - Able to perform limited core business functions

Consultant notification can occur outside Support Level time, and thus the response may occur after the next Support Level begins. Furthermore, "Time to Arrive On-Site (Table-3)" starts from Support Level starting time and "Time to Resolve the Problem" is Support Level time starting from the actual time of arrival on site.

1.5   Problem Resolution and Penalties

If problems have not been corrected within two (2) hours of the initial contact, the Consultant shall send qualified maintenance personnel to the respective Client's site to take necessary actions to correct the issue reported (defect, problem or non-conformity).

If faults are not corrected within the time limits specified in the Table-2, the Client shall be entitled to a penalty payment for each hour that the Consultant fails to resolve the fault.

Maximum ceiling of penalty for a given month is 10% of the monthly support and maintenance price.

The time to arrive on-site is specified in the Table-3.

Support Level	Business Critical	Business Critical	Non-Business Critical	Non-Business Critical
	Fatal	Impaired	Fatal	Impaired
High	6 Hours LKR 5,000.00 per hour	10 Hours LKR 3,000.00 per hour	10 Hours LKR 3,000.00 per hour	15 Hours LKR 2,000.00 per hour
Medium	8 Hours LKR 5,000.00 per hour	12 Hours LKR 3,000.00 per hour	12 Hours LKR 3,000.00 per hour	20 Hours LKR 2,000.00 per hour

Table-2: Resolution Time and Penalties

Support Level	Business Critical	Business Critical	Non-Business Critical	Non-Business Critical
	Fatal	Impaired	Fatal	Impaired
High	Not applicable	Not applicable	Not applicable	Not applicable
Medium	2 Hours	3 Hours	3 Hours	5 Hours

Table-3: Time to arrive on-site

Annex C

Software Project Audit Process

Version 1.2

Information and Communication Technology Agency of Sri Lanka

1. Introduction

1.1 Purpose

Purpose of this document is to describe the Software Project Audit Process which is capable of auditing and ensuring the quality of different activities carried out throughout a software project life-cycle. The main purpose of this process is to provide much higher level of confidence in the quality of the deliverables received by the client from the developer. The quality level of the audited activity is presented using a measurement technique called metrics.

The process should be followed by both the development team and the Software Project Audit team to derive their own metrics to measure the quality status of a software product in its life cycle. Eventually, the trend analysis of such metrics can be used to identify any potential project issues or failures and to come up with solutions.

This document explains several guidelines which can be used within the audit process for project progress calculation and mapping payment milestones with project deliverables or and project artifact reviews to effectively manage the project.

Further, the document contrasts the Software Project Audit process from typical software development life cycle and illustrates how it has been automated by integrating several testing tools and testing methodologies as well as embedding best industry standards.

1.2 Scope

Scope of this document is to provide an insight about the Software Project Audit Process, importance of metrics, analysis of metrics, automated process of metric generation, skills required to generate certain metrics, guideline for project progress calculation, guideline for mapping payment milestones with deliverables and guideline for Review of Project artifacts.

1.3 Definitions, Acronyms and Abbreviations

Acronym	Definition
AQI	Architecture Quality Index
AD	Architectural Design
CQI	Code Quality Index
DD	Defect Density
DQI	Design Quality Index
DSI	Defect Severity Index
ISI	Issue Severity Index
PERI	Project Execution Readiness Index
RCI	Requirement Clarity Index
SPA	Software Project Audit
SR	Software Requirement
TTEI	Tasks Tracking Efficiency Index
TR	Transfer
UAT	User Acceptance Test
OAT	Operational Acceptance Test

2. Process Overview

It is often said that if something cannot be measured, it cannot be managed or improved. There is immense value in measurement, but you should always make sure that you get some value out of any measurement that you are doing.

What is a Metric?

It is a standard of measurement which can be used to measure the software quality. It gives a confidence in the software product. They are typically the providers of the visibility of the software product you need.

Why Measure?

When used appropriately, metrics can aid in software development process improvement by providing pragmatic, objective evidence of process change initiatives. Although metrics are gathered during the test effort, they can provide measurements of many different activities performed throughout a project. In conjunction with root cause analysis, test metrics can be used to quantitatively track issues from points of occurrence throughout the development process. In addition, when metrics information is accumulated, updated and reported on a consistent and regular basis, it ensures that trends can be promptly captured and evaluated.

What to Measure?

When considering the metric driven process, it can be divided into two parts. The first part is to collect data, and the second is to prepare metrics/charts and analyze them to get the valuable insight which might help in decision making. Information collected during the software development process can help in:

- Finding the relation between data points
- Correlating cause and effect
- Input for future planning

Normally, the metric driven process involves certain steps which are repeated over a period of time. It starts with identifying what to measure. After the purpose is known, data can be collected and converted into the metrics. Based on the analysis of these metrics appropriate action can be taken, and if necessary metrics can be refined and measurement goals can be adjusted for the better. Data presented by Development/testing team, together with their opinion, normally decides whether a product will go into client or not. So it becomes very important for Development team/test teams to present data and opinion in such a way that data looks meaningful to

everyone, and decision can be taken based on the data presented. Every software project should be measured for its schedule and the quality requirement for its release. There are lots of charts and metrics that we can use to track progress and measure the quality requirements of the release. In Figure 1.0 shows some of main metrics which can be derived at specific level of the software development life-cycle.
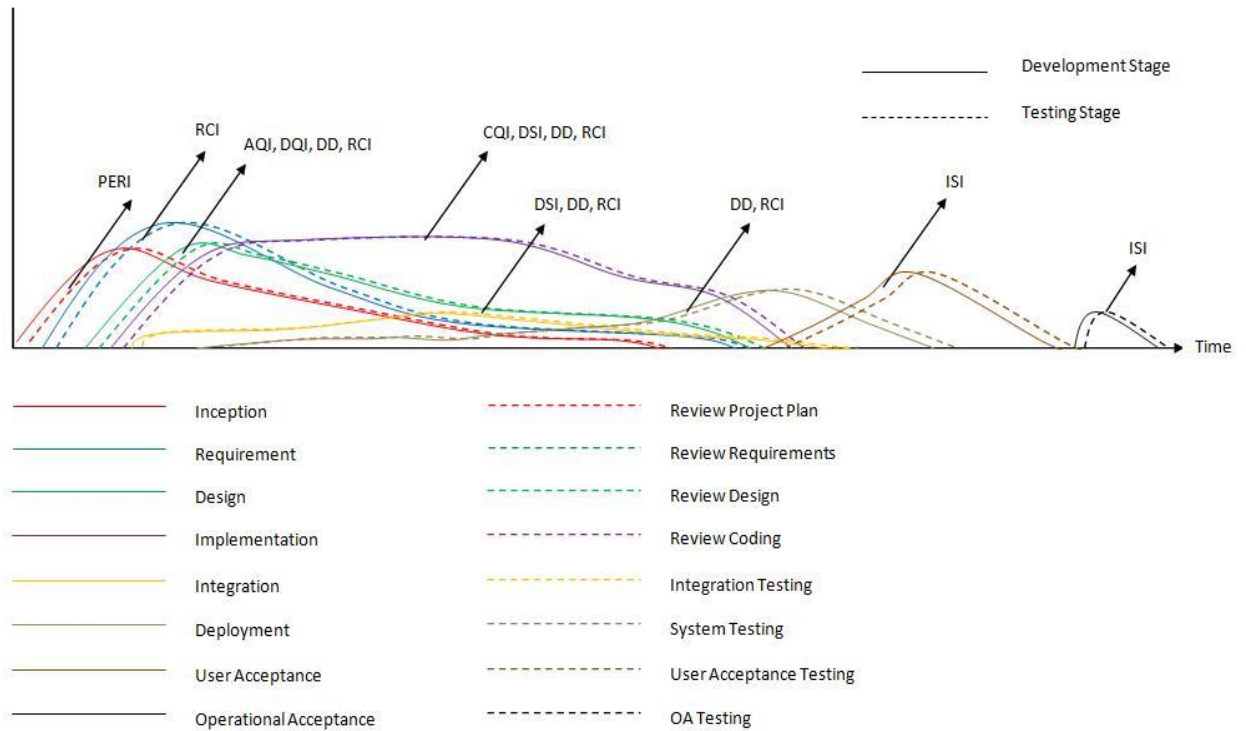

Figure 1.0 - Various Metrics derived at different levels of SD process

2.1 Metrics in Brief

Metric	Purpose
Project Execution Readiness Index (PERI)	This Proposed index at requirements stage is derived based on quality of the documents involve with this phase. The main Documents involve in this phase are; * User Requirements Document * Acceptance test plans * Project management plan for the SR phase * Configuration management plan for the SR phase * Verification and validation plan for the SR phase * Quality assurance plan for the SR phase When reviewing , reviewers can verify the document by checking its content with a checklist. Each of thesecontent in a checklist is categorized under their Severity to the System. All defects in those contents should be logged in a defect tracking system. Finally, index can be derived as; Weighted average of the total number of Open Issues in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$ Total weight (162+54+18+6+2+1) Note: Can be calculated based on the review cycles
Requirements Clarity/Change Index(RCI)	This index measures following two criteria relevant to requirements 1. Requirements Clarity This is the proposed index is at Specification Stage which should indicate how well each member of the Software development team comprehend the requirements and also indicates How well the requirements are cleared for Software Development Team. 2. Requirement Changes Requirement changes may be arisen at any stage of a project. Therefore, this index should be continued till UAT phase of a project and all the requirement changes arisen during that period should be captured under this index.

	The index indicates, weighted average of the total number of Open Issues in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$ Total weight (162+54+18+6+2+1) Note: Can be calculated based on the review cycles.
Architectural Quality Index (AQI)	Testing indicator for Architectural design level. The main documents of the AD phase are; *Architectural Design Document (ADD); *Software Project Management Plan for the DD phase (SPMP/DD) *Software Configuration Management Plan for the DD phase (SCMP/DD) *Software Verification and Validation Plan for the DD Phase (SVVP/DD) *Software Quality Assurance Plan for the DD phase (SQAP/DD) *Integration Test Plan (SVVP/IT) When reviewing , reviewers can verify the document by checking its content with a checklist. Each of these content in a checklist is categorized under their Severity to the System. All defects in those contents should be logged in a defect tracking system. Finally, index can be derived as; Weighted average of the total number of Open Issues in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$ Total weight (162+54+18+6+2+1) Note: Can be calculated based on the review cycles
Design Quality Index (DQI)	This is the Index proposed at Detailed Design Level. Should define a quality index (DQI) to measure and evaluate the quality of the Detailed Design based on the quality of the documents involve with the Detailed Design phase. The main documents of the AD phase are the; *Detailed Design Document (DDD) *Software User Manual (SUM) *Software Project Management Plan for the TR phase (SPMP/TR) *Software Configuration Management Plan for the TR phase (SCMP/TR)

	*Software Quality Assurance Plan for the TR phase (SQAP/TR) *Acceptance Test specification (SVVP/AT) When reviewing , reviewers can verify the document by checking its content with a checklist. Each of these content in a checklist is categorized under their Severity to the System. All defects in those contents should be logged in a defect tracking system. Finally, index can be derived as; Weighted average of the total number of Open Issues in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$ Total weight (162+54+18+6+2+1) Note: Can be calculated based on the review cycles
Code Quality index (CQI)	- Indicates how well the software codes are written and maintained. - To be derived using considering multiple aspects. This will be decided in project execution. - Index can be derived as; Weighted average of the total number of Open Issues in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$ Total weight (162+54+18+6+2+1)
Defect Density (DD)	- Number of defects per unit size of the application (KLOC) - Calculated end of each drop cycle. - The Number of Known Defects is the count of total defects identified against a particular software entity, during a particular time period - Size is a normalizer that allows comparisons between different software entities (i.e modules, releases, products). Size is typically counted either in Lines of Code or Function Points.
Defect Severity Index (DSI)	- Indicates application stability - Weighted average of the total number of Open Defects in the product detected till date against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\underline{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}$

	Total weight (162+54+18+6+2+1) Note: Calculated weekly and delivered by drop
Issue Severity Index (ISI)	During the User Acceptance Test(UAT) time issues can be arisen. All those issues should be logged in UAT documentation as well as in the bug tracking System. - Weighted average of the total number of Open issues in the product arisen during the UAT period against all categories (Blocker (B), Critical (C), Major (Ma), Normal (N), Minor (Mi), Trivial(T)). Metric: $\dfrac{(B*162 + C*54 + Ma*18 + N*6 + Mi*2 + T)*10}{}$ Total weight (162+54+18+6+2+1)
Defect Category	attribute of the defect in relation to the quality attributes of the product. Quality attributes of a product include functionality, usability, documentation, performance, installation, stability ,compatibility , internationalization etc. This metric can provide insight into the different quality attributes of the product. This metric can be computed by dividing the defects that belong to a particular category by the total number of defects.
Defect Cause Distribution Chart	This chart gives information on the cause of defects.
Defect Distribution Across Components	This chart gives information on how defects are distributed across various components of the system.
Defect Finding Rate	This chart gives information on how many defects are found across a given period. This can be tracked on a daily or weekly basis.
Defect Removal Efficiency	The number of defects that are removed per time unit (hours/days/weeks). Indicates the efficiency of defect removal methods, as well as indirect measurement of the quality of the product. Computed by dividing the effort required for defect detection, defect resolution time and retesting time by the number of defects. This is calculated per test type, during and across test phases.
Effort Adherence	As % of what is committed in contract. Provides a measure of what was estimated at the beginning of the project vs. the actual effort taken. Useful to understand the variance (if any) and for estimating future similar projects.
Number of Defects	The total number of defects found in a given time period/phase/test type

|	
	that resulted in software or documentation modifications. Only accepted defects that resulted in modifying the software or the documentation are counted.
Review Efficiency	# of defects detected /LOC or pages reviewed per day
Test Case Effectiveness	The extent to which test cases are able to find defects. This metric provides an indication of the effectiveness of the test cases and the stability of the software. Ratio of the number of test cases that resulted in logging defects vs. the total number of test cases.
Test Case Execution Statistics	This metric provides an overall summary of test execution activities. This can be categorized by build or release, module, by platform (OS, browser, locale etc.).
Test Coverage	Defined as the extent to which testing covers the product's complete functionality. This metric is an indication of the completeness of the testing. It does not indicate any thing about the effectiveness of the testing. This can be used as a criterion to stop testing. Coverage could be with respect to requirements, functional topic list, business flows, use cases, etc. It can be calculated based on the number of items that were covered vs. the total number of items.
Test Effort Percentage	The effort spent in testing, in relation to the effort spent in the development activities, will give us an indication of the level of investment in testing. This information can also be used to estimate similar projects in the future. This metric can be computed by dividing the overall test effort by the total project effort.
Traceability Metric	Traceability is the ability to determine that each feature has a source in requirements and each requirement has a corresponding implemented feature. This is useful in assessing the test coverage details.
Scope Changes	The number of changes that were made to the test scope (scope creep). indicates requirements stability or volatility, as well as process stability. Ratio of the number of changed items in the test scope to the total number of items
Task Tracking Efficiency Index (TTEI)	This index indicates the average time taken to attend to general project tasks. $$TTEI = \frac{\Sigma \text{ Time taken to attend task}}{\Sigma \text{ open task}}$$

Table 1.0 – Metrics

2.2 Metrics Analysis

Much as the time is spent gathering or maintaining metrics, enough time should be spent to review and interpret on a regular basis throughout the test effort, particularly after the application is released into production. During review meetings, the project team should closely examine all available data and use that information to determine the root cause of identified problems. It is important to look at several metrics, as this will allow the project team to have a more complete picture of what took place during a test.

Let's assume that as part of the SPA Process, the following metrics are collected by the SPA team.

Metric	Purpose
Defect Severity Index	Weighted average index of the Severity of defects. A higher severity defect gets a higher weight. S1 is a show stopper, S2 is high severity, S3 is medium & S4 is low. Ideally, this should slope down as test cycles progress.

For instance, if the test team has generated the following metrics:
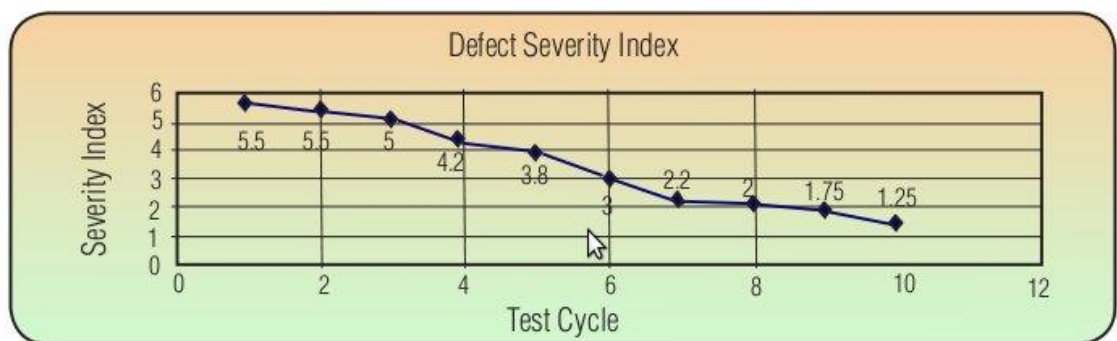
Lookinat the graphs one can safely deduce the followings;

Defect Severity Index Trend:

What does the graph indicate? The defect severity index is sloping down consistently. This indicates an increasingly favorable trend. As the test cycle progresses (from cycle 1 to cycle 10), the severity index is sloping which suggests increasing quality of the application (as lesser number of critical and high severity defects are being reported).

This is what it could mean: While a fall in the defect severity index is definitely a good trend, looking at this index in isolation could be misleading. Following factors need to be considered in order to have a meaningful analysis.

Number of defects logged - let us consider an example where the test team executed two cycles of testing (assuming other things as constant). The number of defects logged against each of these cycles along with the calculated severity index is shown below.

Number of Defects		
Defect Severity	**Cycle 1(# of defects)**	**Cycle 2(# of defects)**
s1	5	5
s2	10	15
s3	50	30
s4	100	100
Severity Index	1.52	1.50

At first thoughts, when we compare cycle 1's Severity Index with cycle 2's Severity Index, cycle 2 looks to be favorable (as the severity index is lower). If you go into the details of the number of defects logged and their severity, the picture turns out to be the opposite. While the total number of Severity 1 and Severity 2 defects for cycle 1 is 15, the number of Severity 1 and Severity 2 defects for cycle 2 is 20. In terms of quality, cycle 1 is better than cycle 2 as cycle 1 has lesser number of high severity defects (though the total number of defects logged in cycle 1 is more than cycle 2 defects and the severity index is greater than cycle 2 severity index). Test coverage has a similar impact. A lower test coverage coupled with reducing severity index would not be a healthy trend.

Severity of Defects		
Defect Severity	**Cycle 1(# of defects)**	**Cycle 2(# of defects)**
s1	4	0
s2	4	0
s3	42	75
s4	27	2
Severity Index	1.81	2.03

- Defect Severity - let's consider another example where the test team executed two cycles of testing (assuming other things as constant). The severity of defects logged against each of these cycles along with the calculated severity index is shown below.

Looking at the severity index, it looks like cycle 1 is better than cycle 2 (as the severity index is low for cycle 1 compared to cycle 2). However, cycle 2 is better than cycle 1 as total number of Severity 1 and Severity 2 defects is zero compared to a total of 8 severity 1 and severity 2 defects of cycle 1. Just because the severity index is low, do not believe the quality of the application is better than the earlier cycle.
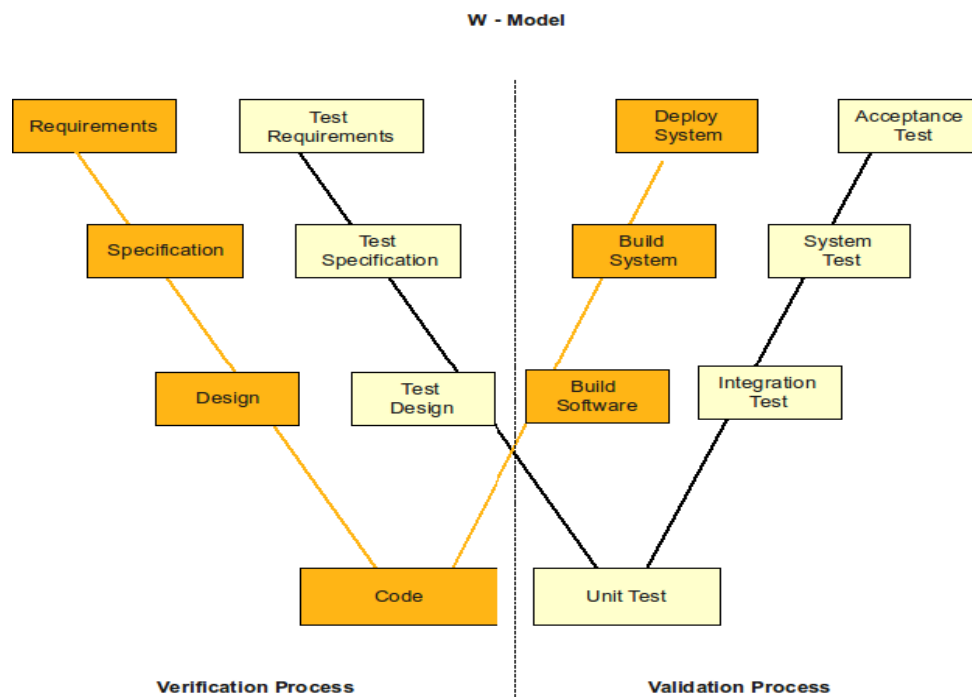
3. Process Automation

In following section describes about the testing methodologies, process and tools to be used while automating the typical software development life-cycle in order to deriving the metrics.

3.1 Testing Methodology

According to the Automated testing process, every development activity is mirrored by a test activity. The testing process follows a well-proven testing methodology called W-model. Following Figure-2.0 explains, the way of testing activities of W-model involve with the standard software development life-cycle.

W - Model

Requirements   Test Requirements   Deploy System   Acceptance Test

Specification   Test Specification   Build System   System Test

Design   Test Design   Build Software   Integration Test

Code   Unit Test

Verification Process   Validation Process

While the execution of the project, either developers or SPA team can generate the related metrics.

3.2 Skills required to generate Metrics

During the different stages of a software project, several roles and parties will be involve with development, reviewing and testing activities. In Figure 3.0 shows the different stages of a software project, the main activities which should perform during those stages, the roles/parties should involve and the metrics which derive and maintain in those stages.

Stage	Inception	Requirements	Architecture	Detail Design	Coding	Testing	System Integration	UAT	OAT
Activity	Review Test Plan & Project Plan	Requirement Verification	Architectural Review	Detail Design Revview & Review Test Cases	Code Review	Unit Testing & Functional Testing	Performance Testing, Integration Testing & Security Testing	User Acceptance Testing	Operational Acceptance Testing
Index	PERI	RCI	AQI & RCI	DQI, DD & RCI	CQI, DSI, DD & RCI	DSI, DD, RCI & UT Report	Perfoamnce Test Results, Security Test results	RCI, ISI & UAT Report	ISI & OAT Report
Skills Required	QA Lead	Business Analyst & Architect	Architect	Designer & Architect	Code Reviewer	QA Team & Code Reviewer (Engineers)	QA Team / Engineers	Project Owner(Client)	Project Manager

Figure 3.0 - Skills required to generate Metrics

3.3 Process of Setting-up a Metric

The Figure-4.0 explains the life-cycle of a Metric or the process involved in setting up the metrics:

Iterative
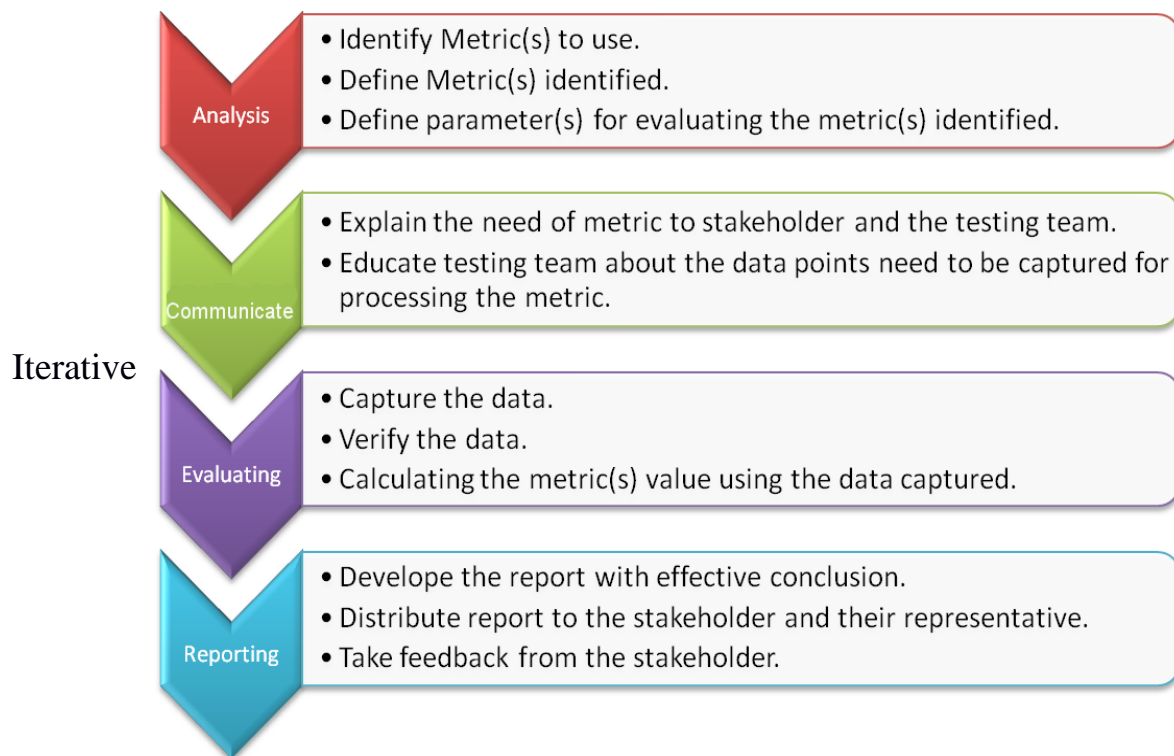
Figure 4.0 - Metrics Life-Cycle

When implementing this process, several testing tools and techniques will be used along with the automated testing process in order to generating, maintaining and evaluating the metrics derived at specific level of the Software development life-cycle.

3.4 Integration of testing tools/process

Below you find a list of tools /process which will be used when automating the typical SD life-cycle suits to the Software Project Audit Process.

- **Fagan inspection -** Fagan Inspection defines a process as a certain activity with a pre-specified entry and exit criteria. Activities for which Fagan Inspection can be used are:

1. Requirement specification
2. Software/Information System architecture (for example DYA)
3. Programming (for example for iterations in XP or DSDM)
4. Software testing (for example when creating test scripts)

- **Cruise Control –** It is both a continuous integration tool and an extensible framework for creating a custom continuous build process. It includes dozens of plug-ins for a variety of source controls, build technologies, and notifications schemes including email and instant messaging. A web interface provides details of the current and previous builds.

- **Bug-zilla -** It is a Web-based general-purpose defect tracking and testing tool.

- **SVN -** It is a revision control system which use Subversion to maintain current and historical versions of files such as source code, web pages, and documentation.

- **Git -** Git is a **free & open source, distributed version control system** designed to handle everything from small to very large projects with speed and efficiency.

- **SCM -** For Configuration identification and Identifying configurations, configuration items and baselines. Also for Configuration control ,Configuration status accounting and Configuration auditing
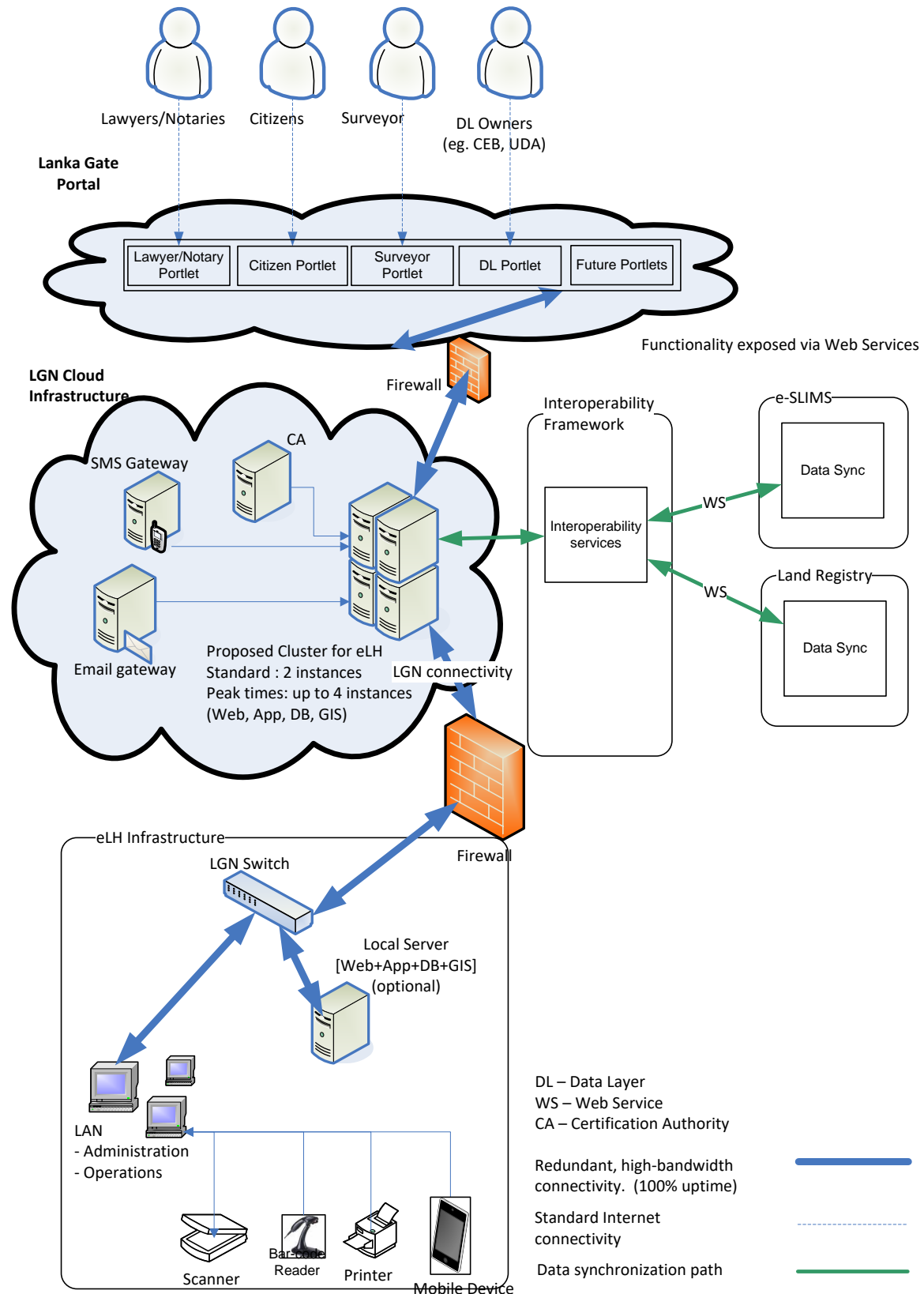
3.5 Displaying Metrics –The Dashboard

The Dashboard is the interface to help project teams to visualize their project statuses by several indexes. And also it could be used to displaying the test results of specific tests carried by the SPA team who responsible for the given project. As an example; in Figure 5.0 displays the current status of the project with its estimated effort against the predicted effort.

Figure 5.0 – SPA Dashboard view

Annex D – Proposed System Architecture

Lawyers/Notaries   Citizens   Surveyor   DL Owners (eg. CEB, UDA)

Lanka Gate Portal

Lawyer/Notary Portlet   Citizen Portlet   Surveyor Portlet   DL Portlet   Future Portlets

Functionality exposed via Web Services

Firewall

LGN Cloud Infrastructure

SMS Gateway

CA

Email gateway

Proposed Cluster for eLH
Standard : 2 instances
Peak times: up to 4 instances
(Web, App, DB, GIS)

LGN connectivity

Interoperability Framework

Interoperability services

WS

WS

e-SLIMS

Data Sync

Land Registry

Data Sync

Firewall

eLH Infrastructure

LGN Switch

Local Server
[Web+App+DB+GIS]
(optional)

LAN
- Administration
- Operations

Scanner   Barcode Reader   Printer   Mobile Device

DL – Data Layer
WS – Web Service
CA – Certification Authority

Redundant, high-bandwidth connectivity. (100% uptime)

Standard Internet connectivity

Data synchronization path

Configurations of server instances
Web Server instance
OS: an Enterprise level OS (Linux)

- RAM 4GB (720 RAM Hours per month)

- Storage 10GB per month (OS + Application Server + caching etc)

- Required Qty: Standard Months ☐ 1, Peak Months ☐ 2

Application Server instance
- OS: an Enterprise level OS

- RAM 8GB (720 RAM Hours per month)

- Storage 10GB per month (OS + Application Server + caching etc)

- Required Qty: Standard Months ☐ 1, Peak Months ☐ 2

Database Server instance
- OS: an Enterprise level OS

- RAM 16GB (720 RAM Hours per month)

- Storage 1000GB per month (OS + Database Server etc)

- Required Qty: Standard Months ☐ 1, Peak Months ☐ 2

GIS Server instance
- OS: an Enterprise level OS

- RAM 16GB (720 RAM Hours per month)

- Storage 1000GB per month (OS + Database Server etc)

- Required Qty: Standard Months ☐ 1, Peak Months ☐ 2

Annexure D

eLand Register

Software Requirements Specification (DSRS)

Version <1.6>

Revision History

Date	Version	Description	Author
08/Apr/2013	1.0	DSRS	Samagi

Table of Contents

Software Requirements Specification (DSRS)

1. Introduction

The initial requirements in relation to the eLand Registry are gathered and specified in this document according to the Unified Process standards. The 'Detailed Software Requirement Specification' (DSRS) is the core document which represents software requirements such as functional requirements and nonfunctional requirements, diagrammatically as well as descriptively.

1.1 Purpose of the Document

The 'Detailed Software Requirement Specification' (DSRS) provides functional requirements of eLand Register solution and nonfunctional requirements, external relationships and other factors to provide a comprehensive set of requirements to design a suitable solution. The DSRS serves as the input document for the system architecture and system design disciplines of the Rational Unified Process (RUP) model. Therefore, the DSRS plays a major role to provide accurate requirements to develop the system architecture of the eLand Register solution.

1.2 Scope of the eLand Register Solution

1.2.1 Scope Definition

This DSRS document was prepared to define the functional requirements of the Automated Land Register which is to be implemented at government Land Registries.

The following requirements were identified as the key functional requirements of the required searching Land Register system

a) Provide for Search facilities based on the scanned pages of the Land Register

b) Registration of documents relating to a land

c) Searching a land based on both scanned and subsequently captured transactions (searching at the Land Registry and searching from a remote site).

d) Printing of land scanned images and details of the subsequent transactions in relation to a specified land.

1.3   The Actors of the envisaged system

No.	Actor	Description
1		
2		
3		
4		
5		
6		

1.4   Definitions, Acronyms, and Abbreviations

Please refer to glossary document to find definitions and acronyms.

1.5 Overview

The following sections of this document explain details requirements of the Land Record Management System. The requirements are represented using diagrammatic tools and techniques relating to the Unified Process. The supplementary requirements section explains about non functional requirements of the solution.

2. Overall Description

Land is a limited resource, and it is the most valuable resource a country has. Optimum utilization of land is essential for development activities. In Sri Lanka context, land is very close to the lives of people and they have a unique relationship with lands. Sri Lankans are proud to own a land of their own. Therefore, eLand Registry program paves them a way to elevate their living standards by utilizing the land which is so much close and clear to them.

Issues related to Land ownership has been longstanding barriers for utilization of land as a tool for generating capital. Bim Saviya and delays in this search due to difficulties to access registers, lengthy searches and lack of space to work in land registries has been an obstacle for the program.

2.1 Current Status and Key Problems

1. Currently there are approximately 47,000 number of land registers across the country and it is estimated that over 20M deeds have been stored in those registries which contains 14 million folios and approximately 70 million transactions..
2. Difficulty in managing the registers and issuing them as may be required by the notaries and lawyers.
3. Information seekers requesting for the same register at the same time.
4. Lawyers and Notaries are faced with the problem of lack of space in land registries.
5. Ensure safety of the registers against ageing, excessive handling and damages by termites.
6. Damages caused by natural disasters and Acts of God.
7. Removal of pages and alterations of records also has been a longstanding problem and safeguarding these registers from such abuses also an important activity.
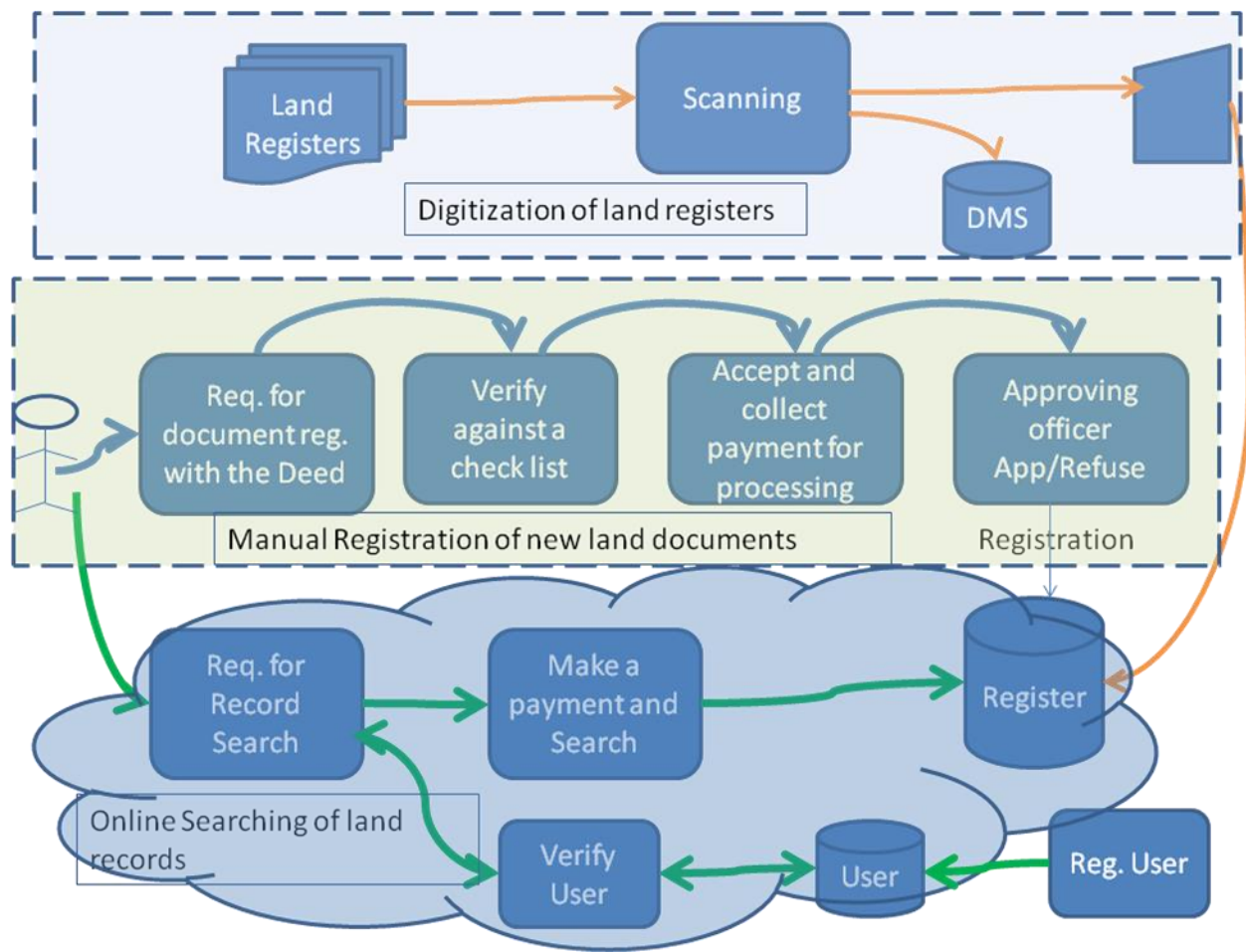
2.2 Objectives and Goals of the system

Objective of eLand Register System is to provide a solution to the above issues and to ensure convenient access to land registers, registration information, facilitate development of land information while the safety of documents and providing a speedy and more convenient and economical service to general public and other government organizations. Elevating the position of Sri Lanka in the doing business indicator by improving access to land registration information is also an important objective of this program.
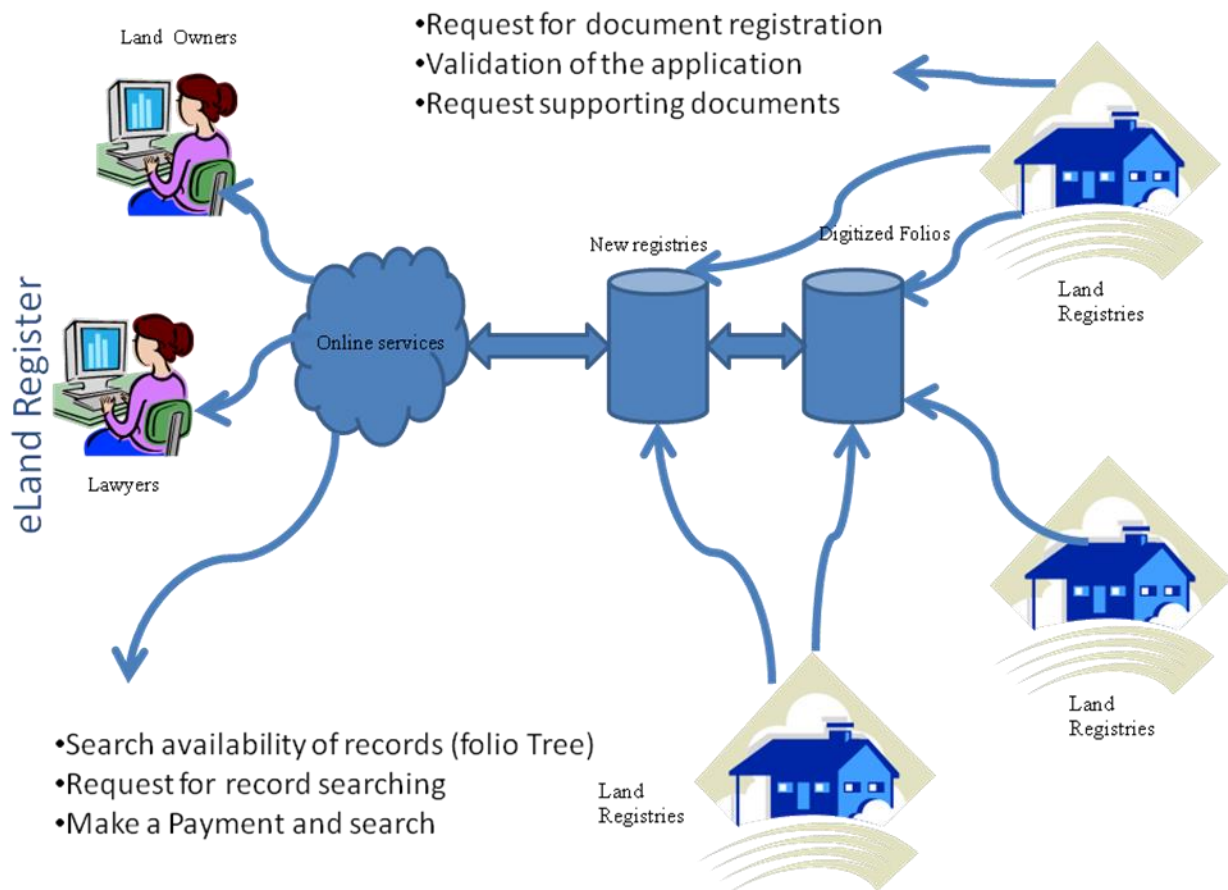
3. High Level Use Cases

BPR Sub-Process	Use Case ID	Use Case Name	Use Case Description

4. Specific Functional Requirements

This DSRS document describes the first layer which has been highlighted in red colour box.

Land Owners

- Request for document registration
- Validation of the application
- Request supporting documents

New registries   Digitized Folios

Online services

eLand Register

Lawyers

Land Registries

Land Registries

- Search availability of records (folio Tree)
- Request for record searching
- Make a Payment and search

Land Registries

4.1 *Use case: User Registration (A1)*

Use Case ID:	A1	
Use Case Name:	User Registration	
Date Created:		Date Last Updated:
Actors:		
Description:		
Preconditions:	Availability of historical records	
Normal Flow:	1. The Administrator who is responsible for maintaining the User profile will create User profiles in the System.	

	2. Each User profile will require filling the essential fields when completing the registration process. Essential fields differ from the base year of Land registry. (**Note:** Essential fields; *Province, District, Land Registry, Land Registry Division, Division.*)

	3. Based on the each specific field, Users will inherit specific user roles; restrict functions (***Scanned, Searched data entry etc.***), access privileges predefined by the system. (**Note:** Every specific user roles should be identified other than mentioned above.) (**Note:** Every user restricted to access for particular land registry) (**Note *(Ex)*:** *User roles*
	     o System Admin
	       ▪ Folio Uploading (Local)
	       ▪ Data Entry (Local)
	       ▪ Report Generating (Local/Global))

	4. Once User has created, System will send an email, indicating User register conformation and password to the person who is registered on the System.
	5. End.
Post conditions:	Verification is successful, log file is updated properly

4.2 *Use case: Document uploading (A2)*

Use Case ID:	(A2)
Use Case Name:	Document uploading
Date Created:	Date Last Updated:
Actors:	
Description:	
Preconditions:	Registered users only
Normal Flow:	1. The User who is interest in uploading a file will login to the System using Username and Password.

2. Once User login to the system, User can upload the scanned documents to the system. (**Note:** Scanned documents can be saved as **'TIFF'** file format. Other formats are not acceptable by the System.)

3. Based on the base year of the scanned document User will get two options to select before upload the scanned documents. (**Note:** This information will capture to maintain the convenient of search result)

    a. Patthu, Korale Type of Volume

    b. Divisional Secretariat Type of Volume

4. **User will compress the scanned document to 'ZIP'** file format and rename it using predefined rename method when compress the scanned document it should contain scanned document related to only one volume. (**Note**: Refer *Use case A2.7*)

    Note:

       1. Name of the ZIP file : **LRD** + **Volume NO:**

       (ex:1-1-1-1-560)

              LRD Volume NO:

       2. Format of the LRD code (ex:1-1-1-1)

           1- **Province**

           1- **District**

           1- **LR**

           1- **LRD**

       3. System should only accept **ZIP** format in compressing scanned documents.)

5. User will be properly instructed before the file uploading about the compressing method and file hierarchy. (**Note:** User should

maintain file hierarchy system for the scanned documents in user side, but when uploading the documents user only update the **ZIP** file to the system.)

6. User uploads the compressed file. (**Note:** If the compressed file has renamed incorrectly, system will reject the upload and send the error message.)

7. System will use the master data file to map the scanned documents. System will identify the document using a code which assign to the document. This code will consist of **_Province, District, Land Registry and Land Registry Division_** (**Note:** Refer Use case **4.7** , Figure **8** and Figure **9**)

8. System will read the name of the **ZIP** file and create relevant folder structure and upload it to the relevant folder in the file hierarchy which is maintaining in the system. (**Note:** File structures for the creating user location and storing images as follows.

    a) **_Folio structure_**: Province → District → Land Registry → Land Registry Division → Volume → Folios
    (**Note:** Refer *Figure 1*)

9. System will automatically update the certain set of data field by use of ZIP file name and type of the scanned documents. (**Note:** Extracted data fields are : *Division, Volume, Patthu, Korale Type of Volume* or *Divisional Secretariat Type of Volume*)

10. System will map the data according to folder structure and upload to the folder hierarchy. (**Note:** Refer *Figure 2* and **Use Case 4.7**)

11. **End.**

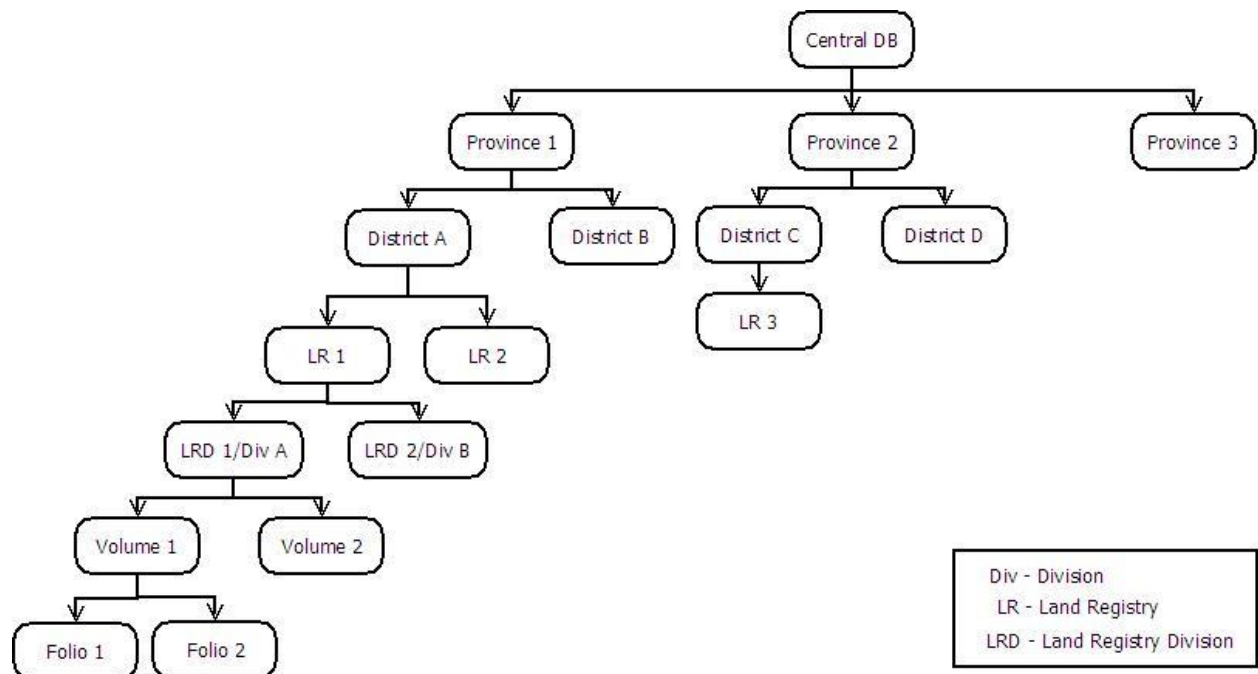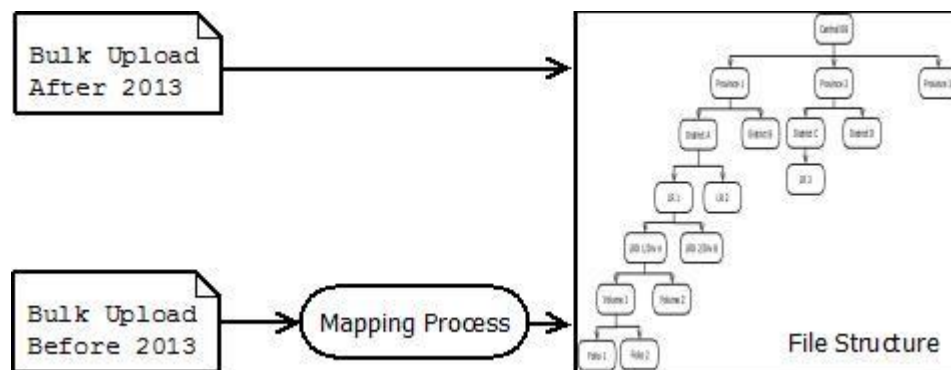|	
Post conditions:	Login out or termination of the session and log file is updated properly

Figure 1: Folio Hierarchy for File Uploading

Figure 2: Mapping Process

4.3 *Use case: Data Entry (*A3*)*

Use Case ID:	A3	
Use Case Name:	Data Entry	
Date Created:		Date Last Updated:
Actors:		
Description:		
Preconditions:	Related request information should be updated in the log file	
Normal Flow:	1. User Responsible for Entering data will login to the system 2. User will seek for the scanned documents in the system for entering remain data by using search criteria. (**Use Case 4.4**) 3. System will fetch image from the system to user screen to add details to the system. (**Use Case 4.5**) 4. Once System fetch the image system will fetch the pre-entered data to the relevant fields, which has been filled by the User already in Use case **A1.2** 5. User will add remaining META data to the system. (**Note:** In this scenario User will add *geo coordinates* (Latitude and Longitude of a Point) other than the typical Locational information) 6. User Responsible for entering data should enter the data to the System. (**Note**: Complete list of Data Elements are listed in under *Annexure 1.*) 7. Upon completing META data into the System, System will generate 'Record ID' for each record sets. • **Parameters for Unique ID**: Land Registry(2), Land Registry Division(2), Volume (4), Folio(3), Random Number(2) (**Note:** Folio Number will vary according to title reference up to **7** digits, Refer *Figure 3*) 8. **End**	

	(Note: All Mandatory data fields, Search options, Menu options should identified.**)**
	Modifications – 2014/04/10
	1. Data entry user should be able to select the volume first to select the folios from the folio list
	2. Sort the folios in to a sequential folio number order
	3. When entering the current folio reference system should search the carried over field and display the details of the land if it is available already. Otherwise set the cursor to first data entry field to start entering the data.
	Modification – 2017/01/14
	This modification for the uploaded existing folios to the system.
	1. Data entry user should be submitted the Data Entry form to check the folio number is existing in the system.
	2. If the submitted folio number is existed, data entry user select 'Yes' to delete the existing folio. Then the existed folio will be inactivated and data entry use can enter new folio to the system.
	3. Then the replaced new folio will be send to the Quality Controller queue to verify the folio.
Post conditions:	Log file is updated properly

LR	LRD	Vol:	Folio:
34	AB	890 1	2349564

Figure 3: Illustration of Unique ID

(**Note:** Random number figure may vary with the discussion of relevant parties)

4.4 *Use case: Search Scanned Document (*A4*)*

Use Case ID:	A4		
Use Case Name:	Search Scanned Documents		
Date Created:		Date Last Updated:	
Actors:			
Description:			
Preconditions:	Users must be validated before registering to the system		
Normal Flow:	1. User responsible for entering data to the system will search for the scanned documents in the System 2. System will fetch the scanned documents which have to update the data. (**Note**: Based on the user role, fetching of scanned documents will vary) 3. User responsible for entering data will be able to select the particular scanned document and enter the data. 4. After updating scanned document System will move particular document from pending directory to relevant directory. 5. **End**.		
Post conditions:	Log file is updated properly		

4.5 *Use case: View Scanned Documents (A5)*

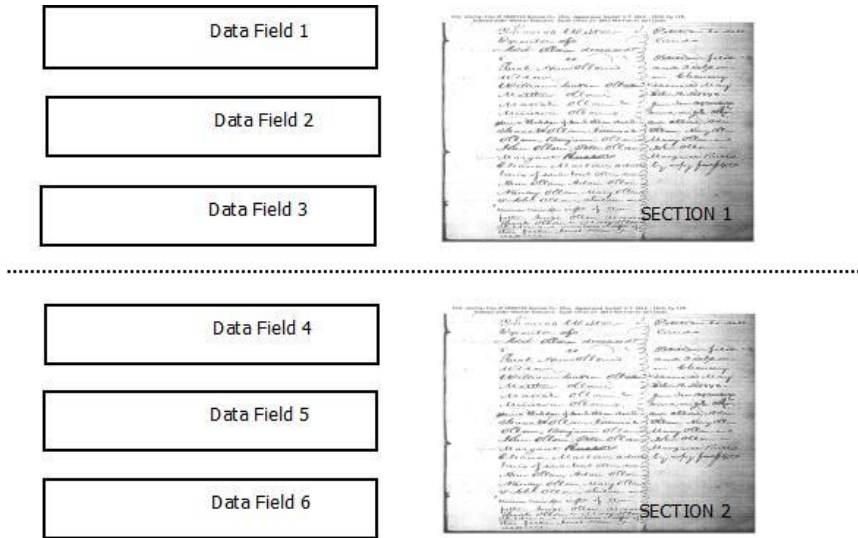|	
Use Case ID:	A5
Use Case Name:	View Scanned Documents
Date Created:	Date Last Updated:
Actors:	
Description:	
Preconditions:	Related request information should be updated in the log file
Normal Flow:	1. User responsible for Entering Data will be search document for enters data into the system. 2. Once relevant document is selected. System will load the scanned document in to predefined format to make convenient of entering data to the System. (**Note:** System will identify the sections of scanned document and crop relevant area and display along with the system interface in order to make convenient of entering data to the system. Also full image of scanned document will be displayed bottom of the System interface.) (**Note:** Refer figure 4) 3. User will enter the data based on scanned document to the system. 4. **End**. **Modifications - 2014-04-10** 1. Need to display cropped image with the relevant data entry area and allow load it when an icon is clicked **2.** There should be a zooming facility also **3. Alternatively it users requested to shift the carried over folio reference and save button to the end of the data entry screen.**
Post conditions:	Log file is updated properly

Figure 4: Illustration of image view and cropping

4.6 *Use case: Reporting (A6)*

Use Case ID:	A6		
Use Case Name:	Reporting		
Date Created:		Date Last Updated:	
Actors:			
Description:			
Preconditions:	Related request information should be updated in the log file		

Normal Flow:	1. User who uses data will send a request to System to generate the reports.
	
	2. Based on the request System will generate the report and send back to the User.
	
	Modification: 2017/01/14
	(**Note:** Required Reports:
	    I. List of pending records for data entry
	    II. Completion rate
	    III. Log report		

	IV. *Detail report for a selected land*
	V. *Volume wise report based on the divisions and the report must display no of folio to specific volume*
	VI. *No of images for specific volume should be display to data entry or qc operator*
	(**Note:** Refer figure 5 for illustration of detailed report for a selected land)
	3. User will print the requested report form the System.
	4. End.
Post conditions:	Log file is updated properly. (The report is generated properly.)

4.7 *Use case: Maintain Master Data File (A6)*

Use Case ID:	A6	
Use Case Name:	Maintain Master Data File	
Date Created:	Date Last Updated:	
Actors:		
Description:	This use cease describes the master data requirements which are relevant to identify folio details, and volume details of scanned documents. Descriptions of tables are listed under normal flow.	
Preconditions:		
Normal Flow:	1. Land Registry Division_New • This table will include the location ids of *Land registry, Divisional Secretariat* and combined code for *Land Registry Division*. This table will list both Pattu, Korale type of volumes and Divisional Secretariat type of volumes records. 2. Divisional Secretariat	

	• This table will include the *Divisional Secretariat Name*, *Divisional Secretariat Code* and *District Id* related to each *Divisional Secretariat*.
	
	3. Land Registry
	    • This table will include the *Land Registry Name*, *Land Registry Code* and *District Id* related to each *Land Registry*.
	
	4. District
	    • This table will include the *District Name*, *District Code* and *Province Id* which related to each *District*.
	
	5. Province
	    • This table will include the *Province Name* and *Province Code*.
	
	(**Note:** This master data will be the guideline to generate combined code of *Land Registry Division* in *Land Registry Division_New* table. Combined code of *Land Registry Division_New* table will vary according to the type of volume. Refer: **Figure 8** and **Figure 9**)
	
	(**Note**: **ICTA** will provide the *Microsoft Excel* worksheet to **RGD** to populate the data.)

Post conditions:	

4.8 *Use case: Folio Printing* *(A7)*

Use Case ID:	A7		
Use Case Name:	Printing of selected folios		
Date Created:	2014-04-10	Date Last Updated:	
Actors:			

Description:	**Enhancement for Folio printing - 2014-04-10** need to display sample folio number need to view the folio before printing
Preconditions:	Related request information should be updated in the log file
Normal Flow:	5. User who uses data will send a request to System to find the folios from the DMS. 6. Based on the request System will display the selected folio to the User on the screen. 7. If the selected folio is correctly displayed on the screen, user will click the print button to print the requested folio form the system. 8. End.
Post conditions:	Log file is updated properly

History of Transactions of the Land A/250/15		
Year	Lot Number	Cross Reference Number

Figure 4: Illustration of Detailed report for a selected land
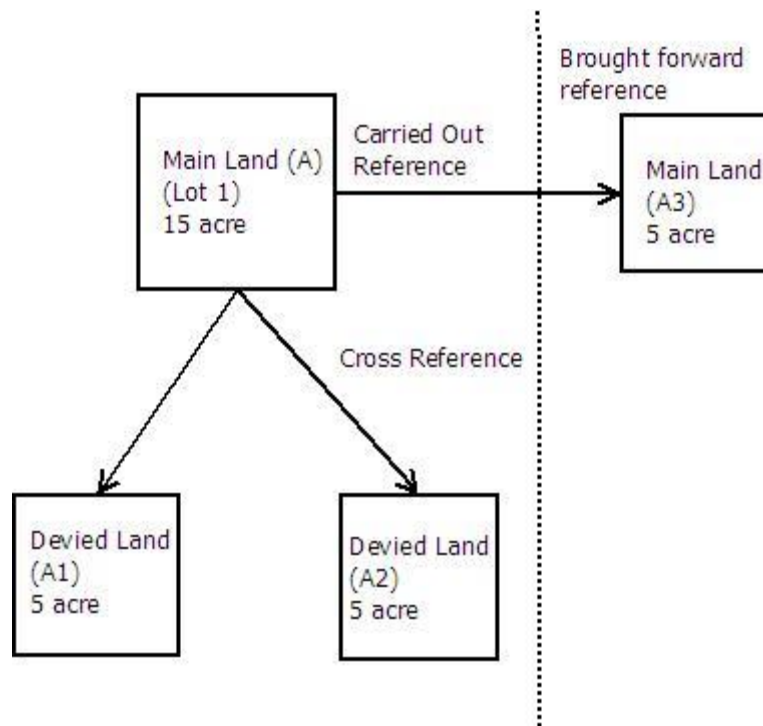
Figure 5: Illustration of Cross Reference and BF Reference, CO reference

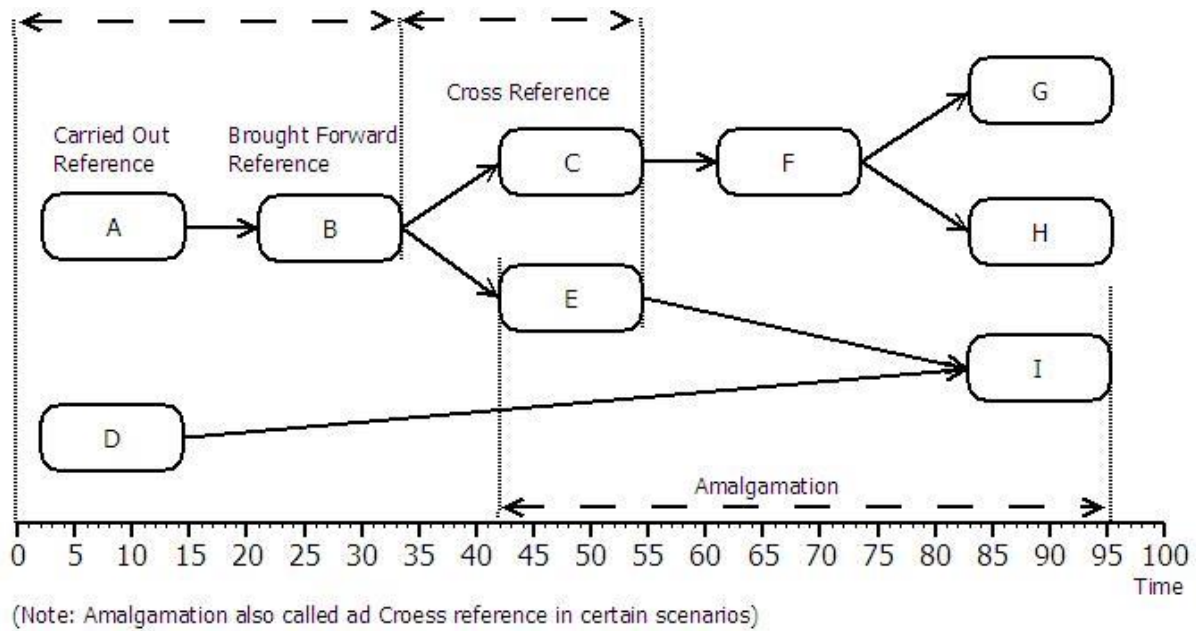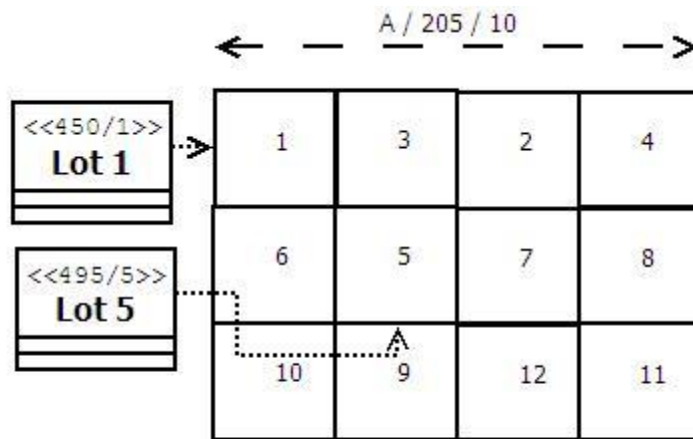(Note: Amalgamation also called ad Croess reference in certain scenarios)

Figure 6: Illustration of Cross Reference and BF Reference, CO reference with time

Note: If User search for Lot 1 / 450/1, Search result would be: 450/1 > A/ 250 / 10
If User search for LOT 5 / 495/5, Search result would be: 495/5 > A/ 250 / 10

Figure 7: Illustration of Division of Land

1	1	1	1
Province_id	District_id	LR_id	LRD_New_id

Figure 8: Illustration of combined code for Pattu, Korale type of Volumes

1	1	0	1
Province_id	District_id	LR_id	LRD_New_id

Figure 9: Illustration of combined code for Divisional Secretariat type of Volumes

4.9 Supplementary Requirements
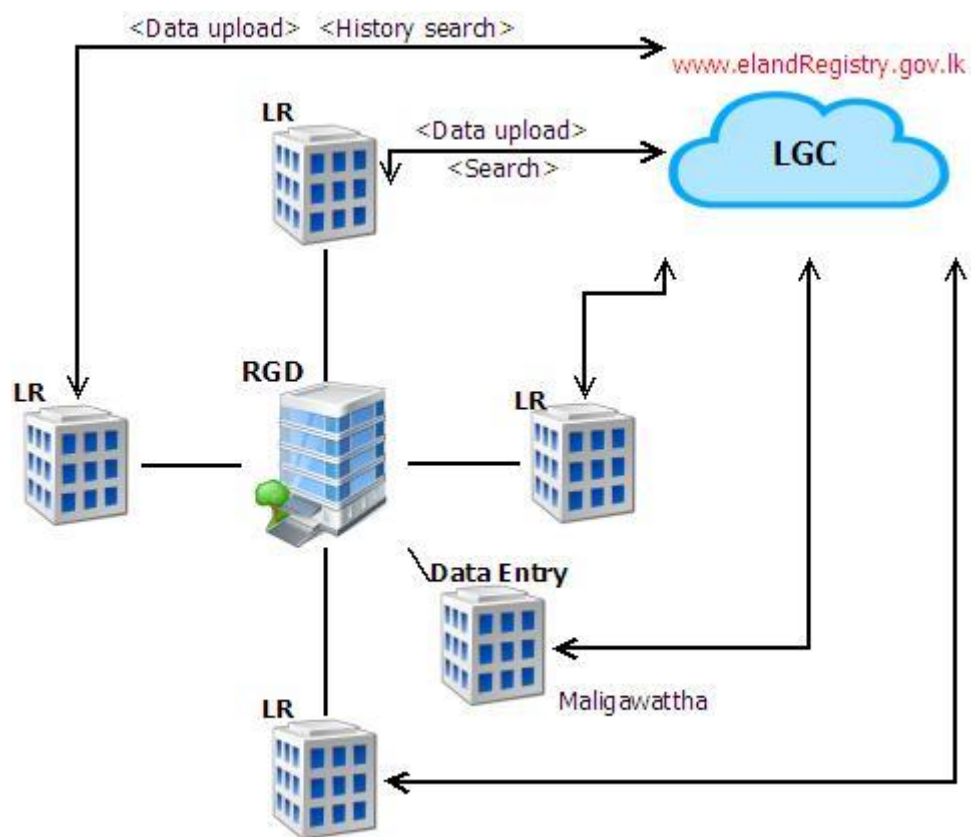
4.9.1 *None Functional Requirements*

Figure 6

Concurrent User Estimation

Description	Number of Users
Land registry	-
Data uploading	3
Searching	5
Total user per registry	8
Number of land registers	45
Total concurrent users	360 (45*8)

- File size of a bulk uploading zip file is approximately 58.59375 MB (200 kB * 300)
- Data entry staff 50 users.

Performance

The following performance criteria are provided as a guideline only. If the actual performance is falling below the stipulated figures, the consultant should justify the reasons. However, the performance level must be accepted by the technical evaluation committee appointed by the client.

- The bandwidth is assumed at 512kbps (shared) (point to point between LIX and the Department web service) with 360 concurrent users in total.
- The bandwidth is assumed at 512kbps (shared) (point to point between LIX and the Citizen portlet) with 500 concurrent users in total.

Item	Performance
Screen Navigation: field-to-field	< 10 milliseconds
Screen Navigation: screen-to-screen	< 5 seconds
Screen Refresh	< 3 seconds
Screen list box, combo box	< 3 seconds
Screen grid – 25 rows, 10 columns	< 5 seconds
Report preview – (all reports) – initial page view (if asynchronous)	< 60 seconds in most instances. It is understood that complicated / large volume reports may require a longer period
Simple enquiry – single table, 5 fields, 3 conditions – without screen rendering	< 5 seconds for 100,000 rows
Complex enquiry – multiple joined table (5), 10 fields, 3 conditions – without screen rendering	< 8 seconds for 100,000 rows
Server side validations / computations	< 10 milliseconds

Client side validations / computations	< 1 millisecond
Batch processing (if any) per 100 records	< 120 seconds
Login, authentication, and verification	< 3 seconds
Daily backups (@ Dept.) – max duration	1 hour (on-line preferred)
Total Restore (@ Dept.) – max duration	4 hours

1. Legal Considerations

No.	Requirement	M/D
1	**Legal Requirements**	
1.1	Applicable Laws: The following legal requirements and considerations build the framework for the eLand Register Solution:	
1.1.1	Registration Document Ordinance and regulations (contains Registration of Documents Act)	M
1.1.2	Notaries Ordinance and regulations	M
1.1.3	Stamp Duty Act and the Gazettes issued by the Finance Ministry related to the calculation of Stamp Duties	M
1.1.4	Computer Crimes Act No 24 of 2007	M
1.1.5	eGovernment Policy of Sri Lanka	M
1.1.6	Electronic Transactions Act	M
1.1.7	Land Registration Manuals	M
1.1.8	Circulars issued by the Registrar General	M

2. Auditing

Wherever applicable, an audit trail of all activities must be maintained. On a service or operation being initiated, the system should log the event, creating a basic 'audit log entry'. It should not be possible for the operation to be executed without the log entry being made.

The information recorded in the audit trail depends on the type of activity which takes place. Each service would be responsible for logging detailed information. The different types of operations are:

- Data Capture and Maintenance
- Creation of an entry / item
- Modification an item
- Deletion
- Control (or status change)
- Process execution
- Data synchronization
- Print (only selected item)
- Retrieval

- Monitor

Detail logging may be enabled or disabled for each type of operation, and/or for each business object. It should be possible to configure which attributes of a data item should be traced at the detail level. Tracing of some attributes may be considered mandatory, and they should not be turned off.

No.	Requirement	M/D
2	**Auditing**	
2.1	Audit Trails	M
	NOTE: The system design should guarantee that all write events and access to sensitive data through the applications are captured in the audit trail. Every database action is logged.	
2.1.1	System MUST maintain a complete audit trail of all write access events (creations, modifications and deletions of records) of the Land Register System.	M
2.1.2	System MUST maintain complete audit trail of all read access to confidential (non-public) data.	M
2.1.3	Each audit trail record MUST capture the following details at a minimum:	M
2.1.3.1	• Identification of the event (the module and function accessed)	M
2.1.3.2	• Type of access (create | modify | delete | read)	M
2.1.3.3	• Date and time	M
2.1.3.4	• Terminal ID / location (indication of the physical location)	M
2.1.4	System MUST provide the ability for authorised users (e.g. security administrators and auditors) to view the audit trails. The system should provide a suitable user interface for this and disallow any modification to the audit trails or system data through such user interface. The interface should provide required features to search for the audit trails by specific modules and functions of the application or by User ID.	M
2.1.5	A security framework MUST exist for web services access.	M
2.1.6	System MUST have flexible facilities for preventing direct user access at a database level. Users should not be able to use native or third party database tools to directly access or modify data.	M
2.2	Audit Function	M

No.	Requirement	M/D
2.2.1	System MUST have a facility to define the following Role privileges, at a minimum:	M
2.2.2	System should provide the facility for Internal Auditors to view all user profiles through the system	M
2.2.3	System should generate reports on success of backup procedures carried out, at a frequency decided by the organisation.	M
2.2.4	System should generate reports on system interruptions.	M
2.2.5	System should provide authorised users with details (audit logs) of all alterations to records in Land Register System	M
2.2.6	System should provide the ability for authorised users to view historical records (i.e. previous value before a modification is made to the field).	M
2.2.7	System should provide the ability for auditors to generate a listing of all additions and changes made to user profiles, for a user defined period. The report should indicate the details of user profile created / modification made and the person who authorised the creation / modification, along with the date / time of the change	M

3.   Security

1.   User authentication and authorization
All portlets should inherit authentication information from the portlet framework, and any authorization requirement should be implemented within the specific portlet application.

However, the solution should have the provision to integrate with the Lanka Gate Identity Management solution in future.

An administrative application needs to be developed wherever applicable.

Wherever applicable, internal small applications need to be developed to capture and store relevant data.

2.   Confidentiality and Integrity
All developed portlets/ back end e-services should ensure 'confidentiality' and 'integrity' whenever required by adhering to transport and message level security standards (i.e. HTTPS, WS-Security).

3.   Availability

All portlets / back end e-services should be developed to ensure 'High Availability' to ensure the system is available all the time, (e.g. Portlets clustering capability should be taken into consideration in the development).

4. Non-repudiation
   All portlets / back end e-services should ensure non-repudiation by having standard audit-trails and provisions to have WS-Security using digital signatures

No.	Requirement	M/D
3	**Security**	
3.1	User Access Management	M
	NOTE: Access privileges are granted to a user by assigning "roles". Each role describes a position within the functions of the Land Registry. A user, who has more than one role, will have the rights of all those roles. Each role should be defined with adequate privileges to carry out the responsibilities assigned to that role. Role privileges determine how data is accessed (via workflow, task and /or service), and the operations which can be carried out.	
3.1.1	System MUST have a facility to define the following Role privileges, at a minimum:	M
3.1.1.1	• Workflows which will be assigned to a role, and the type of work	M
3.1.1.2	• Tasks which may be assigned to a role, and the type of work	M
3.1.1.3	• Services which may be utilised by a role. Each service MUST be granted access to individual business objects, to Add, Change, Delete or Retrieve data.	M
3.1.2	System MUST allow a user to perform tasks only through the services to which he/she has access.	M
3.1.3	Within the service, if rights are defined at micro level, then a user should be able to perform only those tasks.	D
3.1.4	In performing these tasks, if any workflow-item or entity is used or changed, then the user should also have the appropriate rights to that workflow-item.	M
3.1.5	Where data, task or service exists within a hierarchy, access to the parent should implicitly grant access to all the child entities.	D
3.1.6	System should have a facility to explicitly deny access to child entities.	D
3.1.6	A user initiating a workflow should be able to check the status of the related work-item, even if access to the detail information is not available.	D
3.2	User Profile Management	M

No.	Requirement	M/D
3.2.1	System MUST provide the ability for application administrators to create and modify user profiles using an application level user management interface. This should facilitate creation and modifications to the user profiles. The system should capture all such creations / modifications done through this interface in the audit log.	M
3.2.2	System MUST ensure that any user profile that was created is not completely erased from the system. Even when all access rights of a user are removed, the user ID, Full name of the user and Designation (last held designation) should not be removed. Note: A user ID once issued should never be assigned again even after the original user has retired and renounced all access rights.	M
3.2.3	All users of the system MUST have unique user names and passwords. The password MUST be defined by the user and not known to any other person (including system administrators and other super users)	M
3.2.4	System MUST maintain separate user profiles for all the users of the system. Note: There should not be a situation where a group of users would use a common password.	M
3.2.5	User profile MUST consist of, at a minimum:	M
3.2.5.1	• User ID	M
3.2.5.2	• Full name of the user	M
3.2.5.3	• Designation	M
3.2.5.4	• Job responsibility	M
3.2.5.5	• Functions available to user (e.g. access rights matrix)	M
	NOTE: In addition to the fields given above, other details about the user may have to be included in the user profile based on the implementation of the workflow functions.	D
3.2.6	System should record the following details about the user profile in addition to the details provided about the user:	D
3.2.6.1	• Date of creating User ID	D
3.2.6.2	• Date of last modification to the user profile.	D
3.2.6.3	• Date of deleting user access rights	D
3.2.6.4	• Identity of the person who authorised the creation / modification to the user profile.	D
3.2.6	System MUST provide a facility for authorized users to designate other users to carry-out specific tasks temporarily for a user defined period. For example, if a person is on leave, an authorized user should be able to assign a subordinate to perform tasks of the person on leave for a designated period.	M
3.2.6.1	On the expiry of the substitution period, the rights assigned to the substitute should be automatically removed by the system.	

No.	Requirement	M/D
3.3	Log-in Controls	
3.3.1	System should have the ability to assign a terminal number to a user name, if required.	D
3.3.2	System should provide a facility to define possible log-in timeframes at the user level. Note: This is to ensure a particular user can log-in to the system only during specified time periods.	D
3.3.3	System should provide a facility to define user-level access rights and specify the functions (read/ write) that could be performed by the specified user within each specified module.	D
3.3.4	System should provide a facility to define the maximum number of unsuccessful log-in attempts per user at a given time. If a user exceeds the maximum number of unsuccessful log-in attempts at a given instance, system should lock-out the user from the system.	D
3.3.5	System should provide a facility for the System Administrator to release a locked out user.	D
3.3.6	System should restrict concurrent logins for a single user.	D
3.3.7	On a successful log-in attempt, the system should display the last log-in time and date for the benefit of the user.	D
3.3.8	System should have the ability to disable a user profile for a given period of time.	D
3.3.9	System should keep a log of all successful and unsuccessful login attempts of a user. The log MUST maintain the following details at a minimum of each login event	D
3.3.9.1	User ID (if valid user ID was provided)	D
3.3.9.2	Date of attempt	D
3.3.9.3	Time of attempt	D
3.3.9.4	Terminal ID (identification of the physical location)	D
3.3.9.5	Whether successful or not	D
3.4	Password Policy	
3.4.1	All passwords MUST be at least eight characters in length.	M
3.4.2	Passwords MUST expire after a user defined interval (default for this parameter would be 30 days)	M
3.4.3	Users MUST be provided with the facility to change their password on the log-in interface.	M
3.4.4	Use of control characters and other non-printing characters should be prohibited.	M
3.4.5	Initial log-in password should be provided by the System Administrator and the system should enforce a password change following the initial log-in.	D

No.	Requirement	M/D
3.4.6	System should restrict the users from repeating any of the previous 3 passwords used (this should be a parameterized value which can be set up by a System Administrator).	D
3.4.7	Display and printing of passwords MUST be masked, suppressed, or otherwise obscured.	M
3.4.8	Current and historical passwords MUST always be encrypted when saved in the database or when transmitted over networks.	M
3.4.9	Passwords MUST not be hard-coded into log-in scripts or any other software macros / programs.	M
3.4.10	Any data transmissions related to passwords travelling over third-party networks MUST be encrypted.	M
3.4.11	User log-in session timeout should be available. For example, if the user is not using the system for a defined time period, the session times out and the user has to re-enter the password to use the system. The session timeout period should be defined only by the System Administrators	D
3.4.11	At the time of user log-in, system should check for the following	D
3.4.11.1	Existence of record for this user ID	D
3.4.11.2	Password security check (correct password or not)	D
3.4.11.3	Terminal ID	D
3.4.11.4	Whether the user profile is enabled for the user	D
3.4.11.5	Whether the user ID is already logged or not	D
3.4.11.6	Whether the user ID is allowed to log-in at a given time and day	D
3.4.11.7	Account expiry date	D
3.5	Sensitive (Non public) data	
3.5.1	System MUST encrypt confidential / sensitive information using a suitable encryption mechanism.	M
3.5.2	System MUST have adequate security measures to ensure the confidentiality of sensitive (non public) information in the system.	M
3.5.3	Any screen that is displaying sensitive information should prominently indicate to the user that the details are sensitive and should not be shared.	D
3.6	Image Security	
3.6.1	System should have print function disable for the users who are not paid for a request	M
3.6.2	When image display on the monitor, all the function which can capture the image on screen should disable as possible.	M
3.6.2	When displaying images on monitor, watermark should added by the system.	M

4. Storage

No.	Requirement	M/D
4	**Storage**	
4.1	Storage Formats	M
4.1.1	System MUST have the ability to store records (data) in any of the three languages (Sinhala, Tamil & English)	M
4.2	Transliteration	
	"Transliteral" software will be made available which MUST be integrated with the proposed solution. Once integrated with the proposed solution, the System MUST have the following features: • Ability to automatically transliterate selected data fields (i.e. name). Following transliteration capabilities should be supported. • Transliterate from Sinhala to English • Transliterate from Tamil to English • Transliterate from Sinhala to Tamil • Transliterate from Tamil to Sinhala • System should provide the facility for the user to override / modify the system's transliteration.	M
4.3	Search Facility	M
	NOTE: Search facility should be available in a uniform manner throughout the system, where records can be searched for. The record maybe searched for during a regular business process such as when issuing a copy, or for ad-hoc purposes such as special inquiries or report generation.	
4.3.1	System MUST have a facility to search information in any of the three languages (i.e. Sinhala, Tamil or English) for an identified set up data items (i.e. Name).	M
4.3.2	System MUST have sorting capabilities for data stored in English.	M
4.3.3	System should have sorting capabilities for data stored in Sinhala.	D
4.3.4	System should have sorting capabilities for data stored in Tamil.	D
4.3.5	System MUST provide search results according to the security and accessibility privileges of a particular user.	M
4.3.6	System MUST provide simple search facilities based on key attributes for all major entities as well as workflow tasks	M
4.3.7	System should provide advanced search facilities where the user can build up a query consisting of several criteria based on any attribute. Name search concepts MUST be applied to name-like attributes.	D
4.4	Search Results	M
4.4.1	System should facilitate easy navigation to view details and related information of search results.	D
4.4.2	System should facilitate to select several search items and action them together.	D
4.4.3	System should facilitate to search within a result set to narrow down the results gradually.	D

No.	Requirement	M/D
4.4.4	Ability to customize the results view. For example, ability to specify columns, sorting order etc.	D
4.5	Scanning	M
	NOTE: Duplicate deeds, certified copies of land registers and certified copies of duplicate deeds need to be scanned and stored digitally as an image, so that the signatures placed on the certificates are captured in the system.	
	NOTE: Indexing of scanned documents is not covered in this document and will require a separate requirements session to agree format and keywords to be used. Note there is already an existing manual indexing used within the land registry and this could form the basis of the future indexing.	
4.5.1	System MUST have the ability to scan documents	M
4.5.2	System MUST have the ability to scan and digitally store documents (e.g. duplicate deed, application form)	M
4.5.3	System should have a facility to easily retrieve the scanned copy of the documents by providing the detailed information contained within that document	M
4.6	Storage of scanned documents	M
4.6.1	System should have the ability to compress the scanned documents and store in a digital format so that they can be easily accessed by multiple terminals located in different offices.	D
4.6.2	System should have the ability to link the scanned document to the relevant data record (i.e. Inward register of notarial documents) in the system.	D
4.6.3	The duplicate deed will be stored in the record room. The system should provide a facility to record details of the storage locations of duplicate deeds.	D
4.6.4	System should have the ability to record the movement of physical documents from one location to another. System should be able to easily keep track of even a batch of documents being moved (i.e. by referring to a range of serial numbers rather than having to record one by one).	D

5. Printing

No.	Requirement	M/D
5	**Output formats**	M
5.1	Requirements for printing documents	M
5.1.1	System **MUST** have the ability to print documents in Sinhala, Tamil or English.	M
5.1.2	System should have the ability to print documents which have more than one language in the same page.	M
5.1.3	System should have a facility to print documents on the Department's letterhead paper.	D

No.	Requirement	M/D
5.1.4	System should have a facility to use multiple types of paper sizes, which would be defined in the system for that type of form / notice.	D
5.1.5	System should have the ability to define fields (such as address field), where the system can fill in automatically if the data is available. If data is not available, system should prompt the user who is creating the document to enter the required details.	D
5.2	Posting documents	M
5.2.1	System should have the ability to print the Land Registry address taken from the system itself.	D
5.3	Managing the printing of documents	M
5.3.1	System MUST have the facility to print documents individually or in a batch.	M
5.3.2	System should have a common print queue for a workgroup. This would allow any user to print all the pending documents sent by several users.	D
5.3.3	System should allow users to select and print only a single document or only several documents from the print queue instead of printing all the pending documents in queue.	D
5.3.4	System should provide the ability for the users to print documents directly without placing it in the print queue.	D
5.3.5	System should provide the ability for authorised users to change queue order.	D
5.3.6	System should provide the ability for authorised users to delete items from the print queue.	D
5.3.7	System should provide the ability for authorised users to pause and restart or stop printing of documents.	D
5.4	Managing the printing of scanned documents	M
5.4.1	System MUST print the scanned documents of duplicate deeds in sufficient detail (sufficient dots per area of printout) to clearly distinguish handwritten text and signatures placed on the certificate.	M
5.5	System MUST have the facility to generate and print a failure report	M
5.5.1	Failure reason Field MUST be editable	M
5.5.2	System MUST generate failure report automatically.	M
5.6.3	System MUST print out failure report automatically once the failure reason has been entered.	M
5.6	**Application for search of land register**	M
5.6.1	System should have the facility to generate and print a receipt (on request) <Address of the Registration Office> *Receipt for Stamps received for search of Land Registers* Application Number: < Application No. > Application Date & Time : <Application Date >	M

No.	Requirement	M/D
	Name of Applicant : \<Name of Applicant\> Search by \<Search by Applicant\> Searching fees paid \<Fees (for search\>	
5.7	**Application for copies of land register:** Output: System MUST have the facility to generate and print a failure report when the record for application for copy of land register is rejected	M

5.7.1	Failure receipt MUST be generated with the following fields:
	     • Station
	     • Application No.
	     • Date
	     • Name of Applicant
	     • Division
	     • Volume
	     • Folio
	     • Rejection Reason
		M

5.8	**Application for copies of land register:** Output: System MUST have the facility to generate and print a receipt (for payment of copying fees)	M

No.	Requirement	M/D
5.8.1	System MUST generate receipt for payment with the following format **Receipt details front:** **REGISTRAR-GENERAL'S DEPARTMENT** *<Address of the Registration Office>* Receipt for Stamps received Received from ……………………………………. Stamps to the value of …………………… Rupees …………………. and cents Being fees on: Application No: *<Application No.>* Station: *<Station>* Date: *<Date>* Total copying fee: *<Total coping fee>* ……………………………………………. Registrar-General / District Registrar / Registrar of Land **Receipt details back:** Application No: It is expected to attend to the application within …………………… days from the date hereof. If it is desired to expedite action on the application, the applicant is advised to call at the office or send a responsible person with a letter of authority signed by him to make the necessary search of the registers.	M
5.8.2	System MUST automatically fill the following information into the receipt from the details recorded • Application No. • Station • Date • Total copying fee	M
5.9	**Application for copies of land register:** Output: System MUST have the facility to print a copy of the land register	M
5.9.1	System MUST recreate the look and feel of the original land register for printing	M
5.10	**Application for copies of duplicate deeds:** Output: System MUST have the facility to generate and print a **failure report** when the record for application for copy of land register is rejected	M

No.	Requirement	M/D
5.10.1	Failure receipt MUST be generated with the following fields: • Station • Application No. • Date • Name of Applicant • Deed No. • Rejection Reason	M
5.11	**Application for copies of duplicate deeds:** Output: System MUST have the facility to generate and print a **receipt** (for payment of copying fees)	M
5.11.1	System MUST generate receipt for payment with the following format **Receipt details front:** **REGISTRAR-GENERAL'S DEPARTMENT** *<Address of the Registration Office>* Receipt for Stamps received Received from ……………………………………. Stamps to the value of …………………… Rupees …………………. and cents Being fees on: Application No: *<Application No.>* Station: *<Station>* Date: *<Date>* Total copying fee: *<Total coping fee>* ……………………………………………. Registrar-General / District Registrar / Registrar of Land **Receipt details back:** Application No: It is expected to attend to the application within …………………… days from the date hereof. If it is desired to expedite action on the application, the applicant is advised to call at the office or send a responsible person with a letter of authority signed by him to make the necessary search of the registers.	

No.	Requirement	M/D
5.11.2	System MUST automatically fill the following information into the receipt from the details recorded • Application No. • Station • Date • Total copying fee	M
5.12	System MUST have the facility to print a **copy of the duplicate deed**	M
5.13	System MUST have the facility to print a **list of the applications for copies** of duplicate deeds by status	M
5.14	System MUST have the facility to print information document once the registration of deeds and certified copy of land register or duplicate deeds is complete	M
5.14.1	Information document MUST be printed in the case of where an applicant has selected Notification Type of 'None' i.e. they have no email or mobile phone.	M
5.14.2	Information to be included: • Serial Day Book No / Application No. • Date of completion • Text to state application has been completed System will automatically generate this and details are to be defined at a later stage	M

6.   Reporting

No.	Requirement	M/D
6	**System setup for reports**	M
	Note: Statistical reporting is required by the Registrar General. System should have the ability to generate basic statistical reports in user-defined formats. A report generation tool should be available for this purpose.	
6.1	Output of reports	M
6.1.1	System generated reports should support the following output methods:	D
6.1.1.1	• Output to standard printers	D
6.1.1.2	• Output to screen	D
6.1.4	• Output to text file format (in tab separated / comma separated formats)	D
6.1.5	• Output to html formats (to allow easy publication in web sites)	D
6.1.6	• Output to common formats such as Open Document Format (ODF), Microsoft Excel format, Lotus 123, PDF etc.	D
6.2	System MUST generate the following reports:	M

No.	Requirement	M/D
6.2.1	Progress report about the volumes (e.g. no of submitted applications, number of registered deeds etc.) (local level) • Purpose: Retrieve statistical data • Generated by: Registrar of Land (R/L) • Recipient: Registrar General • Frequency: Monthly	M
6.2.2	Consolidated progress report (overall view) • Purpose: Retrieve statistical data • Generated by: Registrar of Land (R/L) • Recipient: Registrar General • Frequency: Monthly • Constraint: can be generated through monthly progress reports, spans one calendar year	M
6.2.3	Monthly report on registration duties paid • Generated by: Registrar of Land (R/L) • Frequency: Monthly	M
6.2.4	Report to local authority (Sample is only in Sinhala available, therefore not covered in this document)	M
6.2.5	Report on licensed notaries	M
6.2.6	Report on status of registration of deeds to be published on the web page of 'Registrar General's Department'	M
6.2.7	Report on overdue collections of registered deeds • Purpose: Identify overdue collections in order to initiate the issuing via ordinary post • Generated by: Issuing Officer • Recipient: Issuing Officer • Frequency: Weekly	M
6.2.8	Report on list of the applications for copies of land registers and duplicate deeds by status • Purpose: Retrieve statistical data • Generated by: Registrar of Land (R/L) • Recipient: Registrar General Frequency: Daily if required	M
6.2.9	Report on overdue certified copies of land registers and duplicate deeds for collection • Purpose: To determine if the certified copy of the land register or duplicate deed has been collected within the specified time and if not trigger the delivery by ordinary post. • Generated by: Issuing Officer • Frequency: Daily Constraint: Report needs to export the records with status of 'Completed' for longer than 7 days	M

No.	Requirement	M/D
6.2.10	System MUST have the facility to generate a report on overtime completed by clerks System will automatically generate the following information on the report: • Username • Date of overtime completed • Hours Details of overtime (Remarks)	M

7. Interface Requirements

No.	Requirement	M/D
7	**Interface Requirements**	
7.1	Interface MUST exist between main system and the web page of 'Registrar General's Department' (Status of registration of deed) Data flow: Status of registration of deeds Data flow: Status of application for copy of land register Data flow: Status of application for copy of duplicate deeds	M
7.2	Interface MUST exist between main system and the email gateway Data flow: Status of registration of deeds Data flow: Status of application for copy of land register Data flow: Status of application for search of land register Data flow: Issuing of certified copy of land register	M
7.3	Interface MUST exist between main system and the mobile gateway Data flow: Status of registration of deeds Data flow: Status of application for copy of land register Data flow: Status of application for search of land register	M
7.4	Interface MUST exist between main system and 'Module for managing delivery of documents' Data flow: Type of delivery	M
7.5	Interface MUST exist between main system and 'Module for maintaining licensed notaries'. Data flow: Name of licensed notary	M
7.6	Interface MUST exist between 'Module for maintaining licensed notaries' and web page of 'Registrar General's Department' <Registrar General's Department> Data flow: Name of licensed notary	M
7.7	Interface MUST exist between 'Module for maintaining land registries' and web page of 'Registrar General's Department' <Registrar General's Department> Data flow: Details of land registry offices	M
7.8	Interface MUST exist between main system and payment gateway. Data flow: Verification of payment	M

7.1.1 *Backup and Contingency planning*

The assurance of the system availability is highly critical for the solution. Therefore, the categorizations of the contingency requirements are as follows,

- Hardware failures
- Issues relating to system live ware
- Breach in System Security
- Disaster related issues
- Changes in operations and policy

7.1.2 *Hardware infrastructure:*

a) **Minimizing failures and their impact**

Hardware failures can be expected due to various reasons that may be due preventive or none preventive reasons. Therefore, it would be impossible to avoid all the failures but it could be minimized to a great extent, and adverse results can be avoided even further. Therefore, following recommended usage and maintenance guidelines will help to minimize failures.

In order to minimize the impact of failures, redundant or duplicate equipment can be made available, especially for critical items such as servers, uninterrupted power suppliers and if possible power generators.

Automatic notification of failures or problems from a management console to a system administrator, to maintenance personnel can help bring about a quick resolution.

b) **Recovery from failure**

In the event that part of the infrastructure fails, the possible effects can range from annoying (temporary loss of connectivity) to disastrous. (loss of data). Therefore, following Best Practices are recommended to recover from failure. Such as,

- Regular data backups must be taken to recover from loss of data.

- Daily, Weekly and Monthly backups are recommended.

- The backups should be verified periodically by restoring.

- There must be clear instructions for recovery.

- The data backup should include the email and messaging repositories.

In all cases, detailed instructions on the recovery procedures and activation of alternate services are essential. The recovery procedures must be tested periodically to ensure it is effective and complete.

7.1.3 *System Performance Requirements*

7.1.4 *Graphical User Interface characteristics*

7.2 Assumptions and Dependencies

1. This requirement document was prepared based on the assumption that there is no change to the current folio system of the land registry
2. It is assumed that all land related transactions are called as document registrations
3. It is assumed that there are predefined users for the identified use cases
4. It is assumed that key data elements of a land can be captured from the digitization process

8. Supporting Information

- *Data elements as per the folio*

  Particulars related to a Folio

  Division-   Volume -   Folio-

  Province-
  District-
  Pattu-

Situation   Korale-
                       Divisional Secretariat-
                       Grama Niladhari Division-
                       Local authority area-
                       Village or Town Street-

Annexure 1

Data element	Description
Asst.No.	
Brought forward from /Volume/Folio (prior folio number)	When there is transaction for the existing land, and there is no subdivision or amalgamation, the new volume which opens for the existing land should indicate the certain set of information brought from old volume is identified as Brought Forward Reference **(Volume/Folio number in the old volume.)**
Carried over to/Volume/Folio (next folio number)	When there is a transaction for the existing land, and there is no subdivision or amalgamation, the old volume which opens for the existing land should indicate the certain set of information carried to the new volume is identified as Carried Over Reference **(Volume/Folio number in the new volume.)**
Cross References	When there is a transaction for the existing land, and there is subdivision or amalgamation, the existing land divide in to certain lots and those new records of information should carried out to new separate volumes identified

	as Cross reference. Cross references are not mentioned on old volume. Only included in new volume.
Current Folio	
Date of Registry (Day Book No. and Date)	Only **year** of registry should be captured
District	
Extent	
Korale	
Land Registry	
Lot No.	
Lot Number	
Name of Land	
Pattu	
Plane Number	
Province	
Village/ Town/ Street	