



## **Software Requirements for Requirements Management Database and Management System**

### **1. Purpose**

This document provides the general software requirements for a requirements management database and management system. Per engineering best practices, conversion of these requirements into a specific working business application is captured in a detailed design specification (see Section 11. Reference List).

### **2. Overview description:**

Figure 1 is a block diagram of the full suite of software management systems required to support the Requirements Management Program. As currently envisioned the suite may be comprised of three main components:

- A requirements management (RM) database and management system
- A document management system
- A review/comment (rev/comm) management system

The rev/comm system is considered a separate system because (a) its function is useful with both the review/commenting of documents and review/commenting of requirements, (b) it can be treated as a somewhat independent module that must tie into each, and (c) it may be available as an off-the-shelf item.

The RM database and the document management systems are two very different entities, addressing different audiences, and serving different purposes. They are coupled through the document metadata. The document management system manages the collection of LBNL policies and procedures and other documents. It enables the general user to search and find in multiple organized ways, which require that document standards be established and used. It also imposes version control and tracking discipline on the documents. Its main outputs are document metadata for the RM database, and reports on document relationships and status.

For cost, timing and priority reasons, we have chosen to give priority to address only portions of a document management system. Specifically, for 2011 through 2012, the Program is placing priority on find and search capabilities and on helping establish good habits in document control practices. These can be accomplished using existing and available tools rather than having to spend money to acquire or develop new ones. In the interest of cost as well as being mindful of timing, we believe that the Lab is

### **LBNL**

04.04.001.004-1.0

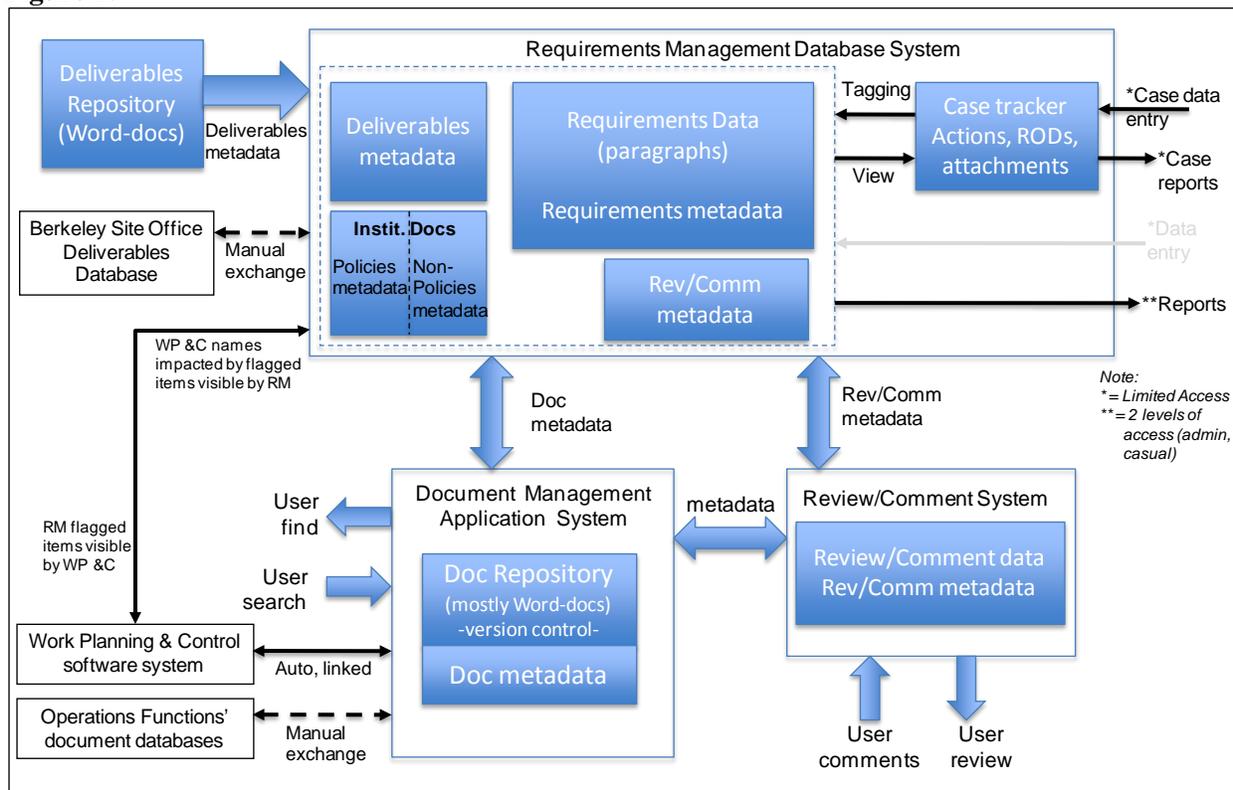
Effective Date: 07/15/2011

Page 1 of 27

best serve by the RM Program piggy-backing or joining with another Lab group who has need for a document management system.

This document covers the RM database and management system, and the necessary interfaces to the adjoining systems.

**Figure 1:**



**2.1 Definitions:**

Contract 31	“Contract 31” is short for Contract No. DE-AC02-05CH11231 between the U. S. Department of Energy and the University of California describing the terms for management of Berkeley Lab. The Contract includes a statement of work (SOW) for the science missions and it details the requirements for managing the operations and business of Berkeley Lab.
Deliverable	Work products or outputs resulting from addressing a requirement that are provided to the contracting agency as demonstration of compliance to the requirement.
Document	Written, visual, audio- or video-recorded information stored in the form of hard copy, film, magnetic tape, electronic data, or in an on-line, web-based format. Documents include and are not limited to: policies, programs, processes, procedures, plans, work instructions, design specifications, engineering drawings and so forth.
Document Management	A business-management process that ensures organization access to current,

**LBNL**

	reliable, and concise information. Document-management process includes document control, change control, configuration control, periodic review, and communication/distribution.
Document Management System	A software application to search, find, and extract information about the contents of a document repository, and also to manage change (add/update/archive) in the contents using standard change control practices. Connects to the RM database and management system.
Institutional Document	A publication authorized by Laboratory management that delineates Laboratory-wide or multifunctional policy, procedures, regulations, or plans. A subset of authoritative documents. Scientific and technical publications and reports are not included in this definition. Examples: Procurement policy, Radiation Protection Program, Laboratory Policy Manual
Metadata	Also referred to as document information, and includes (but not limited to) titles, document numbers, revision dates, and for traceability, the related source requirements and implementing documents' information. For this document, metadata is used in the database to establish the relationship between different entities.
Parsing	Breaking down a source requirement document to an appropriate level of detail for linking associated performance expectations to implementing mechanisms
Policy Area	A grouping of related policies. Policy areas are organizationally neutral; that is, they do not reflect organizational structure. Though organizationally neutral, policy areas typically assigned to an Operations function. Some policy areas may span across more than one function, and a primary functional owner is therefore assigned.
Policy Area manager	Person with expertise in and responsibility for a specific Policy Area.
Record (database)	All information related to one item in a database; one row of a relational database.
Requirement	A specific obligation to perform an action mandated by Berkeley Lab senior management or the University of California, or the federal, state, or local government; or to comply with the Laboratory's contract with the Department of Energy. For the development of this database, "requirements" do not include Lab generated documents such as policies or high level program documents.
Requirements Management Database & Management System	A software application that includes (a) a relational database connecting requirements to Lab policies and other documents, and (b) functions to manage change (add/update/archive) in requirements. Connects to the Document Management System application.
Rev/Comm	Review/comment – an on-line means to notify reviewers of a document/requirement for review, to allow reviewers to access for review, and to record comments.
RM	Requirements Management
RMC	Requirements Management Committee – a proposed committee of members with policy-expertise covering multiple disciplines
RMC Representative	A member of the RMC.
ROD	Record of decision – a written statement summarizing a decision
SME	Subject matter expert
Source Requirements Document (SRD)	A high level document that establishes performance expectations as a result of a citable policy, directive, law, regulation, or contract. Examples: 10 CFR 851, <i>Worker Safety and Health Program</i> ; LBNL Travel and Expense Policy; DOE Contract 31, Section (Clause) H.18, <i>Application of DOE Contractor</i>

	<i>Requirements Documents</i>
Validation	The process of: (a) evaluating a system or component during, or at the end of the development process to determine whether it satisfies specified requirements; or, (b) providing evidence that the software, and its associated products, satisfies system requirements allocated to software at the end of each life-cycle activity, solves the right problem (e.g., correctly models physical laws, implements business rules, uses the proper system assumptions), and satisfies the intended use and user needs. (Reference: IEEE Standard 1012-2004)
Verification	The process of: (a) evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase; or, (b) providing objective evidence that the software and its associated products conforms to requirements (e.g., for correctness, completeness, consistency, accuracy) for all life-cycle activities during each life-cycle process (acquisition, supply, development, operation, and maintenance); satisfies standards, practices, and conventions during life-cycle processes; and, successfully completes each life-cycle activity and satisfies all the criteria for initiating succeeding life-cycle activities (e.g., building the software correctly). (Reference: IEEE Standard 1012-2004)
WG	Working Group – an extension of the RMC, consisting of subject matter experts, whose role is to focus on a single case

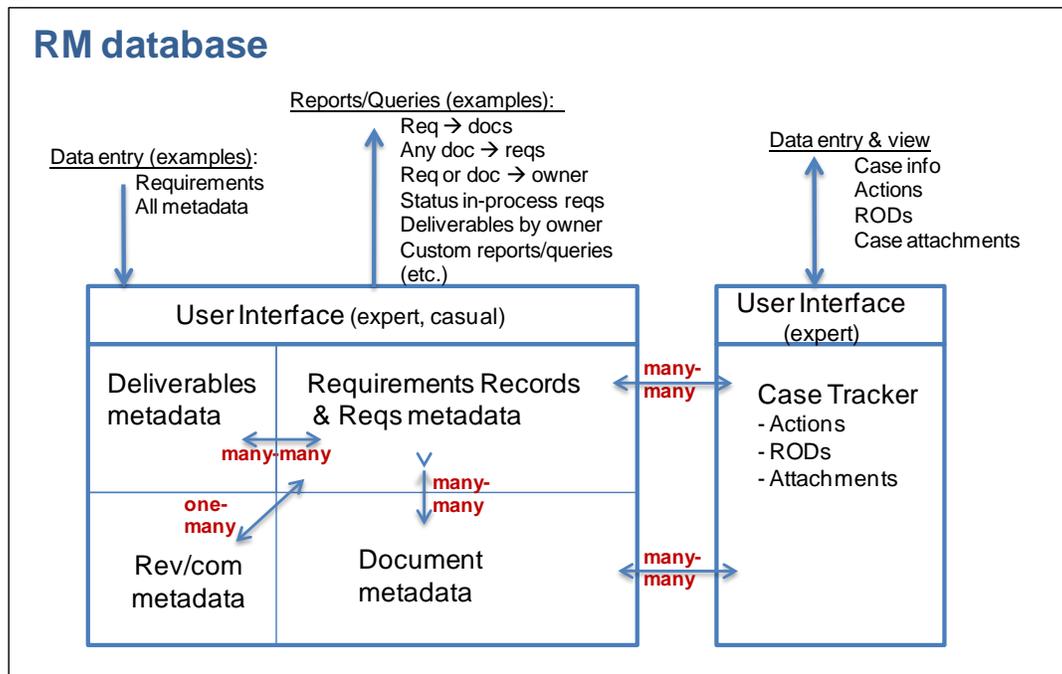
### 3. Core Data Modules of RM Database and Management System

The RM database and management system has two key functions:

1. It is a relational database, whose prime function is to tie the Department of Energy (DOE) contract (including standards and regulations) requirements to LBNL policies and requirements and to supporting LBNL documents, and
2. It supports workflows in the management of requirements, policies and supporting documents. Such workflows are primarily directed at managing change in requirements or policies or documents, and include, for example, a case tracker and a means to capture records of decision (RODs). Since some requirements define reports (or deliverables) that must be submitted to DOE on a regular basis or if an event is triggered, it is important to track completion of such deliverables and, if possible, provide a means of notification of upcoming deliverables.

Figure 2 illustrates the different modules of the RM database. Central is the Requirements data module, which has specific relationships with the Document, Deliverables, ROD, Case Tracker, and rev/comm modules. Table 1 at the end of Section 3 summarizes the data, metadata, relationships for each core module of the RM Database and Management System. Sections 3.1 through 3.7 describe each core module.

Figure 2:



### 3.1 Requirements Module

- a. Each record in the Requirements data module of the RM database corresponds to a detailed requirement copied or summarized from Contract 31 or applicable federal/state/local regulations and standards, or University of California requirements or Laboratory senior management requirements.
  - (1) Each detailed requirement is derived from a source requirements document (SRD)<sup>1</sup>.
- b. Each requirement must carry a unique identifier. Some SRDs may likely not have identifiers (sections, subsections, paragraphs, etc.), and hence, reliance on solely the ReqID may be necessary to define uniqueness. Appendix A provides a proposed set of fields that capture a requirement's identifying information.
- c. Requirements are subject to change, and the period between being notified of a possible change and the actual execution or effective date can be long.
  - (1) Each record must include a status flag (for example, active, active change pending, retired).
    - i. This status flag must be directly settable.
    - ii. This status flag must be settable via a Case Tracker entry.

<sup>1</sup> (See also Definitions, Section 2 of this document.) An example of a SRD is a DOE Order or a federal regulation, and is likely has many requirements. The SRD is parsed into individual requirements, and each of these forms a single record in the RM database.

- iii. This status flag and its associated requirements identification must be available to pass to other Laboratory business systems (such as Work Planning and Control)
- (2) Each record must include a means to capture the change history of the requirement.
  - i. Change history data includes the date of modification, the Contract Modification number (see Section 3.6).
  - ii. Change history is a reportable record.
- d. Requirements tie directly to all the other database core elements. Relationships may be many-to-many or one-to-many.
- e. Other metadata fields of a requirements record are shown in Table 1.
- f. A means to enter or modify records must be provided.
  - (1) Single entry, or small number (less than approximately 10) of entries.
  - (2) Upload of multiple entries (block upload) from common table forms (for example, Excel)
- g. A means to download records must be provided to common spreadsheet applications, such as Excel.

### 3.2 Documents Module

The Documents module of the RM database is comprised of document metadata.

- a. Each document record corresponds to a unique institutional document.

Institutional documents are subject to control, and include policies and procedures and other documents implementing requirements. These do not include scientific or technical publications or reports. Institutional documents are typically owned by different functional groups, and therefore, at present and in the near term, are likely to be managed under one or more different document management systems either manual or off-the-shelf application.
- b. Document metadata fields are listed in Table 1.
- c. A means to pull (or update) status and identifying data from the various document management systems must be provided.
  - (1) Single entry
  - (2) Upload of multiple entries (block upload) from common table forms (for example, Excel)
  - (3) (Future) Should the Laboratory move to a single lab-wide document management system, ability to upload directly (under control) into the RM database would be beneficial.
- d. A requirement may result in a number of implementing documents (for example, a policy and supporting procedures).
- e. A document may address multiple requirements.
- f. Each document record must include a status flag (active, pending change, archived).
  - i. This status flag must be directly settable.
  - ii. This status flag must be settable via a Case Tracker entry.

- iii. This status flag and its associated requirements identification must be available to pass to other Laboratory business systems (such as Work Planning and Control).

### 3.3 *Deliverables Module*

Deliverables are a subset of the requirements, but with additional tracking information. Deliverable requirements often expect periodic reports or other submissions over the course of the contract's term. The RM database contains deliverables metadata.

- a. A deliverable's unique identifier is a due date combined with the requirement's identifying information and description. Because there can be submissions of frequency greater than 1, there are can be multiple deliverables for a requirement. (For example, requirement for an annual report means that there is a deliverable every year for the particular requirement.)
- b. Deliverables metadata are listed in Table 1.
- c. Some deliverables can satisfy more than one requirement (for example, a report that satisfies a federal regulation may also fulfill a state regulation). This means that the deliverables file cannot be a simple embedded table in the Requirements file.
- d. Most deliverables are reports, which will be stored outside of this RM database.
- e. Completion of a deliverable is noted by entry of a completion date, by whom, and a link to the location of the completed deliverable report.

### 3.4 *Tracking Case Module*

A case record corresponds to a requirement review case, which may be an instance of activity related to a change (to a contract requirement, a Lab policy, or institutional document), or an instance of query or issue related to a requirement or policy matter. Such instances (or cases) are brought before the Requirements Management Committee (RMC) for logging and assignment. Note the case tracker is not used to update or add a requirement or other metadata.

- a. Data and metadata fields for a case record are listed in Table 1.
- b. Case record identification number is generated automatically.
- c. Case record data include an embedded table of one or more dated comments.
- d. Case record data include an embedded table of one or more dated action items, owners, status, and associated attachments.
- e. A subset of the action list contains one or more records of decisions (ROD), distinguished from actions by an identifier such as a checkbox.
- f. Case record metadata include a status entry (open, closed, hold)
- g. A case record typically corresponds to one requirement or policy, but may also correspond to a full SRD, which may have more than one requirement.
  - (1) If the SRD itself is undergoing modification, a means to tag or label the SRD(s) must be achievable via entry in the case record in addition to via direct access to the SRD metadata.
- h. A case record may identify and reference one or more institutional documents as requiring modification.

- (1) A means to tag the institutional document(s) requiring modification must be achievable via entry in the case record in addition to via direct access to the institutional document metadata.
- i. A means to directly enter data into a case record must be provided.
  - (1) A means to create a new case record, whose number is automatically generated, must be provided.
  - (2) A means to locate and update an existing case record by number or date must be provided.
- j. A means to download a case record's dated comments must be provided.
- k. A means to download a case record's dated action items must be provided.
- l. A means to download a case record's associated ROD(s) must be provided.

### **3.5 Records of Decision (ROD) Sub-module**

A ROD is a dated written decision regarding a requirement (or set of requirements).

- a. A ROD record includes a decision summary (text), and is identified by its entry date and association with a case record.
- b. Multiple RODS may report to a single case record. The collection of RODs associated with a single case record is an embedded table in that case record. RODs may be considered a special case of Action Item, and if treated as such must carry a designator (a check box) to enable sorting.
  - (1) The ROD may be supported by an attached or linked written analysis or implementation plan.
    - i. The supporting information may be located in a repository within or outside of the RM database.
  - (2) ROD metadata fields are listed in Table 1.
  - (3) ROD is numbered automatically (CaseID + number)
  - (4) A means to list RODs for a given requirement must be provided. The relationship may be through the case record.
  - (5) A means to list RODs for a given institutional document must be provided. The relationship may be through the case record.
  - (6) ROD information is entered into the database by way of the case record.

### **3.6 Contract Modifications Tracking Sub-Module**

A Contract Modification record corresponds to a single executed modification to Contract31.

- a. The Contract Modification record includes a copy of the modification summary.
- b. Contract Modification metadata include its identifier and execution date, and are shown in Table 1.
- c. A contract modification may impact more than one requirement.
- d. The relationship to a requirement record is through the requirement's change history embedded table.

### **3.7 Review/Comment Module**

**LBNL**

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 8 of 27

*The official or current version is located in the repository for Institutional Documents, accessible via OCA's website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*

As noted in Section 2, a review/comment capability is low priority for the initial launch of the RM Database and Management System. However, in developing the RM Database, allowance for tying a review/comment record to a requirement should be considered.

**Table 1: Summary of Data, Metadata, Relationships Per RM Database System Element**

List is subject to change. See text for comments, overview descriptions. Additional yes/no questions may be added for query/sorting purposes.

Annotated and amended Table 1, Data, Metadata Relationships per RM Database System Element - 5/12/2011; updated 7/15/2011

Black - original Table 1; blue - comments

Requirement	Document	Deliverable	Case	Action (embedded table A)	ROD (embedded tableB)	Rev/Comm	Contract Mod
<b>Data</b>	Text (paragraph from Contract) (examples provided)	Location (link to) of doc	Location of (link to) deliverable	Multiple Comment (text) tied to date	Description	Comment Entry	Location of Rev/Comm Summary
	Change history with date (what I wanted here was a list of changes for a particular req instance - effective date changes - version tracking might do it, if it includes sort capability)		Assigned WG (text) Initial background information		Comment	Location of (link to) Analysis Attachments or link	
	Link to SRD (include field for this)		Action list (embedded tableA) ROD list (embedded tableB)		Attachments (if any) or linked info	Location of (link to) Plan	
<b>Metadata</b>	ReqID (auto)	DocID (auto)	DlvID (auto)	CaseID (auto)	ActionID	RodID (auto)	RCID (auto) ModID (auto)
	Contract heading	Doc number	DueDate	Case Open Date	Date Assigned	Entry date	RCDate ContractMod #
	Contract heading ID	Doc title	ActualDeliveryDate(s)	Case Closed Date	Assigned Owner PAM group list - editable	RODownerName1 PAM group list - editable	ExecDate
	Contract subheading ID	Revision number	Status (open/closed) drop down	Status (op/clos/hold) drop down	Date closed	RODownerFunc1 (Function group list - editable)	
	Source Req type	LabPUBnumber	Frequency drop down - (annually, quarterly, etc.)	Priority (high, med, low) drop down	Status (open, closed, hold) dropdown	RODTeam(text)	
	SRD ID	Doc type (policy, process, program, procedure, etc.) (drop down)	PrimaryOwnerName PAM group list - editable	Initiator PAM group list - editable	Attachments? dropdown y/n	RODstatus (open/clos) drop down	
	SRD title	Doc level (hierarchical relationship) (drop down - 1,2,3...)	PrimaryOwnerFunc (Function group list - editable)	Initiator's Function (Function group list - editable)			
	Section/paragraph	Rev0PubDate	ContribOwnerName PAM group list - editable	Impacted Policy Area1 Policy Area Group list - editable			
	Section title	LatestPubDate	ContribOwnerFunc PAM group list - editable	Impacted Policy Area2 Policy Area Group list - editable			
	Effective date	EffectiveDate	BSOPOCName BSO group list - editable	Impacted Policy Area3 Policy Area Group list - editable			
	Status (active/active change pending/retired) drop down	NextReviewDate	DlvType drop down - report, screen shot	Sr. Manager owner Sr. Manager Group list - editable			
	Pending ContractMod? yes/no	DocOwnerName1 (DocOwner group list - editable)	Meet >1 req? y/n drop down yes/no	Sr. Manager function Function group list - editable			
	Notif date of pending status (change process can be long, may start actions to support change while pending)	DocOwnerFunc1 (Function group list - editable)	If yes meets >1 req, itemize which other (list per ReqID or identifying metadata)	WG assigned? y/n			
	Responsible PAMname1 (PAM group list - editable)	DocOwnerName2 DocOwner group list - editable		Approval authority? Approval list - editable			
	FunctionName1 (Function group list - editable)	Req 30day review? yes/no		Legal review/approval req? y/n drop down			
	PAMname2 (PAM group list - editable)	Status flag Active, pending change		Impact/risk analysis required? y/n drop down			
	PAMname3 (PAM group list - editable)			Impact/risk analysis written? y/n drop down			
	Primary source or embedded? (drop down)			Impact/risk analysis reviewed? y/n drop down			
	If embedded, cite primary (Contract & source ID)			Implementation plan required? y/n drop down			
	Deliverable? y/n drop down			Implementation plan written? y/n drop down			
	Required at LBNL? y/n drop down			Implementation plan reviewed? y/n drop down			
	If not required, comment & ref ROD			Implementation start date Implementation complete date Implementation status (in process, complete) drop down Implementation owner PAM group list - editable			
<b>Relationships</b>	Primary	ReqID (many)	ReqID (many)	ReqID (many)	CaseID (one)	CaseID (one)	ReqID (one) ReqID (many)
	DocID (many)	RCID (many)	RCID (one)	DocID (many)			DocID (one)
	CaseID (many)	CaseID (many)		RodID (many)			DlvID (one)
	DlvID (many)						
	RCID (many)						
	RodID (many)						
	ModID (many)						

## 4. Outputs

### 4.1 Reports/Queries

A list of example outputs/reports/queries to be extracted from the database is shown in Table 2. The list is likely to be expanded in the final requirements specification for this software application.

- a. A pre-described set of reports shall be available to general (casual) users. Casual users must be able to make relatively simple queries.
- b. Custom reports/queries will be generated by a small set of persons with designated access rights.

**Table 2: Database Outputs (Reports/Queries) – Examples**

	Preliminary Outputs (Reports/Queries)	Lowest skilled level User (Section 5.c definitions)
General	List of open review cases, status, owners?	Casual/Deliverables
	List of completed or open Contract deliverables, with owners, due dates.	Casual/Documents
	List of all documents	Casual/view
	List of documents pending 30 day review	RMC
	List of requirements by type (DOE, fed, state, etc.)	Casual/view
	For a SRD, list all individual requirements	Casual/view
	List all case jobs based on implementation plan start date	RMC
For a given requirement	List associated policies and/or institutional documents	Casual/view
	List open or closed review cases (logged entries)	RMC
	List open or closed RODs	RMC
	List deliverables completed	RMC
	List deliverables open	Casual/view
	List pending contract modifications, date when placed on pending list	Casual/view
	List owner (and group by Policy Area, function, etc.)	Casual/view
	Find associated policy and doc versions as of a certain date	Casual/view
Find change history	Casual/view	
For a given policy	List the associated requirements and institutional documents	Casual/view
	Find Change history	Casual/view
	List by publication date	Casual/view
	List RMC Rep owner	Casual/view
For a given Policy Area	List requirements and docs that PA owns	Casual/view
	List the open Cases and open actions that PA owns	RMC

### 4.2 Notifications

- a. Automatically generated notifications are highly desirable.
- b. Notifications are generated based on user-defined conditions.

## LBNL

- c. The most common notifications are triggered by a change in the database. For example, when a ROD associated with a specified Policy Area is filed, the data entry of the filing date triggers notifications.
- d. A second type of notifications are triggered based on a user-settable time-window prior to a due date for a deliverable or action item. For example, a user wishes to be notified 2 weeks prior to the due date of a specific deliverable.

## 5. Users

- a. Number of persons managing inputs to this database is expected to be less than 20.
- b. The number of persons who may view pre-defined reports or pre-defined queries is open to the Lab community (LDAP access).
- c. Access levels:
  - (1) Administrator (expert user):
    - i. Change all information content. Create queries, extract reports.
    - ii. View all open and closed deliverables.
    - iii. Search all; generate reports and queries.
    - iv. Assign access rights.
    - v. Override and complete tasks assigned to others. (Rev 0.8 change)
    - vi. Estimated number of persons: < 5 (RM Program Manager, IT admin, select others)
  - (2) Editor
    - i. Change Case only.
    - ii. Read only all else
    - iii. Search all; generate reports and queries
    - iv. Change Deliverable status.
    - v. Estimated number of persons: 20 (Policy Area managers, RMC members, select SMEs)
  - (3) Limited editor rights (deliverables owner) – “Casual/Deliverables”:
    - i. Change Deliverables status
    - ii. Attach link to specific deliverable.
    - iii. Search/read pre-defined reports and limited queries
    - iv. Estimated number of persons: 40 (expert users and additional selected SMEs)
  - (4) Limited editor rights (document owner) – “Casual/Documents”:
    - i. Change Case only.
    - ii. Read only Cases owned.
    - iii. Search/read pre-defined reports and limited queries.
    - iv. Estimated number of persons: 50 to 100.
  - (5) Read only (casual user) – “Casual/View only”:
    - i. Read only
    - ii. Run pre-defined reports and limited queries
    - iii. Estimated number of persons: open to Lab community

## 6. Use Cases

- a. Change a requirement including update deliverable: modify, add, archive
  - Input by RM Program Manager (expert user)
- b. Enter/review/update case item:
  - Input by RM Committee member
  - Review by any RM Committee member, SME, Policy Area manager
  - Update by RM Committee member
- c. Enter/review/update ROD
  - Input by RM Committee member
  - Review by any RM Committee member, SME, Policy Area manager
  - Update by RM Committee member
- d. Submit a deliverable: modify, add
  - Input by Deliverable Owner
- e. Change document metadata: modify, add, archive
  - Manual input by RM Program Manager
  - Auto-update from Document Management System desirable (future)
- f. Run reports/queries
  - Verification checks for any new entries or changes (Items 6a through 6e, for example)
  - Per list of Outputs, Section 5 (preliminary)
  - Custom reports, queries by RM Committee member, SME, Policy Area manager
- g. Set and receive notifications
  - Set notification conditions by RM Committee member, SME, Policy Area manager
- h. View pre-defined reports:
  - Casual users, general community members
- i. Add/Change Points of Contact, Owners
  - Global change, if a name appears more than once within the requirements data listing.
- j. Define pre-defined reports for casual users

## 7. Major Work Flows

- a. A requirement record must be changed (add new, or modify existing)
  - RM Program Manager (expert) enters data.
- b. RM Committee (RMC) is notified of activity arising due to a requirement change (new, modified, retired):
  - Open new Case item (new ID number assigned), enter information.
  - Committee review, then assign analysis to owner/Working Group (RM PM enters information in Case Tracker)
  - Affected documents are tagged (auto) as undergoing possible modification. Working Group (WG) accesses RM database
    - Review current requirement,
    - Run queries/reports to find related documents, related RODs, related Rev/Comm, owners, etc.
    - Analyzes requirement,
    - Recommends.
  - RMC logs recommendation (enter info in Case Tracker); opens and files a new ROD, attaches analysis and enters info,

### LBNL

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 13 of 27

*The official or current version is located in the repository for Institutional Documents, accessible via OCA's website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*

- If continue, assigns WG to plan implementation (enters info in Case Tracker)
  - If requirement is to be retired, record impacts on database in comments.
    - Make adjustments to database as required. (Change Requirement status, break links(?), and so forth).
  - If stop, closes task ( Case Tracker).
  - WG creates implementation plan, recommends
  - RMC logs recommendation, plan completion, owner(s) of implementation, expected complete date (enter info in Case Tracker); updates ROD status, attaches implementation plan, enters implementation plan data.
  - Implementation task may include updating Reqs database
    - Change/add/archive requirement (Requirement Data Module)
    - Change/add/archive deliverable (Deliverable Module)
  - Implementation task may include updating document (Document Module)
    - Change/add/remove document metadata [must be aligned with the specific document's Document Management System]
    - Change/add/remove document (from repository) [controlled by Document Management System]
  - Implementation monitored by RMC
    - Review, enter review date in Case Tracker
    - (Option) Comment on status in Case Tracker
  - Implementation completed, all changes completed
    - RMC logs closure date (enter info in Case Tracker)
    - Document tags are removed (auto)
    - Document metadata changes are pushed to subscribing business systems
- c. RMC receives proposed document or policy change (new, modified, archive)
- Open new Case Tracker item (new ID number assigned), enter information
  - RMC review, then assign analysis to owner/working group (enter information in Case Tracker)
    - Affected documents are tagged (auto) as undergoing possible modification.
  - 
  - Working group (WG) accesses RM database
    - Review current requirement,
    - Run queries/reports to find related documents, related RODs, related Rev/Comm, owners, etc.
    - Analyzes requirement,
    - Recommends.
  - RMC logs recommendation, plan completion, owner(s) of implementation, expected complete date (enter info in Case Tracker); updates ROD status, attaches implementation plan, enters implementation plan data.
  - Implementation task may include updating document (Document Module)
    - Change/add/remove document metadata [must be aligned with the specific document's Document Management System]
    - Change/add/remove document (from repository) [controlled by Document Management System]
  - Implementation monitored by RMC
    - Review, enter review date in Case Tracker

- (Option) Comment on status in Case Tracker
- Implementation completed, all changes completed
  - RMC logs closure date (enter info in Case Tracker)
  - Document tags are removed (auto)
  - Document metadata changes are pushed to subscribing business systems
- d. RMC receives query on a requirement or document or policy.
  - Run queries/reports to find requirement, documents, policies, related activities, including related RODs, related Rev/Comm, owners, etc.
- e. Document metadata pushes to RM database.
- f. SME submits Deliverable
  - Searches and finds instance in database.
  - Enters completion date, uploads file or link to file.

## 8. Interfaces

Figure 1 illustrates the several interfaces with the RM Database and System. Each is described briefly below.

### 8.1 User Interface

The user interface to the RM database must address several levels of user capabilities, and address both data entry and search/report functions.

- Administrators, or “Superusers” [Section 5.c (1)] are trained and given rights to change data within the database. The set of persons with these skills is expected to be quite small. The user interface for these persons must remain as intuitive and clear as possible, with an option of dividing many functions into different screens (for example, data entry screen, data reporting/queries screen, administration screen, etc.).
- Editors, Section 5.c (2) trained to and given rights to modify Case Jobs within the database. The set of persons with these skills is expected to be quite small. The data entry user interface for these persons must remain as intuitive and clear as possible, These users will likely use the same search/report screen as Limited Editors and Casual users. They may also be trained to use the Administrators search/report screen(s) to produce custom reports.
- Limited Editor Rights/Deliverables, “Casual/Deliverables” [Section 5.c (3)] trained to upload Contract deliverables. The user interface for these persons must be as simple and clear as possible, focused on enabling them to (a) upload a deliverable, and (b) update status in the database for the specific deliverable (upload date, by whom, change status flag). These users will use the same search/report screen as Casual users.
- Limited Editor Rights/Documents, “Casual/Documents” [Section 5.c (4)] trained to open and modify Case Jobs for document modifications only. The user interface for these persons must also be as simple and clear as possible, focused on enabling them to (a) enter document metadata, (b) update status in the database for the specific document, and (c) upload any

information in support of the document modification. These users will use the same search/report screen as Casual users.

- “Casual users – View Only” [Section 5.c (5)] will be limited to viewing a search/report screen where they may create simple reports/queries. The user interface for these persons must be as intuitive (simple and clear) so as to require no specialized training, with all necessary knobs accessible on one screen. There must not be any superfluous knobs or information that may confuse or distract the user. These persons will have no access to data entry screens.

## **8.2 LBNL Work Planning and Control System**

A LBNL Work Planning and Control (WP & C) System is currently under development. The WP & C system normally provides the user with links to documents in the document repository. However, if a document is undergoing modification or was recently modified, the tags introduced through the RM database must be visible to the WP & C user. Since the WPC System will rely on an accurate and current suite of institutional documents, and until the Functions’ documents are collected into a single repository, the WPC users will be among the “casual users” using pre-defined RM database reports/queries to locate documents. The WP & C system will be one subscribing system to which RM database changes may be pushed.

Further, for communications to persons by policy or institutional document changes, the RMC will seek to rely on the WP&C system to provide names associated with a particular policy or institutional document.

## **8.3 PeopleSoft**

Since each requirement instance includes at least a Laboratory owner or point of contact, highly desirable is a connection to PeopleSoft listing of Laboratory employees to flag departures from the Laboratory. A means to globally change a single name is required.

## **8.4 DOE Berkeley Site Office Contract Deliverables Management System**

In late 2010, the DOE Berkeley Site Office (BSO) released its SharePoint-based management system that includes a module for tracking LBNL’s deliverables required by DOE Contract 31. The system allows for automatically generated notifications of deliverables. Laboratory and BSO points of contact have been assigned to each deliverable. Viewing rights by Lab staff is extremely limited, and reports can only be generated by BSO staff.

The information contained in the BSO Contract Deliverables SharePoint module is a subset of the proposed Laboratory RM database.

There are no requirements for direct connectivity between the two databases. However, the RM database must be capable of generating a report whose format is sufficiently similar to a BSO generated report so that the deliverables data may be compared for accuracy.

## **LBNL**

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 16 of 27

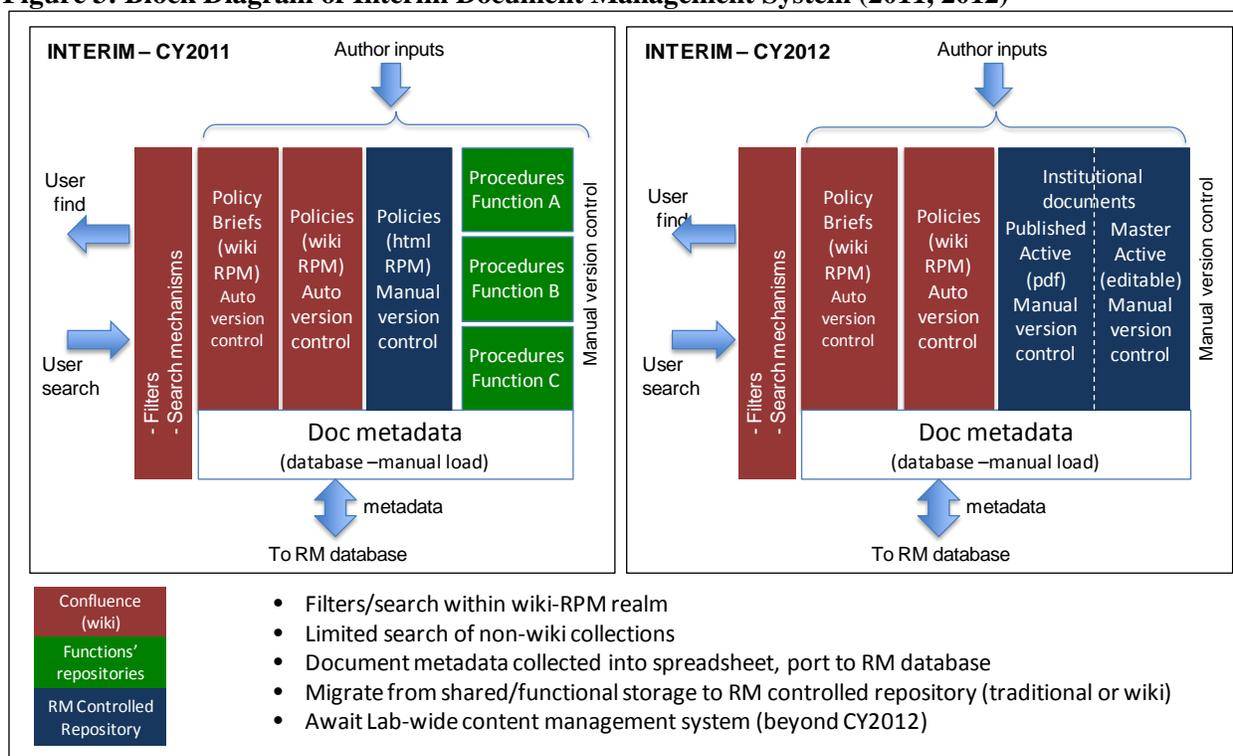
*The official or current version is located in the repository for Institutional Documents, accessible via OCA’s website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*

### 8.5 LBNL Operations Functions' Document Management Systems

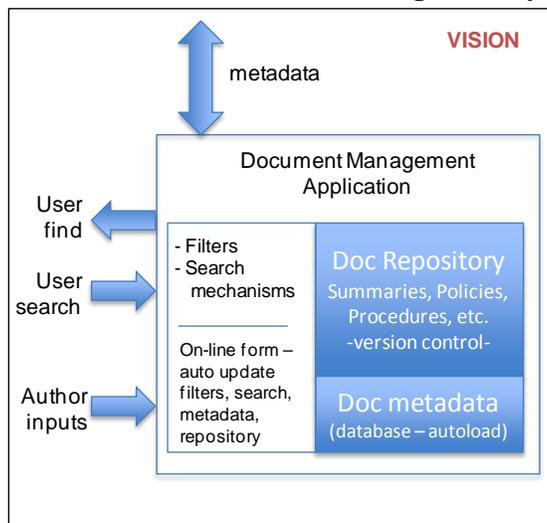
Currently, all LBNL Operations Functions manage their institutional documents manually; that is, through spreadsheet lists. Few, if any at all, have rigorous check-in/check-out processes. Each Function is responsible for setting up and maintaining its own repository for its set of institutional documents. Thus, manual updates from each Function must be provided and manually entered into the proposed RM database.

Figure 3 describes the document management system for calendar years 2011 through 2012 for institutional documents. The CY2011 view shows the multiple repositories owned by and controlled by the individual functions. The CY2012 shows the migration towards assembling the collection of institutional documents into a single repository under RM control. Figure 4 illustrates the vision for a well-connected RM database and document management system (beyond 2012).

**Figure 3: Block Diagram of Interim Document Management System (2011, 2012)**



**Figure 4: Vision for Document Management System**



### 8.6 Review/Comment System

As noted in Section 2, review/comment capability is a low priority. If ever such a module were available to the RM Program (via a lab-wide initiative for an enterprise content management system), its primary tie to the RM Program would be by way of a specific requirement or document or policy identification.

## 9. Verification, Validation

### 9.1 Verification:

A specific test plan shall be devised and implemented to verify that the developed database application meets requirements. The RM Program Manager shall review and approve results.

### 9.2 Validation:

A specific test plan shall be devised and implemented to validate the resulting application. The RM Program Manager shall review and approve results.

### 9.3 Acceptance Criteria

See Appendix D.

## 10. References

Document Number	Title
04.04.001.003	<a href="#">Requirements Management Process Description</a>
10.06.001.001	<a href="#">Managing Institutional Documents Process Description</a>
04.04.001.101	Procedure – <a href="#">Analyzing Requirements and Determining Risks and Impacts</a>
04.04.001.102	Procedure – <a href="#">Developing, Reviewing, Approving an Implementation Plan</a>
04.04.001.201	Form – <a href="#">Analyzing Requirements and Determining Risks and Impacts</a>
04.04.001.202	Form – <a href="#">LBNL Implementation Plan Template</a>

### LBNL

04.04.001.004-1.0  
Effective Date: 07/15/2011

04.04.001.204	Form – <i>RM Log Input Sheet</i>
04.04.001.206	Form – <a href="#">Significance Rating Form</a>
10.06.001.102	Procedure – <a href="#">Developing, Reviewing, Approving Institutional Policy Documents</a>
10.06.001.203	Form – <a href="#">Approval Form for Institutional Policy Documents</a>
10.06.001.101	Procedure – <a href="#">Developing, Reviewing, Approving Non-Policy Documents</a>
10.06.001.204	Form – <a href="#">Approval Form for Non-Policy Documents</a>

## 11. Revision History

Date	Revision	By whom	Revision Description	Section affected
10/3/10	0.0	L. Young	Initial	
2/16/11	0.1	L. Young	update	all
4/8/11	0.2	L. Young	Complete, update terminology	all
5/31/11	0.3	L. Young	Add Appendix on Doc Mgmt Workflow Update Table 1.	
7/15/11	0.4	L. Young	Add clarifications based on Ovitass discussions, & WP&C	all
10/6/11	0.5	L. Young	Add clarifications based on Ovitass/LBNL requires review 10/6	
10/11/11	0.6	L. Young	State acceptance criteria per LBNL internal meeting 10/10	Add Appendix D
12/1/11	0.7	L. Young	Add clarifications based on 11/21 and 11/29 Ovitass-LBNL discussions	Section 5, Table 1, Table 2
2/10/12	0.8	L. Young	Add “override” capability to Admin role (5.c.(1)) Change heading labels in Appendix A Annotate RM Case Job in Amendments/Clarifications.	
7/16/12	1.0	L. Young	Blend clarification material. Add Reference list. Finalize for publication.	Most.

### LBNL

04.04.001.004-1.0  
Effective Date: 07/15/2011

**Appendix A: Requirements Identification Fields (with sample items)**

**Requirements Identification Fields**

ReqsID	Contract Part	Contract Section	Contract Subsection	Source Requirement Type	SRD Citation	SRD Title	SRD Section/Paragraph Citation	SRD Section/Paragraph Title	Requirement Description	Primary source or embedded?
	Contract Section	C		Contract Section	C.05	Description/Specs/ Workstatement	C.05	PLANS AND REPORTS	The Contractor shall submit periodic plans and reports.....	Primary
	Contract Clause - FAR	I	I.016	Federal Acquisition Regulation (FAR)	FAR 52.219-9	SMALL BUSINESS SUBCONTRACTING PLAN (APR 2008)	I.016 (I)(2)	SSR	The Summary Subcontract Report (SSR) shall be submitted annually.....	Primary
	Contract Appendix	J.1	Appendix A	Contract Appendix	Appendix A	EMPLOYEE PROGRAMS	Section IX (c)	Employee Referral Incentive Program (ERIP)	The Laboratory will provide .....	Primary

Notes:

- “ReqsID” is the database identification number
- Contract labels are aligned to Contract 31 sections and section titles
- Source requirement can be a Contract section, a DOE order, a federal regulation, a Contract appendix and so forth.

**LBNL**

04.04.001.004-1.0

Effective Date: 07/15/2011

## Appendix B: Example of Case Sheet

**LBNL**

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 21 of 27

*The official or current version is located in the repository for Institutional Documents, accessible via OCA's website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*



## Appendix C: Document Management Workflow

### Document Management Metadata

- Title
- Document number
- Revision Level
- Revision date
- Publication date
- Effective date
- Original date (Revision 0)
- Next review date
- Author
- Author Policy Area
- Author Function/Division
- Document Reporting Relationships (Doc number, title)
  - “Flows from” list [“parent(s)”]
  - “Flows to” list [“child(ren)”]
- Internal<sup>2</sup> reviewers list
- Internal approver(s) to move to external review
- External<sup>3</sup> reviewers list
- Final approver(s) for publication
- Document Database Manager name
- User list

### Workflows:

#### I. Create new document

1. Author initiates:
  - a. Gets Document Number from Doc Database Mgr
  - b. Provides to Doc Database Mgr
    - i. Internal Reviewer list
    - ii. Internal Approver list
    - iii. External Reviewer list
    - iv. Final Approver list
    - v. User list
    - vi. Document reporting relationships (Flow to & Flow from)
2. Doc DB Mgr establishes Interim Metadata sheet
3. Author completes document draft
4. Author initiates Internal Review cycle
5. Internal Review cycle (notify, review, comment, track dates/who)
6. Author updates document draft
7. Author updates Interim Metadata sheet, notifies Doc DB Mgr
8. Internal Approver(s) approve draft for external review
9. External Review cycle (notify, review, comment, track dates/who)
10. Author updates document draft
11. Final approval (notify, review, approve)
12. [Document ready for publication]
13. Author reviews and finalizes Interim Doc Metadata sheet

---

<sup>2</sup> “Internal”= within immediate department or division.

<sup>3</sup> “External” = outside immediate department or division, usually within Lab though reviewers could include UCOP or DOE.

### **LBNL**

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 23 of 27

*The official or current version is located in the repository for Institutional Documents, accessible via OCA's website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*

14. Author
  - a. Notifies Doc DB Mgr and
  - b. Submits final approved document
  - c. Submits final approved Doc Metadata sheet.
15. Doc Database Mgr:
  - a. Stores document
  - b. Updates Doc Metadata
  - c. Triggers notifications to Users
  - d. Triggers notifications to RM database.

## 2. Modify document

1. Author
  - a. Obtains copy of last revision of document
  - b. Reviews and provides modifications to Doc Database Mgr
    - i. Internal Reviewer list
    - ii. Internal Approver list
    - iii. External Reviewer list
    - iv. Final Approver list
    - v. User list
    - vi. Document reporting relationships (Flow to & Flow from)
2. Doc DB Mgr
  - a. Flags document as “modification in process”
  - b. Establishes Interim Metadata sheet based on Author’s modifications
3. Author completes draft modifications to document
4. Author initiates Internal Review cycle
5. Internal Review cycle (notify, review, comment, track dates/who)
6. Author updates document draft
7. Author updates Interim Metadata sheet, notifies Doc DB Mgr
8. Internal Approver(s) approve draft for external review
9. External Review cycle (notify, review, comment, track dates/who)
10. Author updates draft
11. Final approval (notify, review, approve)
12. [Document ready for publication]
13. Author reviews and finalizes Interim Doc Metadata sheet
14. Author
  - a. Notifies Doc DB Mgr and
  - b. Submits final approved document
  - c. Submits final approved Doc Metadata sheet.
15. Doc Database Mgr:
  - a. Stores modified approved document
  - b. Archives previous version
  - c. Removes “in process” flag
  - d. Updates Doc Metadata
  - e. Triggers notifications to Users
  - f. Triggers notifications to RM database.

## Appendix D: Summary of Acceptance Criteria

This section summarizes the criteria for customer acceptance. Timing and dates are based on the targets verbally communicated by Ovitass at the LBNL/Ovitass kickoff meeting 9/27/2011. Completion of the project encompasses all details of this requirements document, whether referenced below or not.

Capability	Referenced sections	Metrics
1. Data can be uploaded into database in bulk and singly. Any record parameter may be changed (new, modified, archived, deleted). Relationships between requirements, institutional docs can be built, and reported. Integrity of relationships can be demonstrated via queries. Record history is retrievable.	Section 3.1, 3.2, 3.3 Section 6a, b, d, e, f Section 7a	Capability achieved by developer no later than December 15, 2011. Tested by at least one expert (Section 5.c.1) LBNL user, within 5 weeks of release by developer. Ease-of-use metric: Upload process or data entry process takes approximately same time and same keystrokes/ windows/menus as uploading MS Access with Excel file.
2. Reports can be created and downloaded	Section 3.1, 3.4 Section 4.1 Section 6f	Capability achieved by developer no later than December 15, 2011. Tested by at least 5 LBNL users (level Section 5.c.2), within 5 weeks of release by developer.
3. RMC case tracker fully functional. Window designed to access/change/retrieve case records information. Functionality includes case entry and modification; storage (attachment) of associated documents; retrieve/report (specific case data; actions and other similar parameters for any selected cases), demonstration of setting status flags of requirements and institutional docs.	Section 3.1c(1), 3.2(f) Section 3.4, 3.5, 3.6 Section 6a, b, c, f Section 7b, c, d Section 8.1	Capability achieved by developer no later than January 31, 2012. Tested by at least 5 LBNL users (level Section 5.c.2), within 3 weeks of release by developer.
4. Administrative functions are working (change/set permissions, change/set notifications, etc.)	Section 6f, g, i, j Section 8.1	Capability achieved by developer no later than January 31, 2012. Tested by at least one expert (Section 5.c.1) LBNL user within 3 weeks of release by developer.
5. Casual User window designed and functional to provide pre-defined query results.	Section 4.1 Section 6f, h, j Section 8.1	Capability achieved by developer no later than January 31, 2012. Functionality to include at least those reports listed in Section 4.1, Table 2. Tested by at least 10 LBNL casual users (Section 5.c.4), within 4 weeks of release by developer.
6. Deliverables data entry including uploading of deliverable for storage. Notifications fully functional.	Section 3.3 Section 4.2 Section 6a, d Section 7f Section 8.1	Capability achieved by developer no later than February 29, 2012. Tested by at least 10 users (Section 5.c.3), within 4 weeks of release by developer.

### LBNL

04.04.001.004-1.0

Effective Date: 07/15/2011

Page 25 of 27

*The official or current version is located in the repository for Institutional Documents, accessible via OCA's website. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.*

## Appendix E: Miscellaneous relationship diagrams

These may be helpful to better understand the relationships and definitions of the several types of instances (concepts) described in Section 3.

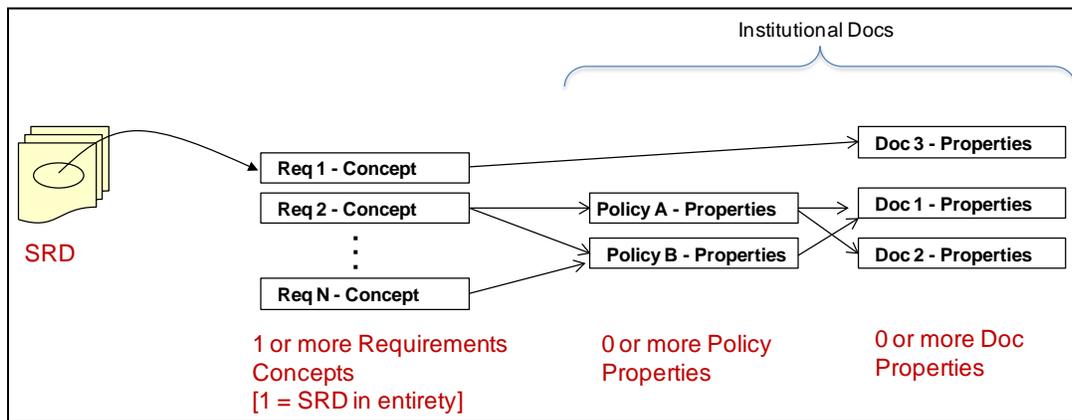


Figure E.1: Diagram showing the relationship(s) between SRD, Requirements, Policies, Docs.

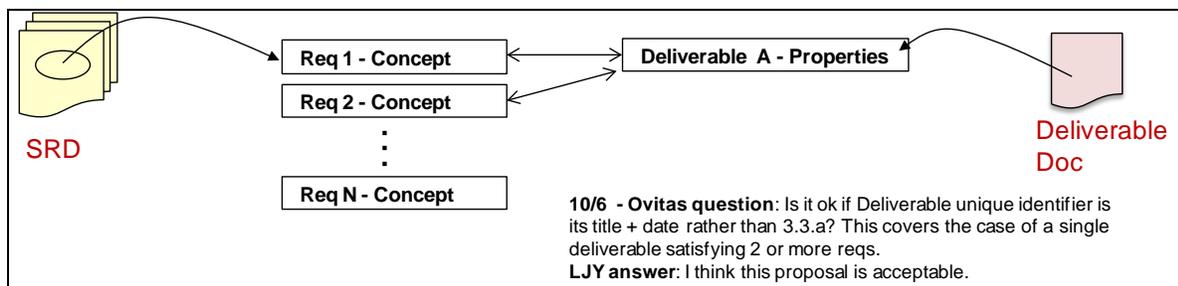


Figure E.2 Illustration to answer Ovitass question on Deliverable identifier.

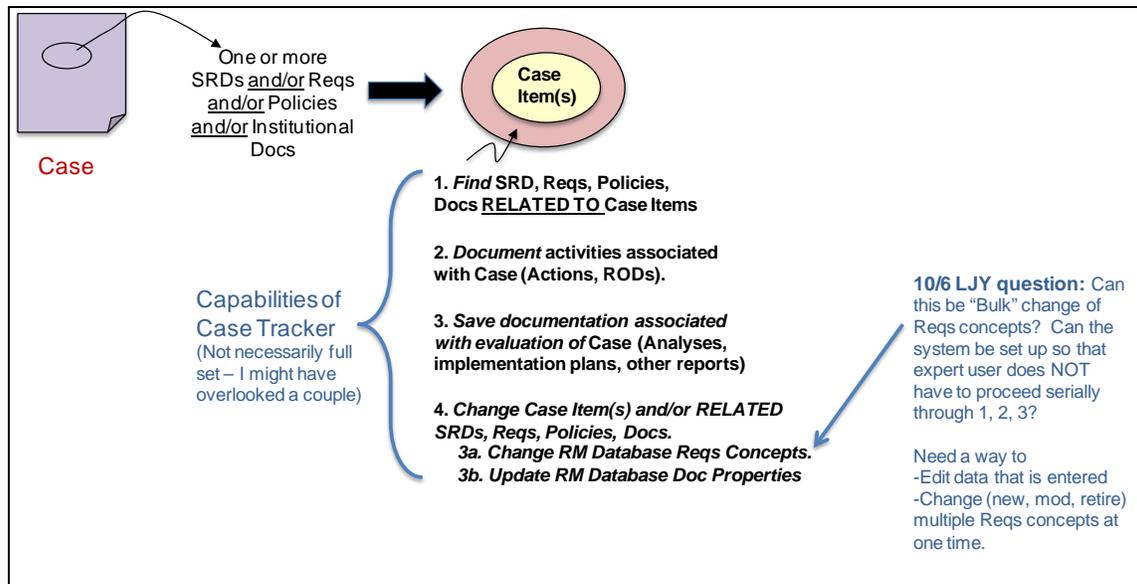


Figure E.3: Illustration of Case Tracker and capabilities. The noted question is captured by requirement of Section 3.1.f(2).

Figure E.4: Illustration of capture of data into the MS Access database to build tables for final RM System database. MS Access is capturing “policy-centric” information.

