

Chapter 4 IREQM Framework

Implementation - *AutoREQM* Prototype

An effective automation tool is helpful for project to manage requirements efficiently and correctively. This thesis addresses the requirement issues in software development, in order to meet the RD and REQM goals in CMMI. Based on the integrated and compliable process in IREQM framework, an automation tool, *AutoREQM*, is set up to help build a CMMI support system to facilitate the REQM and RD activities during the software development process. The *AutoREQM* supports the RD process within IREQM framework, and the RMP and RCM process for management concerns.

Requirement items usually have different explanations in various software engineering processes. To keep consistency between the project plans and the baselined artifacts during the REQM activities, some terms are first identified in Table 7, with definitions in RUP. The IREQM framework in this research is derived from the RUP concepts and practices, and thereby the RUP Suite tools provided by IBM Rational are fitted to help implement the IREQM framework. Following the RD process in IREQM framework to substantiate the *AutoREQM* requirement specifications, we use three tools encapsulated in RUP Suite, RequisitePro (RPro), ClearQuest (CQ), and Rational Administrator (RA), along with appropriate configuration settings, to demonstrate the feasibility of IREQM concepts, based on the System Representation research method.

4.1 Background Analysis

CMMI model is useful for organizations to achieve stable, capable, and mature processes, as well as the management ability to develop, acquire, and maintain products/services. Although the CMMI model provides wide guidance for process development, the actual processes used in organizations depend on the various organizational environments, sizes, and structures. The IREQM framework provides a RUP customization approach for software development organizations to enhance their ability to manage requirements by meeting CMMI goals.

In the drastically competitive software development industry, customers are usually with high-speed and high-quality expectation. Managing requirements effectively and efficiently during software development process therefore becomes an important challengeable issue for managers. Building a set of automated REQM system for supporting management decisions and activities to reduce the incurred cost due to requirements change are also valuable to enhance the management efficiency.

In addition, since outsourcing has become the major trend of software development, the difficulties of communicating between different groups for requirements tracking are increased inevitably. The automated REQM support system should be helpful to manage documents/artifacts and construct common criteria for requirements change, so as to facilitate communicating and coordinating managerial information during the outsourcing software development process.

4.2 Requirements Management Planning via RMP

Traceability is one of the most important concerns, especially in requirements changing situations, and thereby the relationships between those documents maintained in the requirement management process should be built at the beginning. In IREQM, we take the RUP's traceability relationships into account to comply with the REQM concerns in CMMI. The recommended strategy (Rational Software Corporation, 1998) about requirement traceability in RUP is that the stakeholder/user need traces to feature, and the feature traces to software requirement. Additionally, the Vision document keeps the information respecting user needs and features of the system. The use cases and supplementary specifications capturing functional and non-functional information about requirements are packaged in SRS.

As the project goes on, stakeholder requests (change requests, enhancement requests, requests for requirement change, or defects) possibly emerge one by one. Any such requests may cause the change of specifications or documentation, and therefore the traceability cannot to be ignored. Besides, the purpose of managing traceability is to understand the source of requirements, manage the scope of the project, manage changes to requirements, assess the project impact of a change in a requirement, and verify that all requirements of the system are fulfilled by the implementation, etc (Rational Software Corporation, 2003).

For the implementation of the IREQM framework in *AutoREQM*, Table 13 shows the different traceability items and their mappings to requirement documents or artifacts, as well as a diagram giving an overview of traceability. Table 14 describes the criteria for the traceability items. These items are the significant factors for successfully implementing the proper activities of REQM. They also help for the continuous requirements development to consider what requirement types are deserved to be defined and what artifacts should include them.

The NEED traces to FEAT, FEAT traces to UC or SUPL (may be further traced to individual STRQ). Since some traceability can be taken care of by the case tool (such as traceability about design and implementation items), *AutoREQM* only concerns about the requirements-related traceability.

Table 13 Traceability Relationships and Complementary Documents

Traceability Item	Document Type	Traces To
Stakeholder Need (NEED)	Vision (VIS)	<pre> graph TD NEED[NEED] -- "traces to" --> FEAT[FEAT] NEED -- "traces to (optional)" --> STRQ[STRQ] STRQ -- "traces to" --> FEAT FEAT -- "traces to" --> UC[UC] FEAT -- "traces to" --> SUPL[SUPL] </pre>
Feature (FEAT)	Vision (VIS)	
Stakeholder Request (STRQ)	Stakeholder Request(STR)	
Use Case (UC)	Use Case Specification(UCS)	
Supplementary Requirement (SUPL)	Supplementary Specification (SS)	
Glossary (GSS)	Integrated Glossary (GLS)	

Table 14 Traceability Criteria

Traceability Item	Criteria
NEED	Every approved NEED must trace to one or more FEAT or traces to individual STRQ (optional)
STRQ	Every approved STRQ must trace to one or more FEAT.
FEAT	Every approved FEAT must trace to one or more UC, or to one or more SUPL.

Another key element in Requirements Management Plan in *AutoREQM* is to configure requirement attributes used to be traced for each type of requirements, as characterized in Table 15. The last key point in requirements management plan is to portray the membership and procedures about requirements change management into a formal change and approval process. To implement the IREQM framework in *AutoREQM*, we involve the RCM process to handle the stakeholder requests through a formal procedure.

Table 15 Requirements Types and Attributes

Requirements Type	Requirement Attributes
Stakeholder Need (NEED)	Priority, Origin
Stakeholder Request (STRQ)	Priority, Origin
Feature (FEAT)	Priority, Status, Type, Origin, Risk, Stability, Architecture Impact, Assigned To, Difficulty, Effort, Defect, EnhancementRequest
Use Case (UC)	Priority, Status, Type, Origin, Risk, Stability, Assigned To, Difficulty, Defect, EnhancementRequest
Supplementary (SUPL)	Priority, Status, Type, Origin, Risk, Stability, Assigned To, Difficulty, Defect, EnhancementRequest
Glossary (GSS)	

Furthermore, requirements management plan is concerned about the criteria of requirements acceptance, such as “Clearly and properly stated”, Verifiable, and

“Appropriate to implement”, to prevent unlimited requests from stakeholders, as well as inadequate verification, costly rework, customer rejection, or project schedule delay.

4.3 Requirements Development via RD

In *AutoREQM*, RD is the primary process to be implemented along with RMP and RCM process to fulfill the objective of the IREQM framework. Some key concepts are illustrated as follows.

4.3.1 Develop Vision

Vision document contains SWOT Matrix, Problem Statement, Stakeholder Needs, Features, Stakeholder Description, Product Requirements, and so forth. In the requirements development of *AutoREQM*, the activity Develop Vision generates the initial vision content, including SWOT Matrix, Problem Statement and Stakeholder Description. The content is further refined in the following activities to become complete.

The SWOT analysis is conducted to understand the strength, weakness, opportunity, and threat of the business environment, to appreciate why the system has to be implemented based on the business goals described in the background information. Also, Problem Statement and Stakeholder Description are developed in this activity, as shown in Table 16 and Table 17. The Problem Statement describes the problem being solved by this project. The Stakeholder Description provides a profile of the involved stakeholders and users in the project, along with their associated environments. But it does not describe their specific requests or requirements, which are captured in a separate stakeholder requests document/artifacts.

Table 16 Problem Statements

Problem	The changed requirements usually become the significant contributors to project failure.
Impact by this problem	If managed ineffectively, the problems relate to changed requirements may result in impacts on cost, schedule, time and loss on productivity.
Effect of a successful solution	Effective requirements management improves the software development efforts and quality.

Table 17 Stakeholder Descriptions

Stakeholder Type	Responsibilities
Customer	Provide domain knowledge
Other Stakeholder	Provide domain knowledge
End User	Provide domain knowledge
PM	RMP, Develop Vision, Assess the impact of the stakeholder request for requirement change, Negotiate and Audit the stakeholder request for requirement change
REQM Personnel	Record the stakeholder request for requirement change with rationale, Assess the impact of the stakeholder request for requirement change, Negotiate and Audit the stakeholder request for requirement change, Record the changed

	requirements to requirements change summary table, Record the source of inconsistency with rationale and Initiate corrective actions, Maintain the requirements tracking table, Maintain the changed requirements and history with rational, Create statistical charts for report
System Analyst	Develop Vision, Understand Stakeholder Needs and Elicit Stakeholder Requests, Analyze Functions (Features), Analyze Operational Workflow, Find and Prioritize Use Cases, Analyze Supplementary Specification, Capture Common Vocabulary, Validate Requirements
Requirements Specifier	Detail Use Cases, Validate Requirements
Technical Reviewer	Review its consistency
Software Architect	Find and Prioritize Use Cases

4.3.2 Understand Stakeholder Needs and Elicit Stakeholder Requests

The objective of this activity is to develop Stakeholder Needs described in the Vision document, as well as the Stakeholder Requests document. The Stakeholder Needs of *AutoREQM* are numbered respectively with prefix “NEED” in Table 18.

In addition, the stakeholder requests for their specific requirements should mainly include the stakeholders/users profile, environment, problem, solution, opportunity assessment, reliability, performance or support needs, etc. They provide articulate statement for the development team to understand the stakeholder or user’s real needs, problems, and environment. Interviewing the key stakeholders is a simple way to gain the information about their requests. Other requirements data collection schemes, such as more interviews from various perspectives, questionnaires, observations, etc. can also be used for this activity.

4.3.3 Analyze Functions (Features)

Table 18 also lists the features of *AutoREQM* developed through Analyze Functions activity. In some cases, customers provide the function list directly, but sometimes functions (features) are generated by the development team, in consultation with customer. Furthermore, the attributes for the requirement type FEAT defined in requirements management plan can be assigned values. For example, the priority attribute with high value is used to determine the features needed to be developed first.

Table 18 Derived Features with Stakeholder Needs in *AutoREQM*

NEED#	Stakeholder Needs	FEAT#	Features
NEED01	Support to maintain the REQM plan efficiently	FEAT01	Ability to provide templates for Requirements Management Plan
		FEAT02	Ability to save and restore Requirements Management Plan
NEED02	Provide an automated process that can manage the documents/artifacts generated by requirements development	FEAT03	Ability to save and restore Background Analysis
		FEAT04	Ability to save and restore Vision Document
		FEAT05	Ability to save and restore Stakeholder Request document
		FEAT06	Ability to save and restore Use Case Description.
		FEAT07	Ability to save and restore Supplementary document
		FEAT08	Ability to save and restore Glossary document
		FEAT09	Ability to save and restore SRS document
NEED03	Provide an automated process for requirements change management	FEAT010	Ability to save documents as Microsoft Word documents
		FEAT011	Ability to maintain Requirements Change Request Form
		FEAT012	Ability to fill in the Requirements Change Request Form online
		FEAT013	Ability to track the state and responsibility of stakeholder request for requirements change
NEED04	Support the requirements traceability	FEAT014	Ability to maintain change request data (audit result...)
		FEAT015	Ability to save and restore each requirement type
NEED05	Provide the information to support inconsistency review.	FEAT016	Ability to save and restore the links between associated requirements
		FEAT017	Ability to maintain Requirements Change Summary Table
NEED06	Provide the information to support impact assessment.	FEAT018	Ability to maintain Review Record for inconsistency, corrective actions, and resolutions.
		FEAT019	Ability to maintain impact affects between traceability items
NEED07	Provide the statistic information, reports or query functionality to support managerial decision.	FEAT020	Ability to maintain traceability table
		FEAT021	Ability to provide the submitted requests report
		FEAT022	Ability to provide the passed requests report
		FEAT023	Ability to provide the inconsistent requests report
		FEAT024	Ability to provide the unresolved requests report
		FEAT025	Ability to provide the uncompleted requests report
		FEAT026	Ability to provide requirements summary report
		FEAT027	Ability to provide requirements change summary report
		FEAT028	Ability to maintain requirements change history
NEED08	Provide individual operational environment to distinguish between different identifications.	FEAT029	Ability to provide query by different requirements attribute (filtered by Priority, Risk, Effort, Stability...)
		FEAT030	Ability to provide not traced requirements report
		FEAT031	Ability to provide Login verification function
		FEAT032	Ability to provide individual's operational interface
		FEAT033	Logon

4.3.4 Analyze Operational Workflow

The activity Analyze Operational Workflow aims to arrange most of the above functions (features) into a workflow from the business scenarios perspective, along with some other considerations, such as user environment, constrains, performance,

and so on. Some new ideas or required functions probably appear during the analysis process. Below are the operational workflows of *AutoREQM*.

1. Manage RD Artifacts

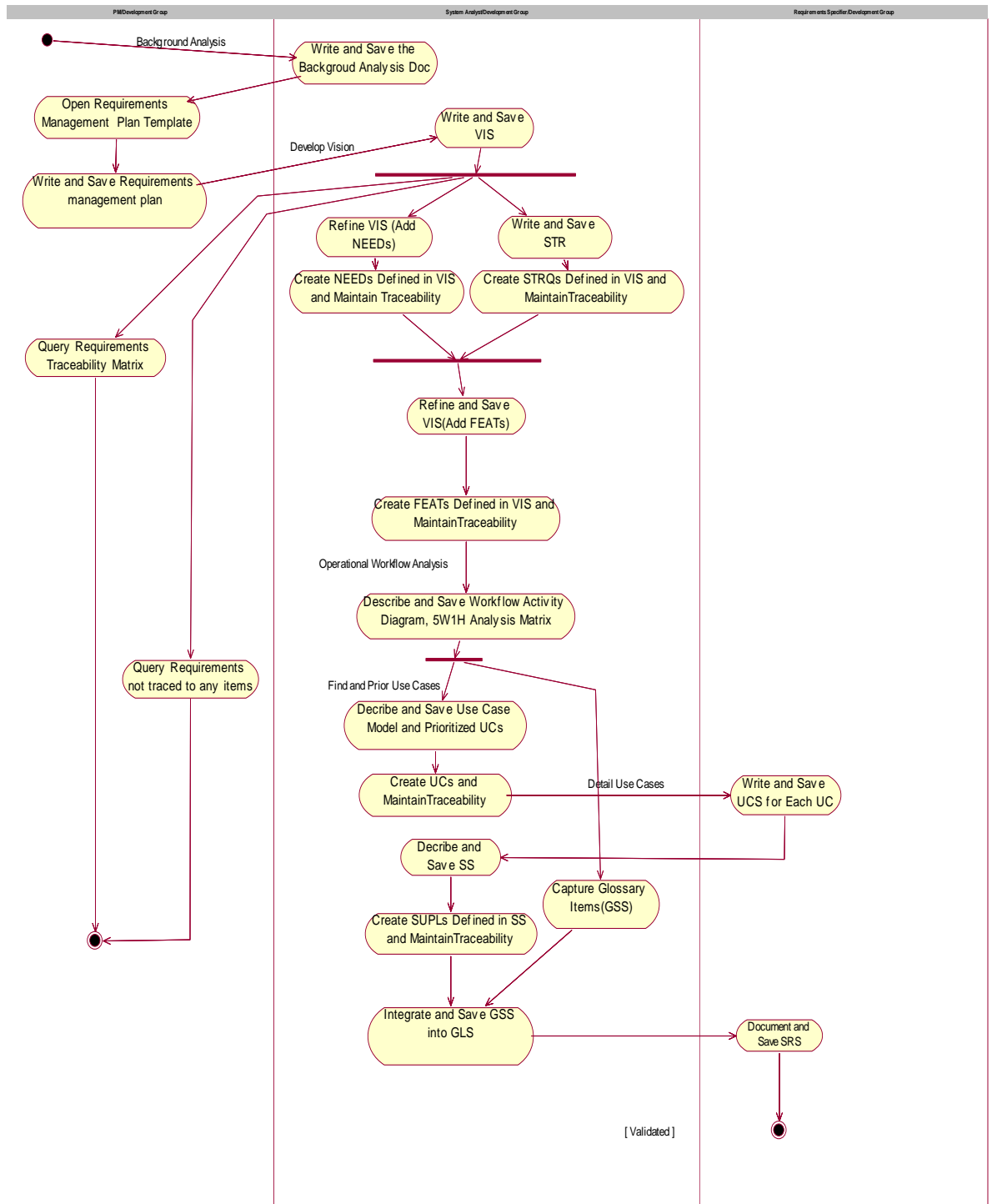


Figure 9 Manage RD Artifacts

2. Manage Requirements Change

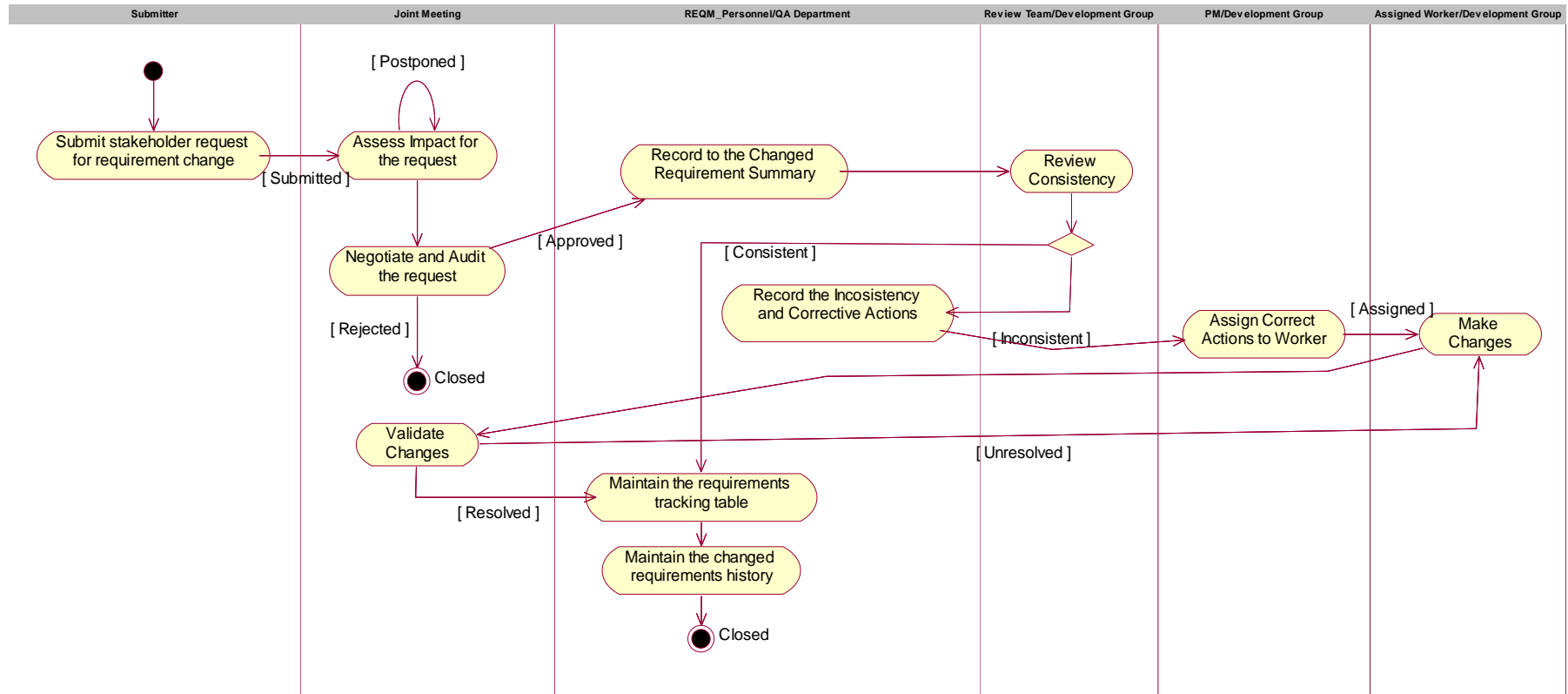


Figure 10 Manage Requirement Change

3. Support Management

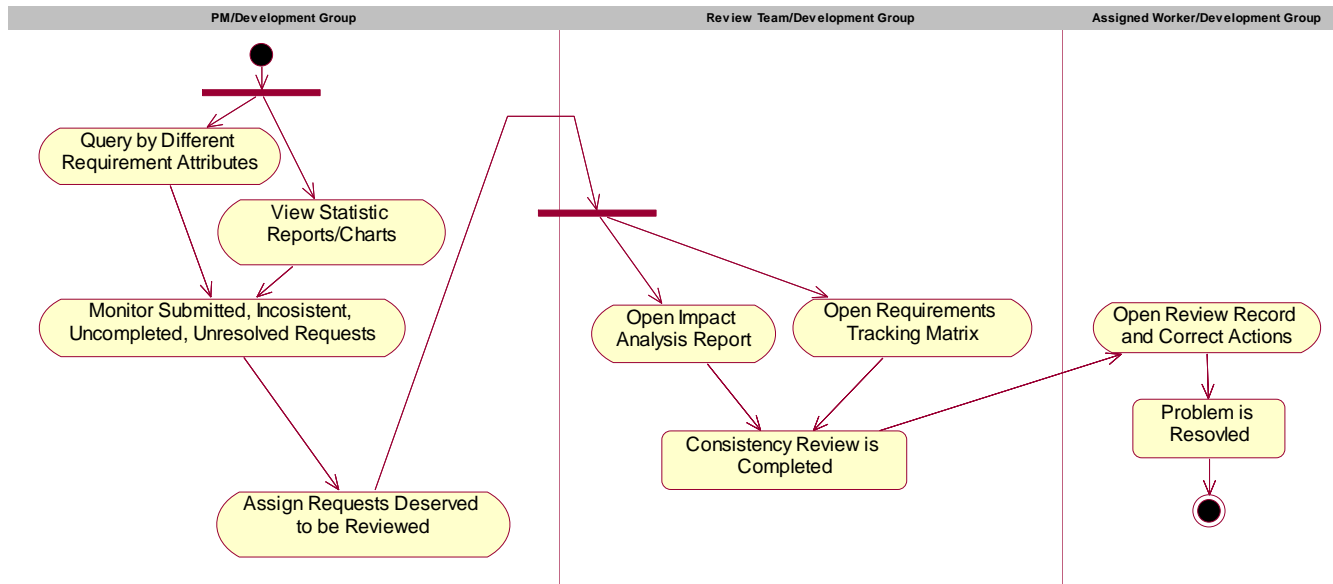


Figure 11 Support Management Change

4.3.5 Find, Prioritize and Detail Use Cases

The purpose of this activity is to find the use cases and consider their priorities for iteration planning based on the project factors such as cost, human resource, or schedule. The use case model of *AutoREQM* is shown in below. We list the prioritized use cases of *AutoREQM*, numbered with prefix “UC”. In addition, the traceability dependencies between features and use cases are also established for requirements change management.

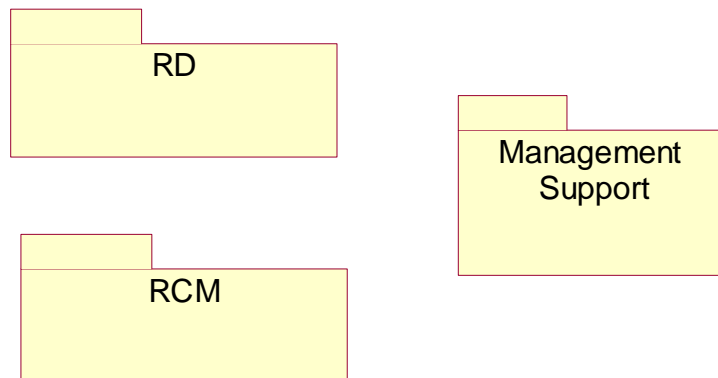


Figure 12 *AutoREQM* Use Case Packages

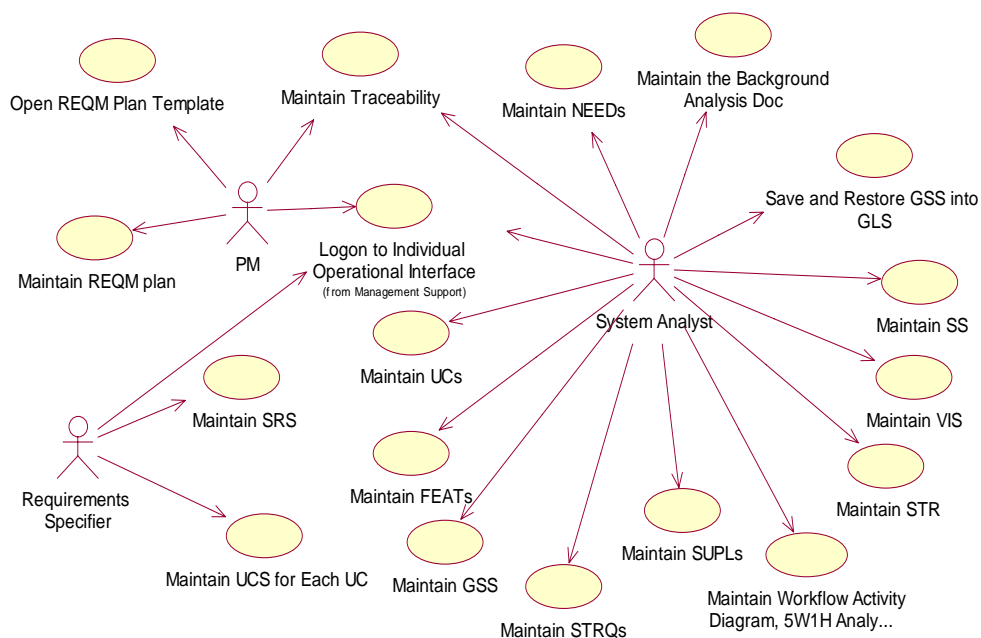


Figure 13 Use Case Diagram Contained in RD Package

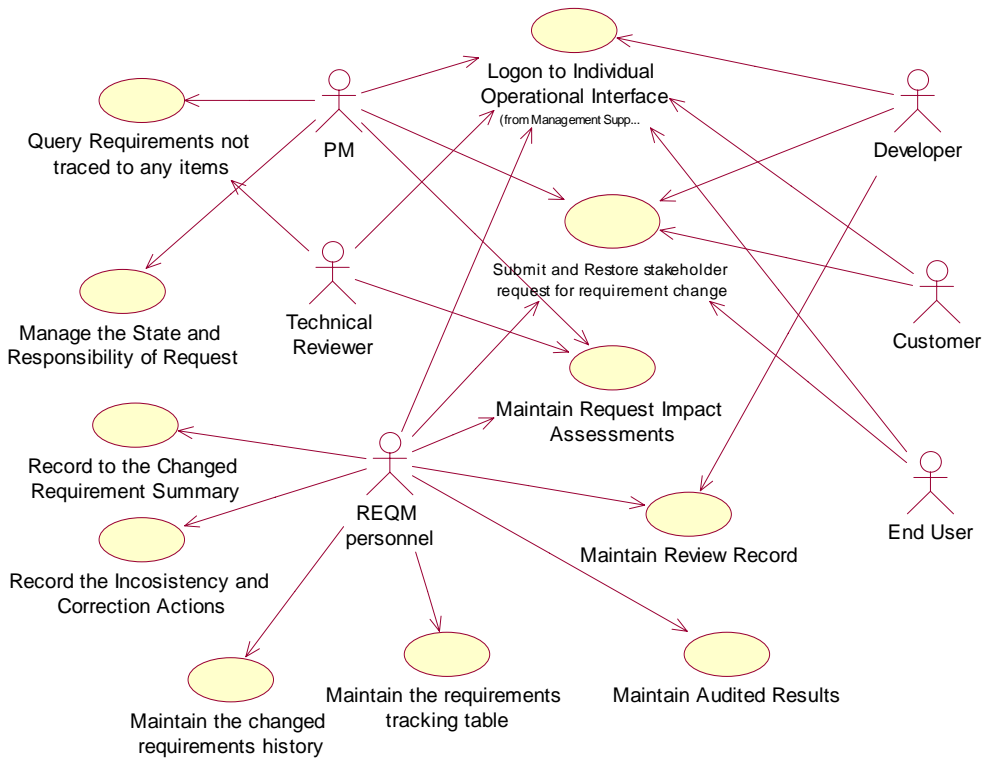


Figure 14 Use Case Diagram Contained in RCM Package

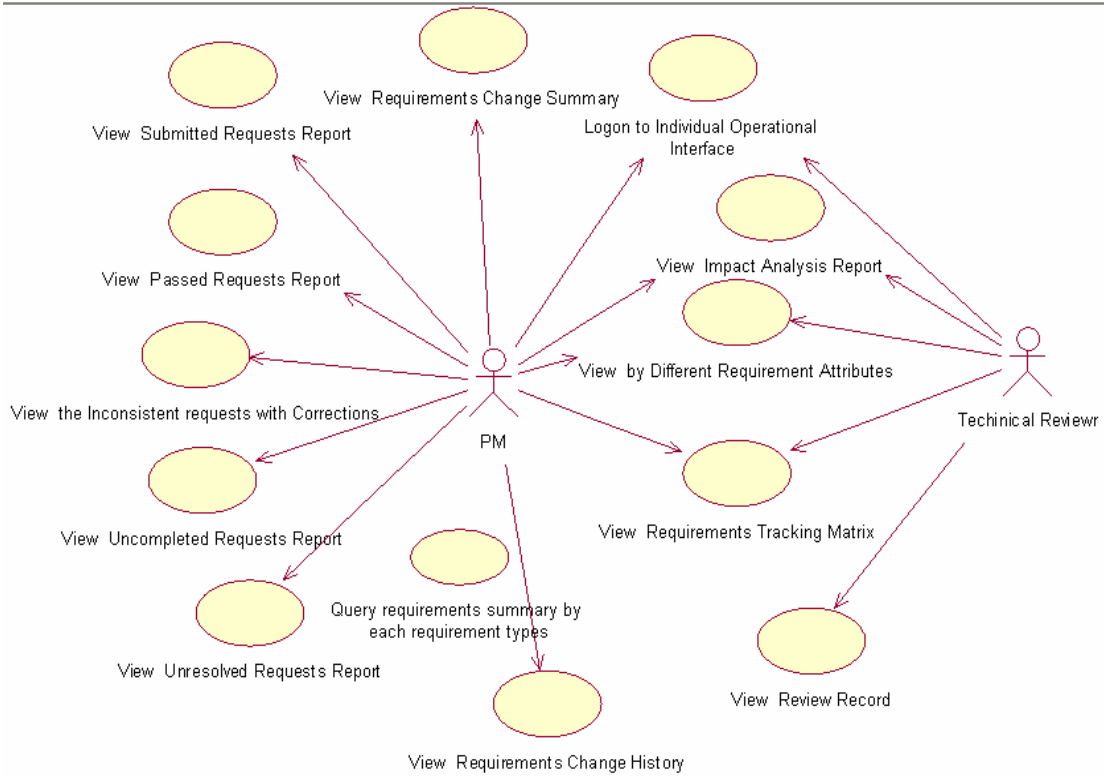


Figure 15 Use Case Diagram Contained in Management Support Package

Table 19 Prioritized Use Cases

Package	UC#	UC Name	Trace to Feature#
RD	UC01	Logon to Individual Operational Interface	FEAT031,032,033
	UC02	Maintain the Background Analysis Doc	FEAT03
	UC03	Open REQM Plan Template	FEAT01
	UC04	Maintain REQM plan	FEAT02
	UC05	Maintain NEEDs	FEAT015
	UC06	Maintain STRQs	FEAT015
	UC07	Maintain FEATs	FEAT015
	UC08	Maintain UCs	FEAT015
	UC09	Maintain SUPLs	FEAT015
	UC010	Maintain GSS	FEAT015
	UC011	Maintain Traceability	FEAT016
	UC012	Maintain VIS	FEAT04
	UC013	Maintain STR	FEAT05
	UC014	Maintain Workflow Activity Diagram, 5W1H Analysis Matrix	FEAT010
	UC015	Maintain SS	FEAT07
	UC016	Maintain UCS for Each UC	FEAT06
	UC017	Save and Restore GSS into GLS	FEAT08
	UC018	Maintain SRS	FEAT09
RCM	UC019	Query Requirements not traced to any items	FEAT030
	UC020	Manage the State and Responsibility of Requests	FEAT013
	UC021	Record to the Changed Requirement Summary	FEAT017
	UC022	Record the Inconsistency and Correction Actions	FEAT018
	UC023	Maintain the changed requirements history	FEAT028
	UC024	Maintain Review Record	FEAT018
	UC025	Submit and Restore stakeholder request for requirement change	FEAT011,012
	UC026	Maintain Request Impact Assessments	FEAT019
	UC027	Maintain Audit Results	FEAT014
	UC028	Maintain the requirements tracking table	FEAT020
Management Support	UC029	View Submitted Requests Report	FEAT021
	UC030	View Passed Requests Report	FEAT022
	UC031	View the Inconsistent requests with Corrections	FEAT023
	UC032	View Uncompleted Requests Report	FEAT025
	UC033	View Unresolved Requests Report	FEAT024
	UC034	View Requirements Change History	FEAT028
	UC035	View Requirements Tracking Matrix	FEAT020
	UC036	View Review Record	FEAT018
	UC037	Query requirements summary by each requirement type	FEAT026
	UC038	Query by Different Requirement Attributes	FEAT029
	UC039	Open Impact Analysis Report	FEAT019
	UC040	Open Requirements Change Summary	FEAT027

The previous development gives the skeleton of *AutoREQM* from which the elaborative elements can be specified. The details of each use case are necessary to the subsequent software design, such as description, preconditions, postconditions, flow of events, extension points, although some of them are optional. The complete use case specifications are the major content of the SRS.

4.3.6 Analyze Supplementary Specification and Capture Common Vocabulary

Use cases capture mainly the functional and behavioral requirements. The non-functional requirements across use cases, such as operating environment, compatibility, usability, reliability, performance, design constraints, and so on, are articulated in the Supplementary Specifications. Additionally, an integrated vocabulary/glossary should be established to record and maintain all the domain terms defined for the designated application system.

4.3.7 Validate Requirements

The SRS provides a complete and comprehensive description of the requirements for the software. The requirements validation is performed to gain the reliance on the guidance of subsequent development. Some organizations use complex validation techniques, such as analyses, simulators or prototypes, to ensure the requirements defined in SRS meet the stakeholder expectations. The requirements validation in *AutoREQM* can be conducted via the validation review of the SRS by the customers to ensure the common understanding of the system requirements to be committed by the developers.

The SRS should be organized as specified in the Requirements Management Plan. Separate SRS may be desired for distinct features in a particular release of the product. The main requirement types implemented in the *AutoREQM* include needs, features, stakeholder requests, use cases, supplementary requirements, and glossary. They are organized in various document types. Except for the vision document, most of these artifacts are usually packaged into SRS.

4.4 Screen Display of *AutoREQM* with Internet-Banking Example

Rational RequisitePro (RPro) is a requirements management tool that helps teams to organize, prioritize, trace relationships, and easily track changes to their requirements. Rational ClearQuest (CQ) is a customizable defect and change tracking system designed for the dynamic environment of software development. With CQ, you can manage every type of change activity associated with software development,

including enhancements, defects, and documentation modifications (RATIONAL SOFTWARE CORPORATION, 2003). Meanwhile, it provides a designer tool to customize your own interfaces with individual behavior.

The *AutoREQM* system is mainly established by the integration use of RPro and CQ. Once the stakeholder requests are proposed and then approved, they can be stored in the CQ and used in the RPro, by their association relationship created with predefined attributes. The *AutoREQM* system can be roughly divided into RD and RCM subsystems, based on the IREQM framework design. The generated reports can be used to support automated requirements tracking and other managerial activities.

In the following illustration, we use a subset of the requirements document of an internet-banking project as an example to elaborate the practical application of *AutoREQM*. The example is given to demonstrate the management of artifacts/documents during the IREQM framework implementation. Before illustrating the real case example, the concerns are focused on the process requirements of achieving REQM and RD goals in CMMI. The concerns are now transferred to the process implementation to maintain requirements documents using Rational tools based on the similar requirements management plan. Some requests for requirements change in the example are given to demonstrate the requirements changing and tracking abilities of *AutoREQM*.

Table 20 summarizes a few Stakeholder Needs, Features, and prioritized Use Cases extracted from the RD documents of the internet-banking project. Table 21 gives a few requirements change requests mainly from the internet-banking development process. Based on the requirements change process specified in Figure 10, the requirements change states for each request and the related management information, such as audit results, originator, date, and impact assessment, are illustrated in the table.


Table 20 Sample NEEDS, FEATs, UCs, and Traceability Relationships

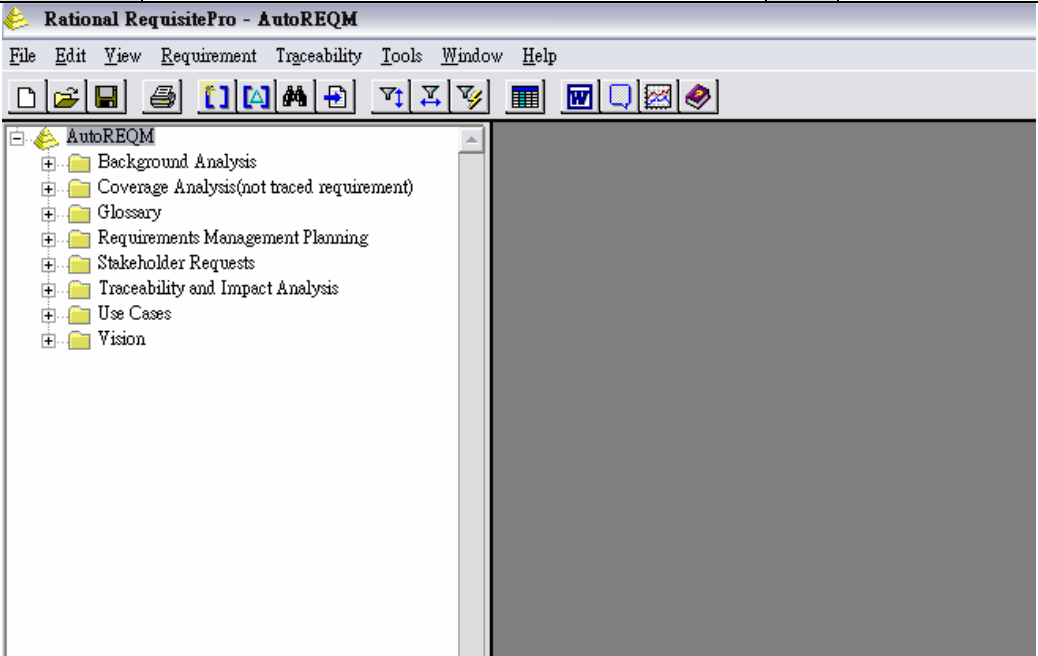
NEED#	Stakeholder Needs	Trace to FEAT#	FEAT Name	Trace to UC#	UC Name
NEED1	Logon-Logout Service	FEAT1	Logon-Logout	UC1	Logon
				UC2	Logout
NEED2	Query Service	FEAT3	Account Query	UC3	Query Account Balance
				UC4	Query Account Exchange Details
				UC5	Query Reimbursement History
				UC6	Query Inward Remittance
NEED3	Account Transfer Service	FEAT2	Account Transfer	UC7	Transfer SSL Account Message
				UC8	Reserve Transferring
				UC9	Pay by Credit Card
NEED4	Loss Registration Service	FEAT4	Credit Card Loss Registration	UC10	Register Credit Card Loss

Table 21 Sample Requests for Requirements Change

Request#	Submission Date	Originator	Headline	Impact Assessment	Audit Date	Audit Result/State	Approver	Resolution
Req00000001	2004/03/06	Yang (Customer)	change of new use registration	FEAT1 affected	2004/03/12	Approved/ Closed	Tseng, Chen	Enhancement Request
Req00000002	2004/03/18	Hwang (Customer)	3 error counts individually allowed for user password and financial password	FEAT1 affected; 0.5 Man-Day required	2004/03/28	Approved/ Resolved	Tseng, Chen	Enhancement Request
Req00000003	2004/04/01	Ling (PM)	account Queries for transfer reservation and its cancellation	FEAT2 affected; 0.5 SA/SD, 1 coding Man-Day required	2004/04/01	Approved/ Assigned	Tseng, Chen	N/A
Req00000004	2004/04/29	Fang (End User)	page modification for account detail transaction	N/A	2004/05/03	Postponed	Tseng, Chen	N/A

The sample screens can be summarized as follows.

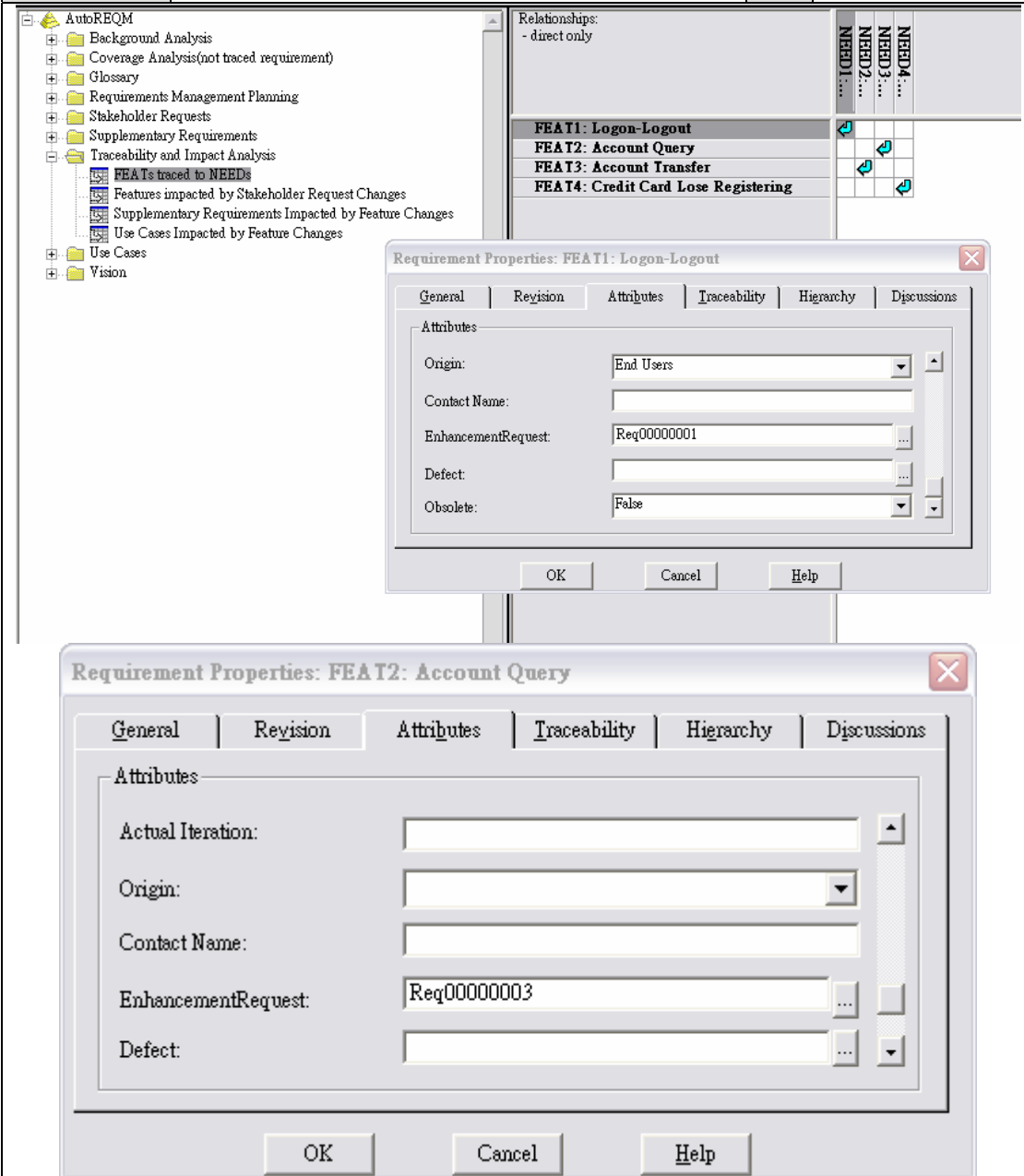
Description	Logon	tool	RequisitePro(RPro)
			
Related UC#	UC01	Screen#	1
Notes	The <i>AutoREQM</i> provides the authorization.		

Description	Overview of the functions about RD Subsystem	tool	RequisitePro(RPro)
			
Related UC#	UC02~UC019, UC028, UC035, UC037~UC038	Screen#	2
Notes	This is an overview of RD subsystem in <i>AutoREQM</i> , with primary functions.		

Description	RMP Templates	tool	RequisitePro(RPro)
	<ul style="list-style-type: none"> AutoREQM <ul style="list-style-type: none"> Background Analysis <ul style="list-style-type: none"> Background Analysis Coverage Analysis(not traced requirement) Glossary Requirements Management Planning <ul style="list-style-type: none"> Requirements Management Plan Stakeholder Requests Supplementary Requirements Traceability and Impact Analysis Use Cases Vision 		
Related UC#	UC02, UC03, UC04	Screen#	3
Notes	<i>AutoREQM</i> provides the predefined background analysis and requirements management plan template. Click them to open the corresponding Microsoft Word format documents.		

Description	Maintain Requirements and documents	tool	RPro
	<ul style="list-style-type: none"> AutoREQM <ul style="list-style-type: none"> Background Analysis Coverage Analysis(not traced requirement) Glossary Requirements Management Planning Stakeholder Requests <ul style="list-style-type: none"> All Stakeholder Requests <ul style="list-style-type: none"> STRQ traced to NEED STRQ1: STRQ from high level manager STRQ2: STRQ from stakeholder 1 Supplementary Requirements Traceability and Impact Analysis Use Cases Vision <ul style="list-style-type: none"> Feature <ul style="list-style-type: none"> All Features <ul style="list-style-type: none"> FEATs traced to NEEDs FEATs traced to STRQs FEAT1: Logon-Logout FEAT2: Account Query FEAT3: Account Transfer FEAT4: Credit Card Lose Registering Stakeholder Need Vision 		
Related UC#	UC037, UC038	Screen#	4
Notes	The documents (UC1,UC2) and requirements(UC1~UC10) can be created to be maintained.		

Description	Traceability Matrix	tool	RPro																				
<ul style="list-style-type: none"> [-] AutoREQM <ul style="list-style-type: none"> [+] Background Analysis [+] Coverage Analysis(not traced requirement) [+] Glossary [+] Requirements Management Planning [+] Stakeholder Requests [+] Supplementary Requirements [+] Traceability and Impact Analysis <ul style="list-style-type: none"> FEATs traced to NEEDs Features impacted by Stakeholder Request Changes Supplementary Requirements Impacted by Feature Changes Use Cases Impacted by Feature Changes [+] Use Cases [-] Vision <ul style="list-style-type: none"> [-] Feature <ul style="list-style-type: none"> All Features FEATs traced to NEEDs FEATs traced to STRQs FEAT1: Logon-Logout FEAT2: Account Query FEAT3: Account Transfer FEAT4: Credit Card Lose Registering [-] Stakeholder Need <ul style="list-style-type: none"> All Stakeholder Needs NEED1: Logon-Logout Service NEED2: Query Service NEED3: Account Transfer Service NEED4: Loss Registering Service Vision 	<p>Relationships: - direct only</p> <table border="1"> <tr> <td>FEAT1: Logon-Logout</td> <td>NEED1:...</td> <td>NEED2:...</td> <td>NEED3:...</td> <td>NEED4:...</td> </tr> <tr> <td>FEAT2: Account Query</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FEAT3: Account Transfer</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FEAT4: Credit Card Lose Registering</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	FEAT1: Logon-Logout	NEED1:...	NEED2:...	NEED3:...	NEED4:...	FEAT2: Account Query					FEAT3: Account Transfer					FEAT4: Credit Card Lose Registering						
FEAT1: Logon-Logout	NEED1:...	NEED2:...	NEED3:...	NEED4:...																			
FEAT2: Account Query																							
FEAT3: Account Transfer																							
FEAT4: Credit Card Lose Registering																							
Related UC#	UC028, UC035	Screen#	5																				
Notes	This is a tracking matrix provided by <i>AutoREQM</i> .																						

Description	Associated with the stakeholder request stored in CQ	tool	RPro
			
Related UC#	UC025, UC028	Screen#	6
Notes	By, "EnhancementRequest" attribute, the stakeholder requests stored in RCM subsystem, where the RCM process located, can be associated with the requirements in RPro. In the screen, FEAT2 is associated with Req00000003.		

Description	Requirements Summary	tool	RPro																																																																																				
<ul style="list-style-type: none"> AutoREQM <ul style="list-style-type: none"> Background Analysis Coverage Analysis(not traced requirement) Glossary Requirements Management Planning Stakeholder Requests <ul style="list-style-type: none"> All Stakeholder Requests STRQ traced to NEED STRQ1: STRQ from high level manager STRQ2: STRQ from stakeholder 1 Supplementary Requirements Traceability and Impact Analysis Use Cases <ul style="list-style-type: none"> UC1 UC2* All Use Cases* Use Cases Traced to Features <ul style="list-style-type: none"> UC1: Logon UC2: Logout UC3: Query Account Balance UC4: Query Account Exchange Details UC5: Query Reimbursement History UC6: Query Inward Remittance UC7: Transfer SSL Account Message UC8: Reserve Transferring UC9: Pay by Credit Card UC10: Register Credit Card Loss Vision 	<table border="1"> <thead> <tr> <th>Requirements:</th> <th>Property</th> <th>Priority</th> <th>Status</th> <th>Difficulty</th> <th>Stability</th> <th>Risk</th> </tr> </thead> <tbody> <tr><td>UC1: Logon</td><td>Name</td><td>High</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC2: Logout</td><td>Name</td><td>High</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC3: Query Account Balance</td><td>Name</td><td>High</td><td>Approved</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC4: Query Account Exchange...</td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC5: Query Reimbursement History</td><td>Name</td><td>Low</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC6: Query Inward Remittance</td><td>Name</td><td>Low</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC7: Transfer SSL Account Message</td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC8: Reserve Transferring</td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC9: Pay by Credit Card</td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>UC10: Register Credit Card Loss</td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> <tr><td>* <Click here to create a requirement></td><td>Name</td><td>Medium</td><td>Proposed</td><td>Medium</td><td>Medium</td><td></td></tr> </tbody> </table>	Requirements:	Property	Priority	Status	Difficulty	Stability	Risk	UC1: Logon	Name	High	Proposed	Medium	Medium		UC2: Logout	Name	High	Proposed	Medium	Medium		UC3: Query Account Balance	Name	High	Approved	Medium	Medium		UC4: Query Account Exchange...	Name	Medium	Proposed	Medium	Medium		UC5: Query Reimbursement History	Name	Low	Proposed	Medium	Medium		UC6: Query Inward Remittance	Name	Low	Proposed	Medium	Medium		UC7: Transfer SSL Account Message	Name	Medium	Proposed	Medium	Medium		UC8: Reserve Transferring	Name	Medium	Proposed	Medium	Medium		UC9: Pay by Credit Card	Name	Medium	Proposed	Medium	Medium		UC10: Register Credit Card Loss	Name	Medium	Proposed	Medium	Medium		* <Click here to create a requirement>	Name	Medium	Proposed	Medium	Medium			
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* <Click here to create a requirement>	Name	Medium	Proposed	Medium	Medium																																																																																		

Requirement Properties: FEAT3: Account Transfer

General | Revision | Attributes | Traceability | Hierarchy | Discussions

From: NEED2: Query Service [Add... Remove]

To: UC3(s): Query Account Remaining Sum
UC4(s): Query Account Exchange Details
UC5(s): Query Reimbursement History
UC6(s): Query Inward Remittance [Add... Remove]

OK Cancel Help

Requirement Properties: FEAT3: Account Transfer

General | Revision | Attributes | Traceability | Hierarchy | Discussions

Attributes

Actual Iteration: []

Origin: End Users []

Contact Name: []

EnhancementRequest: Req00000003 []

Defect: []

OK Cancel Help

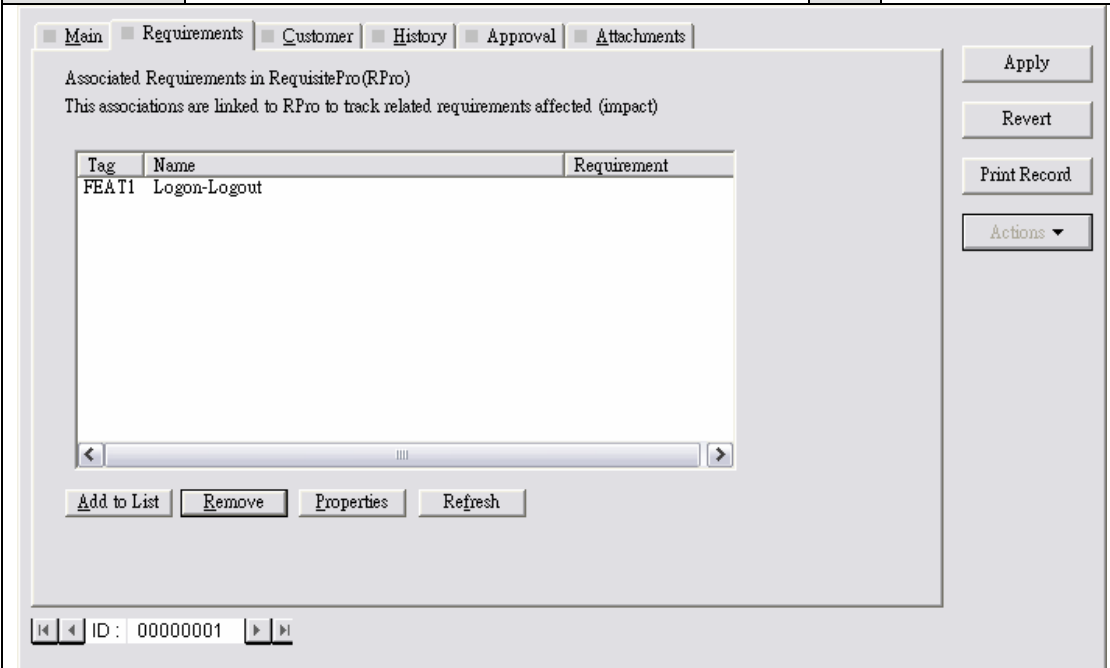
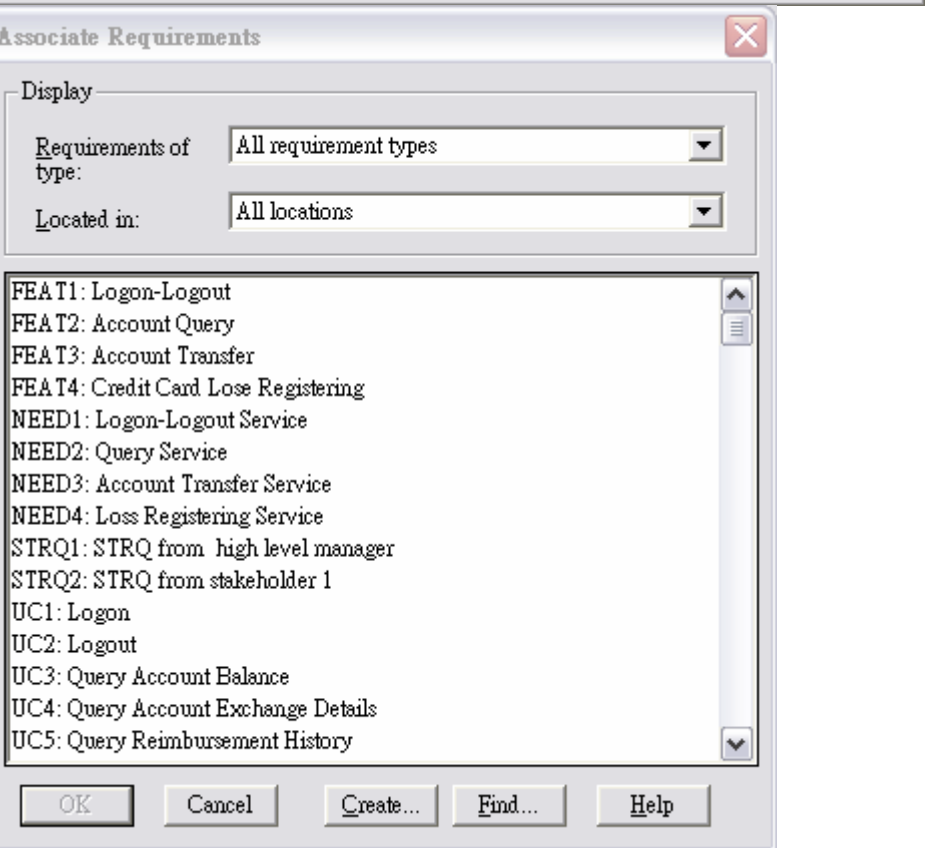
Related UC#	UC038	Screen#	7
Notes	AutoREQM provides the query of requirements summary with attributes for each requirement type. The states of each requirements type can be recorded to track the state of present processing.		

Description	Attributes for each requirement type	tool	RPro
Related UC#	UC038	Screen#	8
Notes	Each requirement type has various requirements attribute.		

Description	Query by requirements attributes	tool	RPro
Related UC#	UC038	Screen#	9
Notes	You can query requirements by requirement attributes		

Description	Query Results	tool	RPro
Requirements:	Property	Priority	Status
		1 - Flt:Y	
► UC5: Query Reimbursement History	Name	Low	Proposed
UC6: Query Inward Remittance	Name	Low	Proposed
Difficulty	Stability	Risk	
Medium	Medium		
Medium	Medium		
Related UC#	UC038	Screen#	10
Notes	You can assign value for each query to filter what you want to see.		

Description	Requirement Change Request Form (Main)	tool	ClearQuest(CQ)
Related UC#	UC025	Screen#	11
Notes	This form is used for proposing a request for requirements change. The main tab provides the primary concerns categories of request submission.		

Description	Requirement Change Request Form (Requirements)		tool	CQ	
					
					
Related UC#	UC025	Screen#	12		
Notes	First screen is Requirements tab that provides the association with those requirements in RPro. The second screen will appear when click 「Add to List」.				

Description	Requirement Change Request Form (Customer)	tool	CQ
Related UC#	UC025	Screen#	13
Notes	The information of primary customer is recorded in this tab.		

Description	Requirement Change Request Form (Attachments)	tool	CQ
Related UC#	UC025	Screen#	14
Notes	The attachments are recorded in this tab.		

Description	Request maintenance (Main)	tool	CQ																				
<table border="1"> <thead> <tr> <th>id</th> <th>Submitted_Date</th> <th>Headline</th> <th>State</th> </tr> </thead> <tbody> <tr> <td>Req00000001</td> <td>2004/7/14 下午 06:15:43</td> <td>Register change for new user</td> <td>Closed</td> </tr> <tr> <td>Req00000002</td> <td>2004/7/14 下午 06:16:13</td> <td>Separate frequencies numbering for user password and financial password</td> <td>Resolved</td> </tr> <tr> <td>Req00000003</td> <td>2004/7/14 下午 06:17:13</td> <td>Data queries for transferred and cancelled reserved accounts</td> <td>Assigned</td> </tr> <tr> <td>Req00000004</td> <td>2004/7/14 下午 06:17:32</td> <td>Screen modification</td> <td>Postponed</td> </tr> </tbody> </table>				id	Submitted_Date	Headline	State	Req00000001	2004/7/14 下午 06:15:43	Register change for new user	Closed	Req00000002	2004/7/14 下午 06:16:13	Separate frequencies numbering for user password and financial password	Resolved	Req00000003	2004/7/14 下午 06:17:13	Data queries for transferred and cancelled reserved accounts	Assigned	Req00000004	2004/7/14 下午 06:17:32	Screen modification	Postponed
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Related UC#	UC020~UC027, UC029~UC034, UC036,UC039~C40	Screen#	15																				
Notes	Once a request is submitted, the managerial form is used to maintain the stakeholder request for requirements change and provide states to track the present situation. Choose Modify to modify the request data.																						

Description	Requests maintenance (Analysis)		tool	CQ																																																																		
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Related UC#	UC026	Screen#	16																																																																			
Notes	The form is mainly used to record the assessment of impact analysis, and the audited results. Click Apply to store changes.																																																																					

Description	Request maintenance (Resolution_Review Record)	tool	ClearQuest(CQ)									
	id	Submitted_Date	Headline									
	Req00000001	2004/7/14 下午 06:15:43	change of new use registration									
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			Assigned									
			Postponed									
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History	Approval	Attachments										
Main	Requirements	Resolution_Review Record										
Analysis	Customer											
Related UC#	UC022, UC024	Screen#	17									
Notes	This form is used for the assigned worker to view the inconsistency and corrections, and record the final resolution.											

Description		Request maintenance (History)		tool	ClearQuest(CQ)																																																																																				
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2004/7/15 下午 04:21:39	PM	Assign	Inconsistent	Assigned																																																																																					
2004/7/15 下午 04:21:43	PM	Validate	Assigned	Resolved																																																																																					
2004/7/20 下午 11:59:56	PM	Modify	Resolved	Resolved																																																																																					
<input type="button" value="◀"/> <input type="button" value="▶"/> ID: 00000002 <input type="button" value="▶"/> <input type="button" value="▶"/>																																																																																									
Related UC#	UC023		Screen#	18																																																																																					
Notes	This form is used to record the history.																																																																																								

Description	Request maintenance (Approval)	tool	ClearQuest(CQ)
<div style="border: 1px solid gray; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid gray;"> ■ Main ■ Requirements ■ Resolution_ Review Record ■ Analysis ■ Customer </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid gray;"> ■ History ■ Approval ■ Attachments </div> <div style="padding: 10px;"> <p>Approvers</p> <p>Approver_1 <input type="text" value="Chen"/> Approver_2 <input type="text" value="Tseng"/></p> <p>Approver_3 <input type="text"/> Approver_Others <input type="text"/></p> </div> <div style="padding: 10px; margin-top: 10px;"> <p>Commitments</p> <p>Commitment_1 <input type="text" value="Su"/> Commitment_2 <input type="text" value="Ling"/></p> <p>Commitment_3 <input type="text"/></p> </div> <div style="border-top: 1px solid gray; padding-top: 5px; margin-top: 10px;"> ⏪ ⏩ ID: 00000001 ⏪ ⏩ </div> </div> <div style="display: flex; justify-content: flex-end; margin-top: 10px; gap: 10px;"> <div style="border: 1px solid gray; padding: 2px 5px;">Apply</div> <div style="border: 1px solid gray; padding: 2px 5px;">Revert</div> <div style="border: 1px solid gray; padding: 2px 5px;">Print Record</div> <div style="border: 1px solid gray; padding: 2px 5px;">Actions ▾</div> </div>			
Related UC#	UC020	Screen#	19
Notes	If the request is passed, the approvals and commitments are mandatory.		

Description		Management Support	tool	CQ
	id	Submitted_Date	Headline	State
▶	Req00000001	2004/7/14 下午 06:15:43	change of new use registration	Closed
	Req00000002	2004/7/14 下午 06:16:13	3 error counts individually allowed for user password and financial password	Resolved
	Req00000003	2004/7/14 下午 06:17:13	account Queries for transfer reservation and its cancellation	Assigned
	Req00000004	2004/7/14 下午 06:17:32	page modification for account detail transaction	Postponed

Result set / Query editor / Display editor /

Main
 Requirements
 Resolution_Review Record
 Analysis
 Customer
 History
 Approval
 Attachments

Submitted_Date: 2004/7/14 下午 06:15:43

ExpectedCompleteDate: 2004/7/29 CompletedDate: 2004/7/28

action_timestamp	user_name	action_name	old_state	new_state
2004/7/14 下午 06:16:10	PM	Submit	No_Value	Submitted
2004/7/15 下午 03:03:57	PM	Modify	Submitted	Submitted
2004/7/15 下午 03:18:04	PM	Modify	Submitted	Submitted
2004/7/15 下午 03:59:38	PM	Approve	Submitted	Approved
2004/7/15 下午 04:22:54	PM	Inconsistent	Approved	Inconsistent
2004/7/15 下午 04:23:16	PM	Assign	Inconsistent	Assigned
2004/7/15 下午 04:23:47	PM	Validate	Assigned	Resolved
2004/7/15 下午 04:24:51	PM	Close	Resolved	Closed
2004/7/20 下午 11:59:12	PM	Modify	Closed	Closed
2004/7/20 下午 11:59:27	PM	Modify	Closed	Closed

Apply Revert Print Record Actions ▼

ID: 00000001

- Workspace: Queries, Charts, Reports
- Personal Queries
 - All Stakeholder Requests
 - Impact Analysis Report
 - Inconsistent Requests
 - Passed Requests
 - Requirements Change Summary *
 - Requirements(in RPro) effected
 - Submitted Requests
 - Uncompleted Requests
 - Unresolved Requests
 - New Chart *
 - Public Queries

Count	Requirements_List.Tag
1	FEAT1
1	FEAT2
2	FEAT3
4	No Value

Result set / Query editor /

Requirements_List.Tag	Count
FEAT1	1
FEAT2	1
FEAT3	2
No Value	4