



Functional Elements Specification

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Abstract:

The ability to provide robust implementations is a very important aspect to create high quality Web Service-enabled applications and to accelerate the adoption of Web Services. The Framework for Web Services Implementation (FWSI) TC aims to enable robust implementations by defining a practical and extensible methodology consisting of implementation processes and common functional elements that practitioners can adopt to create high quality Web Services systems without reinventing them for each implementation.

This document specifies a set of Functional Elements for practitioners to instantiate into a technical architecture, and should be read in conjunction with the Functional Elements

35 Requirements document. It is the purpose of this specification to define the right level of
36 abstraction for these Functional Elements and to specify the purpose and scope of each
37 Functional Element so as to facilitate efficient and effective implementation of Web
38 Services.

39

40 **Status:**

41 This document is updated periodically on no particular schedule.

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278

1 Introduction

279

280 The purpose of OASIS Framework for Web Services Implementation (FWSI) Technical
281 Committee (TC) is to facilitate implementation of robust Web Services by defining a practical and
282 extensible methodology consisting of implementation processes and common functional elements
283 that practitioners can adopt to create high quality Web Services systems without re-inventing
284 them for each implementation. It aims to solve the problem of the slow adoption of Web Services
285 due to a lack of good Web Services methodologies for implementation, cum a lack of
286 understanding and confidence in solutions that have the necessary components to reliably
287 implement Web Service-enabled applications.

288

289 One of the FWSI TC's deliverables is the Functional Elements Specification, which is detailed in
290 this document. This Specification specifies a set of functional elements that practical
291 implementation of Web Services-based systems will require. A Functional Element (FE) is
292 defined as a building block representing common reusable functionalities for Web Service-
293 enabled implementations, i.e. from an application Point-Of-View. These FEs are expected to be
294 implemented as reusable components, with Web Services capabilities where appropriate, and to
295 be the foundation for practitioners to instantiate into a technical architecture. The
296 implementations of these FEs are further supported by another complementary work that is also
297 from the FWSI TC, the Web Services Implementation Methodology (WSIM) [1]. As such, the TC
298 hopes that through the implementations of these FEs, robust Web Service-enabled applications
299 can be constructed quickly and deployed in a rapid manner.

300

301 The target audiences for this document are expected to be solution providers who intend to use
302 the Functional Elements Specification to create building blocks that can be instantiated into the
303 technical architecture of their solutions or software vendors and independent software vendors
304 (ISVs) that are expected to build the functional elements specified into their products. Individuals
305 and researchers who are interested in Web Services will also be able to benefit from this
306 document. It is recommended that this document should be used in tandem with the Functional
307 Elements Requirements document, to ensure that readers have a holistic view to the thought
308 processes and knowledge that are encapsulated.

309

1.1 Document Outline

311

312 This document describes the Functional Elements in three main sections. In this section,
313 explanation on the motivation for creating this Specification and the kind of impact that it will
314 create for Web Service-enabled implementations and the terminology used in the normative part
315 of this document are included.

316

317 Section 2 lists the identified Functional Elements arising from requirements documented in the
318 Functional Elements Requirements document [2]. Under each of the ensuing FE, the following
319 descriptions are provided:

- 320 • Motivation

321 A section for providing a short introduction explaining the motivation of including the FE from
322 an application Point-Of-View, including cross-referencing of the requirements for the
323 Functional Element

- 324 • Terms Used
325 A glossary of the terms used. An explanation or illustration of the runtime capabilities of the
326 Functional Element are also provided where appropriate.
- 327 • Key Features
328 A list of key features to be implemented is provided here and is expressed in the normative
329 form.
- 330 • Interdependencies
331 In this section, the interdependencies between Functional Elements are provided to clarify
332 the linkages between FEs (if any).
- 333 • Related Technologies and Standards
334 Here, the reliance of the Functional Elements on related technologies and specifications (or
335 standards) are provided
336
- 337 Section 3 provides the examples of how the Functional Elements can be assembled to accelerate
338 web service-enabled applications. From these Functional Elements, a variety of solutions can be
339 built.
340

341 1.2 Motivation

342
343 In a Service-Oriented Architecture (SOA) environment, new applications/services are created
344 through the assembly of existing services. One of the key advantages of this loosely coupled
345 model is that it allows the new application/service to leverage on 3rd party services. As a typical
346 3rd party's implementation of the services is done via the software component approach, this
347 specification further proliferate new applications/services by defining a framework for Web
348 Services implementation consisting of Functional Elements. Through these Functional Elements,
349 which are implementation neutral, this Specification hopes to influence future software
350 development towards assembly of services rather than 'pure built only'.

351 1.3 Terminology

352
353 Within this document the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL
354 NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
355 document are to be interpreted as described in RFC2119 [3].
356

357 Cross-references to the Functional Elements Requirements document [2] are designated
358 throughout this specification to the requirement contained where the requirement number is
359 enclosed in square brackets (e.g. **[MANAGEMENT-005]**).
360
361

2 List of Functional Elements

362

363

2.1 Data Integrator Functional Element (new)

364

2.1.1 Motivation

365

366 The Data Integrator Functional element is expected to be used for enabling easy and simple
367 mechanisms to access disparate data sources by:

- 368 • Providing unified data view of enterprise across various data sources,
- 369 • Enabling the partitioned view of data for different groups/departments based on defined
370 logical views, and
- 371 • Performing data processing or transformation before presenting the defined logical data
372 view(s).

373

374 This Functional Element fulfills the following requirements from the Functional Elements
375 Requirements Document 02:

376 Primary Requirements

377 1.1 PROCESS-220 to PROCESS-236.

378 Secondary Requirements

379 1.2 None

380

2.1.2 Terms Used

381

Terms	Description
Batch Retrieval Definition	Batch retrieval definition defines how batch data retrieval is performed. The definition of batch retrieval would include the XML schema for the XML format of retrieved data, the mapping of the data fields in the format to the data fields in the logical data view and the schedule of batch retrieval
Data Repository	Data repository is a form of persistent data storage used by Data Integrator to store information of logical data views information.
Data Source	Data source is physical data storage where data can be retrieved. It may include relational database, XML database, LDAP, text file, XML file, URL that pointing to a set of data in Internet.

<p>Data Transformation Rule</p>	<p>Data transformation rule defines how raw data is transformed into the data format that is requested by final presentation. Data transformation rule has two types.</p> <ul style="list-style-type: none"> –The first type is the one that applies at the logical data view level and generates instances of data for the whole data view. » An example of this type rule could be a name of the pre-defined function that gets data instances from various data sources and fills in the data view. –The second type is the one that applies at the data field level of the logical data view and only generates the data for that particular data field. » An examples of this type rule could be a formula like: data field 1 in logical data view = data field 1 in data source 1 X data field 2 in data source 2 .
<p>Logical Data View</p>	<p>Logical data view is a conceptual/semantic data model. It is defined by the name of logical data view, owner, created date, the data fields, the sources of data fields, the constraints of data view, and the transformation rule associated.</p>

382

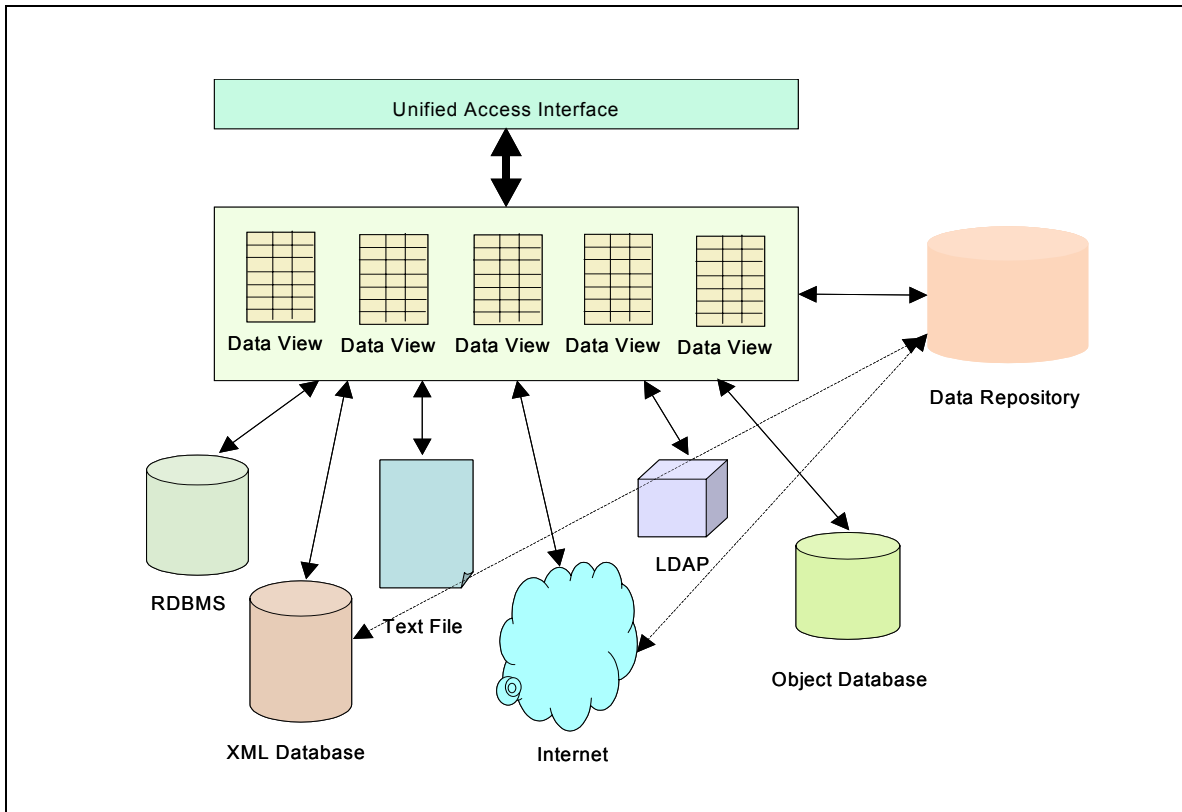


Figure 1: An Overview of the Data Integrator Functional Element

383

384
385
386
387

Figure 1 depicts the basic concepts of how the participating entities collaborate together in the Data Integrator Functional Element. Data can be physically scattered across various data sources, residing on the local area network (LAN) or over Wide Area Network (WAN). Examples include RDBMS, XML database, XML files, URLs that point to a set of data in the Internet, etc.

388 Data Integrator enables the creation of different set of logical data views for various applications
389 or systems. Users of Data Integrator manipulate the data according to the logical data view
390 defined through a unified access interface. Logical data views could be physically stored in Data
391 Repository for easy and fast access.
392

393 **2.1.3 Key Features**

394 Implementations of the Data Integrator Functional Element are expected to provide the following
395 key features:

- 396 1. The Functional Element **MUST** provide the capability to manage the available data sources.
397 This includes capability to:
 - 398 1.1. Add new data source to the pool of available data sources.
 - 399 1.2. Remove data source from the pool of available data sources.
- 400 2. The Functional Element **MUST** provide the capability to define a logical data view based on
401 the pool of available data sources.
- 402 3. The Functional Element **MUST** provide capability to manage the updating and deletion of a
403 logical data view.
- 404 4. The Functional Element **MUST** provide capability to manage the creation, updating and
405 deletion of data transformation rules.
- 406 5. The Functional Element **MUST** provide capability to retrieve data based on the logical data
407 view defined.
- 408 6. The Functional Element **MUST** provide a unified way to query data based on defined logical
409 data views.
- 410 7. The Functional Element **MUST** provide a mechanism to extract data from various data
411 sources and transform the data according to defined transformation rules for a logical data
412 view.

413

414 In addition, the following key features could be provided to enhance the Functional Element
415 further:

- 416 1. The Functional Element **MAY** provide capability to insert, update and delete data based on a
417 logical data view (where applicable).
- 418 2. The Functional Element **MAY** provide the capability to retrieve batch data based on logical
419 data view according to a schedule and present the retrieved data in predefined XML formats.
- 420 3. The Functional Element **MAY** provide the capability to manage the definition of batch data
421 retrieval. This includes capability to:
 - 422 3.1 Define a batch data retrieval
 - 423 3.2 Disable the schedule of batch data retrieval
 - 424 3.3 Enable the schedule of batch data retrieval
 - 425 3.4 Remove the definition of batch data retrieval
- 426 4. 5 The Functional Element **MAY** implement data repository to host consolidated data. This
427 data repository hosts the physical entity that stores the content of a logical data view.
- 428 5. 6 The Functional Element **MAY** provide a mechanism to synchronize data between data
429 repository and data sources if data repository is provided.

430

431 **2.1.4 Interdependencies**

432 None

433

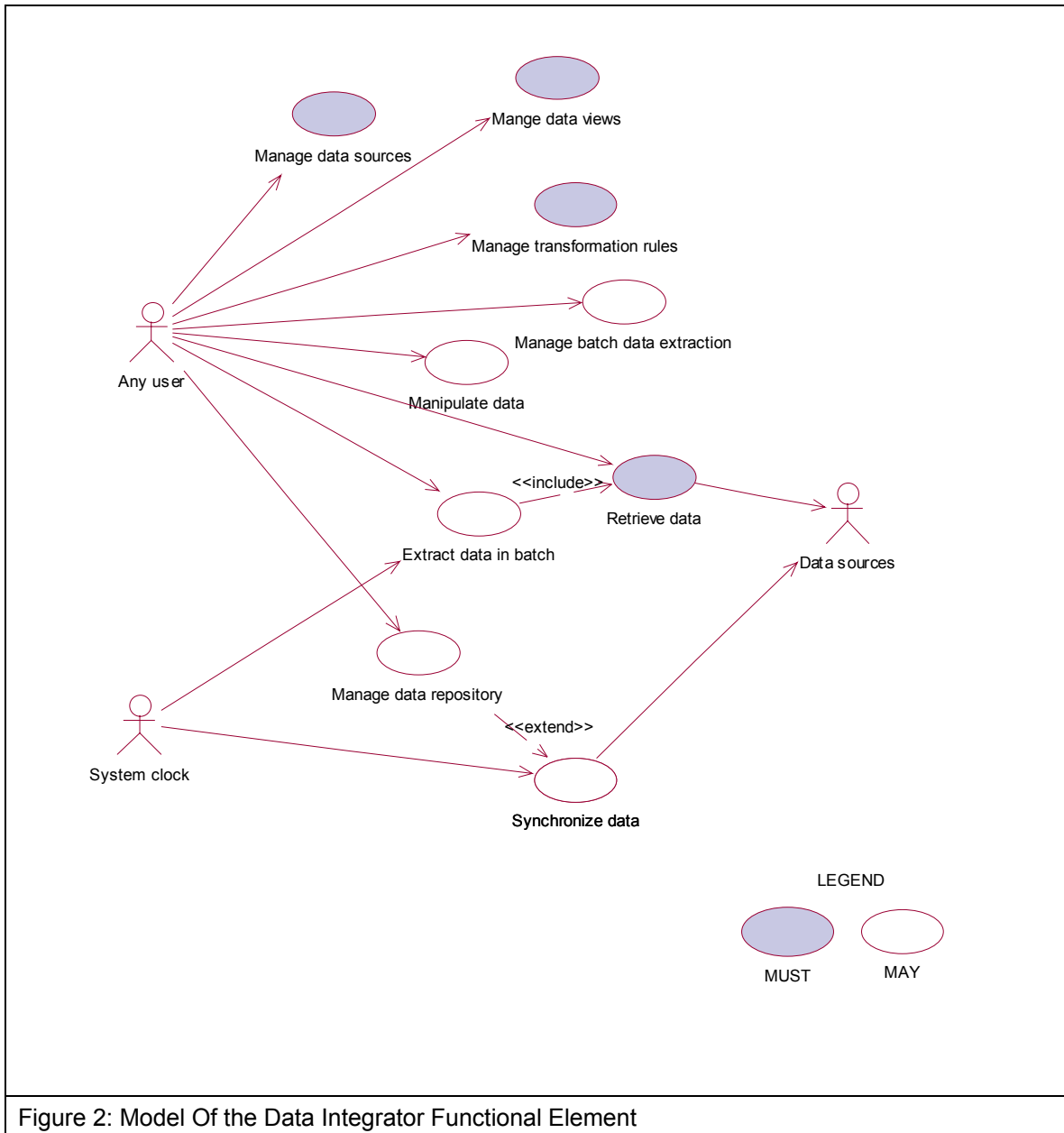
434 2.1.5 Related Technologies and Standards

435 RDBMS, LDAP, XML Database

436

437 2.1.6 Model

438



439

440 **2.1.7 Usage Scenarios**

441 **2.1.7.1 Manage data sources**

442 **2.1.7.1.1 Description**

443 This use case allows the user to manage the available data sources on which logical data views
444 are created.

445 **2.1.7.1.2 Flow of Events**

446 **2.1.7.1.2.1 Basic Flow**

447 The use case begins when the user of the Data Integrator wants to add in new data sources or
448 remove existing data sources.

449 1: The user sends a request to Data Integrator together with data source profile and operation.

450 2: Based on the operation it specified, one of the following sub-flows is executed:

451 If the operation is '**Add in data source**', then sub-flow 2.1 is executed.

452 If the operation is '**Remove data source**', then sub-flow 2.2 is executed.

453 2.1: Add in data source.

454 2.1.1: The Functional Element gets the data source profile data, i.e. name, description,
455 data source location for connection, login Id and password of the user who has privileges
456 to manipulate data sources.

457 2.1.2: The Functional Element registers the data source as available data source.

458 2.2: Remove data source.

459 2.2.1: The Functional Element gets the name of data sources

460 2.2.2: The Functional Element checks whether the data source is valid data source.

461 2.2.3: The Functional Element removes the data source from the pool of available data
462 source (with the assumption that the user has a valid login Id and password).

463 3: The Functional Element returns the results to indicate the success or failure of this operation to
464 the user and the use case ends.

465 **2.1.7.1.2.2 Alternative Flows**

466 1: Data Source Already Registered.

467 1.1: If in the basic flow 2.1.2, the data source is already registered, Functional Element will
468 return an error message to the user and the use case ends.

469 2: Data Source Not Exist.

470 2.1: If in the basic flow 2.2.2, the data source is not registered as available data source,
471 Functional Element will return an error message to the user and the use case ends.

472 3: Persistency Mechanism Error.

473 3.1: If in the basic flow 2.1 and 2.2, the Functional Element cannot perform data persistency,
474 Functional Element will return an error message to the user and the use case ends.

475 **2.1.7.1.3 Special Requirements**

476 None.

477 **2.1.7.1.4 Pre-Conditions**

478 None.

479 **2.1.7.1.5 Post-Conditions**

480 None.

481

482 **2.1.7.2 Manage Data Views**

483 **2.1.7.2.1 Description**

484 This use case allows the user to manage the logical data views.

485 **2.1.7.2.2 Flow of Events**

486 **2.1.7.2.2.1 Basic Flow**

487 The use case begins when the user wants to create/retrieve/update/delete a logical data view.

488 1: The user sends request to manage logical data view together with logical data view definition
489 and operation.

490 2: Based on the operation it specifies, one of the following sub-flows is executed:

491 If the operation is '**Create Data View**', the sub-flow 2.1 is executed.

492 If the operation is '**Retrieve Data View**', the sub-flow 2.2 is executed.

493 If the operation is '**Update Data View**', the sub-flow 2.3 is executed.

494 If the operation is '**Delete Data View**', the sub-flow 2.4 is executed.

495 2.1: Create Data View.

496 2.1.1: The Functional Element gets logical data view definition, i.e. name, description,
497 owner of data view, created date, data fields of data view, the source fields of data fields,
498 and transformation rule.

499 2.1.2: The Functional Element checks whether the logical data view exists.

500 2.1.3: The Functional Element creates the logical data view exists.

501 2.2: Retrieve Data View.

502 2.2.1: The Functional Element gets name of the logical data view and retrieve condition.

503 2.2.2: The Functional Element retrieves the logical data view's information according to
504 the condition.

505 2.3: Update Data View.

506 2.3.1: The Functional Element gets name of the logical data view and its definition
507 2.3.2: The Functional Element checks whether the logical data view exists.
508 2.3.3: The Functional Element updates the logical data view definition
509 2.4: Delete Data View.
510 2.4.1: The Functional Element gets name of the logical data view.
511 2.4.2: The Functional Element checks whether the logical data view exists.
512 2.4.3: The Functional Element removes the logical data view.
513 3: The Functional Element returns the results of the operation to the user and the use case ends.

514 **2.1.7.2.2 Alternative Flows**

515 1: Data View Already Exists.
516 1.1: If in the basic flow 2.1.2, the data view is already defined, Functional Element returns an
517 error message and the use case ends.
518 2: Data View Cannot Be Deleted.
519 2.1: If in the basic flow 2.4.3, the data of the logical data view is stored in Data Repository,
520 Functional Element returns an error message and the use case ends.
521 3: Data View Not Found.
522 3.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the data view does not exist, Functional
523 Element will return an error message and the use case ends.
524 4: Data View Cannot Be Updated.
525 4.1: If in the basic flow 2.4.3, the data of the logical data view is stored in Data Repository,
526 Functional Element returns an error message and the use case ends.
527 5: Persistency Mechanism Error.
528 5.1: If in the basic flow 2.1.2, 2.1.3, 2.2, 2.3.2, 2.3.3, 2.4.2 and 2.4.3, the Functional Element
529 cannot perform data persistency, Functional Element will return an error message to the user
530 and the use case ends.

531 **2.1.7.2.3 Special Requirements**

532 None.

533 **2.1.7.2.4 Pre-Conditions**

534 None.

535 **2.1.7.2.5 Post-Conditions**

536 None.

537

538 **2.1.7.3 Manage Transformation Rules**

539 **2.1.7.3.1 Description**

540 This use case allows the user to manage the data transformation rules that are used by the Data
541 Integrator to perform the data transformation before passing data back to users.

542 **2.1.7.3.2 Flow of Events**

543 **2.1.7.3.2.1 Basic Flow**

544 The use case begins when the user wants to create/retrieve/update/delete a data transformation
545 rule.

546 1: The user sends request to manage data transformation rule together with the definition of
547 transformation rule and operation.

548 2: Based on the operation it specifies, one of the following sub-flows is executed:

549 If the operation is '**Define Data Transformation Rule**', the sub-flow 2.1 is executed.

550 If the operation is '**Retrieve Data Transformation Rule**', the sub-flow 2.2 is executed.

551 If the operation is '**Update Data Transformation Rule**', the sub-flow 2.3 is executed.

552 If the operation is '**Delete Data Transformation Rule**', the sub-flow 2.4 is executed.

553 2.1: Create Data Transformation Rule.

554 2.1.1: The Functional Element gets the definition of the data transformation rule, i.e.
555 name, description, rule type, function name, data view name, and applied data fields.

556 2.1.2: The Functional Element checks whether the data transformation rule exists.

557 2.1.3: The Functional Element creates the data transformation rule.

558 2.2: Retrieve Data Transformation Rule.

559 2.2.1: The Functional Element gets name of the data transformation rule and retrieve
560 condition.

561 2.2.2: The Functional Element retrieves the data transformation rule's information
562 according to the condition.

563 2.3: Update Data Transformation Rule.

564 2.3.1: The Functional Element gets the name of data transformation rule.

565 2.3.2: The Functional Element checks whether data transformation rule exists.

566 2.3.3: The Functional Element updates the definition of the data transformation rule.

567 2.4: Delete Data Transformation Rule.

568 2.4.1: The Functional Element gets the name of data transformation rule.

569 2.4.2: The Functional Element checks whether the data transformation rule exists.

570 2.4.3: The Functional Element removes the data transformation rule from the Functional
571 Element

572 3: The Functional Element returns the results of the operation to the user and the use case ends.

573 **2.1.7.3.2 Alternative Flows**

574 1: Data Transformation Rule Already Exists.

575 1.1: If in the basic flow 2.1.2, the data transformation rule is already defined, Functional
576 Element returns an error message and the use case ends.

577 2: Data Transformation Rule Cannot Be Deleted.

578 2.1: If in the basic flow 2.4.3, the data of the logical data view, on which the data
579 transformation rule is applied, is stored in Data Repository, Functional Element returns an
580 error message and the use case ends.

581 3: Data Transformation Rule Not Found.

582 3.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the data transformation rule does not exist,
583 Functional Element will return an error message and the use case ends

584 4: Data Transformation Rule Cannot Be Updated.

585 4.1: If in the basic flow 2.3.3, the data of the logical data view, on which the data
586 transformation rule is applied, is stored in Data Repository, Functional Element returns an
587 error message and the use case ends.

588 5: Logical Data View Not Exist.

589 4.1: If in the basic flow 2.1.3, the data of the logical data view, on which the data
590 transformation rule is applied, dose not exist, Functional Element returns an error message
591 and the use case ends.

592 6: Persistency Mechanism Error.

593 5.1: If in the basic flow 2.1.2, 2.1.3, 2.2, 2.3.2, 2.3.3, 2.4.2 and 2.4.3, the Functional Element
594 cannot perform data persistency, Functional Element will return an error message to the user
595 and the use case ends.

596 **2.1.7.3.3 Special Requirements**

597 None.

598 **2.1.7.3.4 Pre-Conditions**

599 None.

600 **2.1.7.3.5 Post-Conditions**

601 None.

602

603 **2.1.7.4 Manage Batch Data Extraction**

604 **2.1.7.4.1 Description**

605 This use case allows the user to define and disable the batch data extraction.

606 **2.1.7.4.2 Flow of Events**

607 **2.1.7.4.2.1 Basic Flow**

608 The use case begins when the user wants to define, remove, enable and disable a batch data
609 extraction.

610 1: The user sends request to manage batch data extraction together with the definition of batch
611 data extraction and operation.

612 2: Based on the operation it specifies, one of the following sub-flows is executed:

613 If the operation is '**Define Batch Data Extraction**', the sub-flow 2.1 is executed.

614 If the operation is '**Remove Batch Data Extraction Definition**', the sub-flow 2.1 is executed.

615 If the operation is '**Enable Batch Data Extraction**', the sub-flow 2.2 is executed.

616 If the operation is '**Disable Batch Data Extraction**', the sub-flow 2.3 is executed.

617 2.1: Define Batch Data Extraction.

618 2.1.1: The Functional Element gets batch data extraction definition, i.e. name,
619 description, XML schema for the XML data format, the mapping of data fields from logical
620 data view to XML data file, and extraction schedule.

621 2.1.2: The Functional Element checks whether the batch data extraction exists.

622 2.1.3: The Functional Element creates the batch data extraction.

623 2.2: Remove Batch Data Extraction Definition.

624 2.2.1: The Functional Element gets name of the batch data extraction.

625 2.2.2: The Functional Element checks whether the batch data extraction exists.

626 2.2.3: The Functional Element removes the batch data extraction from the Functional
627 Element.

628 2.3: Enable Batch Data Extraction.

629 2.3.1: The Functional Element gets name of the batch data extraction.

630 2.3.2: The Functional Element checks whether the batch data extraction exists.

631 2.3.3: The Functional Element enables the batch data extraction.

632 2.4: Disable Batch Data Extraction.

633 2.4.1: The Functional Element gets name of the batch data extraction.

634 2.4.2: The Functional Element checks whether the batch data extraction exists.

635 2.4.3: The Functional Element disables the batch data extraction.

636 3: The Functional Element returns the results of the operation to the user and the use case ends.

637 **2.1.7.4.2.2 Alternative Flows**

638 1: Batch Data Extraction Exist.

639 1.1: If in the basic flow 2.1.2, the batch data extraction is already defined, Functional Element
640 returns an error message and the use case ends.

641 2: Batch Data Extraction Not Found.

642 2.1: If in the basic flow 2.2.3, 2.3.3 and 2.4.3, the batch data extraction does not exist,
643 Functional Element will return an error message and the use case ends

644 3: Persistency Mechanism Error.

645 3.1: If in the basic flow 2.1.2, 2.1.3, 2.2.2, 2.2.3,2.3.2, 2.3.3, 2.4.2 and 2.4.3, the Functional
646 Element cannot perform data persistency, Functional Element will return an error message to
647 the user and the use case ends.

648 **2.1.7.4.3 Special Requirements**

649 None.

650 **2.1.7.4.4 Pre-Conditions**

651 None.

652 **2.1.7.4.5 Post-Conditions**

653 None.

654

655 **2.1.7.5 Retrieve Data**

656 **2.1.7.5.1 Description**

657 This use case allows the user to perform data retrieval based on the logical data view defined.

658 **2.1.7.5.2 Flow of Events**

659 **2.1.7.5.2.1 Basic Flow**

660 The use case begins when the user wants to perform data retrieval based on a logical data view.

661 1: The user sends request to retrieve data by providing the name of logical data view and SQL
662 query statement.

663 2: The Functional Element checks whether the logical data view exists.

664 3: The Functional Element retrieves the definition of logical data view specified.

665 4: The Functional Element verifies the correctness of the SQL statement by checking the syntax
666 of statement and the data fields used.

667 5: The Functional Element retrieves the definition of data transformation rule related with the data
668 view.

669 6: The Functional Element performs the data retrieval from data sources

670 7: The Functional Element performs the data transformation to the data retrieved and fill up the
671 data according to the definition of the logical data view.

672 8: The Functional Element returns the results of the operation to the user and the use case ends.

673 **2.1.7.5.2 Alternative Flows**

674 1: Query Statement Is Invalid.

675 1.1: If in the basic flow 4, the SQL statement is not valid, Functional Element returns an error
676 message and the use case ends.

677 2: Data View Not Found.

678 2.1: If in the basic flow 3, the specified data view is not found, Functional Element returns an
679 error message and the use case ends.

680 3: Data Source Not Available.

681 3.1: If in the basic flow 6, the data sources are not available for retrieving data, Functional
682 Element returns an error message and the use case ends.

683 4: Data Transformation Rule Not Found.

684 4.1: If in the basic flow 5, the data transformation rule is not available, Functional Element
685 returns an error message and the use case ends.

686 5: Data Repository Are Not Available.

687 5.1: If in the basic flow 6, the data of the logical data view is stored in Data Repository and
688 the Data Repository is not available, Functional Element returns an error message and the
689 use case ends.

690 **2.1.7.5.3 Special Requirements**

691 None.

692 **2.1.7.5.4 Pre-Conditions**

693 None.

694 **2.1.7.5.5 Post-Conditions**

695 None.

696

697 **2.1.7.6 Manipulate Data**

698 **2.1.7.6.1 Description**

699 This use case allows the user to insert, update, and delete data based on a logical data view
700 defined.

701 **2.1.7.6.2 Flow of Events**

702 **2.1.7.6.2.1 Basic Flow**

703 The use case begins when the user wants to insert, update, and delete data based on a logical
704 data view.

705 1: The user sends request to manipulate data by providing the name of the logical data view and
706 SQL statement.

- 707 3: The Functional Element retrieves the definition of logical data view specified.
- 708 4: The Functional Element verifies the correctness of the SQL statement by checking the syntax
709 of statement and the data fields used.
- 710 5: The Functional Element checks the violation of operations based on the definition of logical
711 data view.
- 712 6: The Functional Element performs the operation specified in SQL statement.
- 713 7: The Functional Element returns the results of the operation to the user and the use case ends.

714 **2.1.7.6.2 Alternative Flows**

- 715 1: Manipulation Statement Is Invalid.
- 716 1.1: If in the basic flow 4, the SQL statement is not valid, Functional Element returns an error
717 message and the use case ends.
- 718 2: Data View Not Found.
- 719 2.1: If in the basic flow 3, the specified data view is not found, Functional Element returns an
720 error message and the use case ends.
- 721 3: Data Source Are Not Available.
- 722 3.1: If in the basic flow 6, the data sources are not available for retrieving data, Functional
723 Element returns an error message and the use case ends.
- 724 4: SQL Error.
- 725 4.1: If in the basic flow 6, there is any error of SQL statement execution, Functional Element
726 returns an error message and the use case ends.

727 **2.1.7.6.3 Special Requirements**

728 None.

729 **2.1.7.6.4 Pre-Conditions**

730 None.

731 **2.1.7.6.5 Post-Conditions**

732 None.

733

734 **2.1.7.7 Extract Data in Batch**

735 **2.1.7.7.1 Description**

736 This use case allows the user to perform batch data retrieval in a scheduled approach based on a
737 logical data view defined.

738 **2.1.7.7.2 Flow of Events**

739 **2.1.7.7.2.1 Basic Flow**

740 The use case begins when the user wants to perform batch data retrieval or the time is up for
741 scheduled batch data retrieval.

742 1: The user sends request to retrieve data by providing the name of the batch data retrieval or the
743 Functional Element clock generates a trigger.

744 2: The Functional Element retrieves the definition of batch data retrieval according to the name.

745 3: The Functional Element prepares the parameters for invocation of Retrieve data use case

746 4: The Functional Element invokes the Data Retrieve use case

747 5: The Functional Element formats the data according to the format defined in the batch data
748 retrieval definition

749 6: The Functional Element returns the results of the operation to the user and the use case ends.

750 **2.1.7.7.2.2 Alternative Flows**

751 1: Definition of Batch Data Retrieval Not Found.

752 1.1: If in the basic flow 2, the definition of batch data retrieval is not found, Functional Element
753 returns an error message and the use case ends.

754 2: Error Returned From Data Retrieve Use Case.

755 2.1: If in the basic flow 4, the use case Retrieve data returns an error, Functional Element
756 returns an error message and the use case ends.

757 **2.1.7.7.3 Special Requirements**

758 None.

759 **2.1.7.7.4 Pre-Conditions**

760 None.

761 **2.1.7.7.5 Post-Conditions**

762 None.

763

764 **2.1.7.8 Manage Data Repository**

765 **2.1.7.8.1 Description**

766 This use case allows the user to manage data repository.

767 **2.1.7.8.2 Flow of Events**

768 **2.1.7.8.2.1 Basic Flow**

769 The use case begins when the user wants to persistent a logical data view in the data repository,
770 or the user wants to dispose the persistency of a data view from the data repository.

771 1: The user sends request to manage data repository by providing the name of the logical data
772 view.

773 2: Based on the operation it specifies, one of the following sub-flows is executed:

774 If the operation is '**Persistent Data View**', the sub-flow 2.1 is executed.

775 If the operation is '**Dispose Data View**', the sub-flow 2.1 is executed.

776 2.1: Persistent Data View

777 2.1.1: The Functional Element retrieves the definition of the logical data view.

778 2.1.2: The Functional Element forms the SQL statement according to the definition of the
779 logical data view.

780 2.1.3: The Functional Element performs the data retrieval from data sources.

781 2.1.4: The Functional Element performs the data transformation according to the
782 transformation rule.

783 2.1.5: The Functional Element creates table in Data Repository and fill in the table with
784 data generated in previous step.

785 2.2: Dispose Data View

786 2.1.1: The Functional Element forms the SQL statements of deleting the table

787 2.1.3: The Functional Element deletes the table in Data Repository.

788 3: The Functional Element returns the results of the operation to the user and the use case ends.
789
790

791 **2.1.7.8.2.2 Alternative Flows**

792 1: Data View Not Found

793 1.1: If in the basic flow 2.1.1, the definition of batch data retrieval is not found, Functional
794 Element returns an error message and the use case ends.

795 2: Data Exist

796 2.1: If in the basic flow 2.1.3, there is data in the table, Functional Element returns an error
797 message and the use case ends.

798 3: Data Repository Error

799 3.1: If in the basic flow 2.1.5 and 2.2.3, there is an error in Data Repository, Functional
800 Element returns an error message and the use case ends.

801 4: Data Source Not Available

802 4.1: If in the basic flow 2.1.3, the data sources related is not available, Functional Element
803 returns an error message and the use case ends

804 **2.1.7.8.3 Special Requirements**

805 None.

806 **2.1.7.8.4 Pre-Conditions**

807 None.

808 **2.1.7.8.5 Post-Conditions**

809 None.

810

811 **2.1.7.9 Synchronize Data**

812 **2.1.7.9.1 Description**

813 This use case allows the user to synchronize data in Data Repository with the data from data
814 sources.

815 **2.1.7.9.2 Flow of Events**

816 **2.1.7.9.2.1 Basic Flow**

817 The use case begins when the user wants to synchronize data of a logical data view in data
818 repository with the data in data sources, or the time is up for synchronization of data.

819 1: The user sends request to synchronize data repository or the Functional Element clock
820 generates a trigger.

821 2: The Functional Element gets or finds those data views that are required to be synchronized
822 with data sources.

823 3: The Functional Element retrieves data view definitions.

824 4: The Functional Element retrieves data from data sources according th definition of logical data
825 view.

826 5: The Functional Element performs the data transformation on the data retrieved.

827 6: The Functional Element update the table in Data Repository with the data generated in
828 previous step.

829 7: The Functional Element returns the result of the operation and the use case ends.

830 **2.1.7.9.2.2 Alternative Flows**

831 1: Data View Definition Not Found

832 1.1: If in the basic flow 3, the definition of batch data retrieval is not found, Functional Element
833 returns an error message and the use case ends.

834 2: Data Repository Error

835 2.1: If in the basic flow 6, there is an error in updating the Data repository, Functional Element
836 returns an error message and the use case ends.

837 3: Data Source Not Available

838 3.1: If in the basic flow 4, the data sources related is not available, Functional Element returns
839 an error message and the use case ends

840 **2.1.7.9.3 Special Requirements**

841 None.

842 **2.1.7.9.4 Pre-Conditions**

843 None.

844 **2.1.7.9.5 Post-Conditions**

845 None.

846

847 2.2 Error Management Functional Element (new)

848 2.2.1 Motivation

849 Error management is an important aspect in any software application development. In particular,
850 it is important to know the cause of error in the Service Oriented Architecture (SOA) environment
851 as an application can consume any service provided from any domain space spans across the
852 Internet space. When an error occurs, it can be from within the same application domain or from
853 different domain space. Hence, it is important to know the system state when the error occurred
854 in the SOA environment. For example, when an error occurred, what services were used; which
855 services' interfaces were used; the passed in parameters and its associated values used for the
856 interfaces, the time when the error occurred, API or SOAP invocation, etc are the important
857 information for managing the application in the SOA environment.

858

859 The Error Management Functional Element is a framework designed to capture the system state
860 at which the error occurred. The variables that governed the system state when an error
861 occurred are defined as follows:

- 862 • The time at which the error occurred.
- 863 • The class/object name that the error occurred.
- 864 • The method name of the said class/object at which the error occurred.
- 865 • The input parameters, parameters types and its associated values of the said method at
866 which the error occurred.
- 867 • The expected output type of the mentioned method name.
- 868 • The error category, error code and error severity assigned by the application.
- 869 • The name of the consumed service/component.
- 870 • The name of the interface used for the said service/component.
- 871 • The input parameters and types defined for the said interface.
- 872 • The values used for the mentioned input parameters.
- 873 • The Universal Resource Location (URL) of the consumed service endpoint.
- 874 • The SOAP Fault message <Fault> element returned from the consumed service.
- 875 • The type of invocation whether it is a Web Service call or Application Programming
876 Interfaces (APIs) call.
- 877 • The domain controller information includes :
 - 878 ○ Name of the domain controller
 - 879 ○ Contact Information, .e. Email Id, Short Message Services (SMS), Telephone,
880 Mobile phone, etc.
 - 881 ○ Means of Notification

882 The main motivation of the Functional Element is to provide a snapshot and capture all the
883 system state information for an application when an error occurred. It assists system
884 administrator to manage the system fault better for the necessary actions required for tracking the
885 fault.

886

887 Figure 3 illustrates the perspective usage of Error Management Functional Element. When an
888 error occurred in an application, the Functional Element will be used to capture the system state
889 into a data store which can either be a database or a flat file.

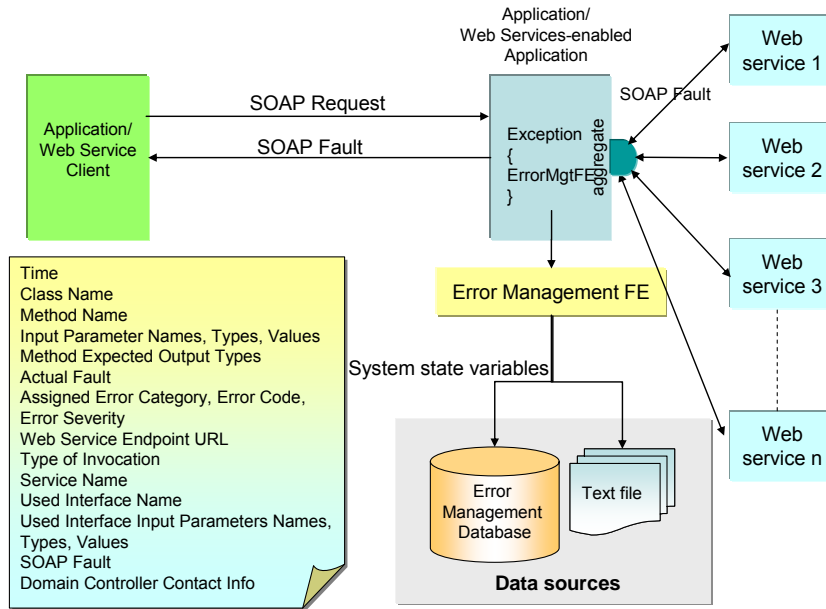


Figure 3: Error Management Functional Element Usage

890

891 This Functional Element fulfills the following requirements from the Functional Elements
 892 Requirements:

893 Primary Requirements

- 894 • MANAGEMENT-340 to MANAGEMENT-346

895 **2.2.2 Terms Used**

Terms	Description
Error Category	The Category or classification of error. For example, the category of error can be classified as: Database error → DATABX, Transaction error → TRANSX, Authentication error → AUTHEX, System error → SYSTEMX, Application-specific error → APPLSX, Third-party service error → THIRDPX, etc.
Error Code	The Error Code defined for each Error Category. For example, 001, 002, 003, etc
Error Severity	The Error Severity defined for each Error Code. For example, the severity could be in the order of <i>Critical, Major, Minor, Warning, For Information Only</i> .

External Application Error	The External Application Error is defined as an error / fault / exception occurred by consuming external Web Services / Components providers. For example, customized exception, SOAPException and SOAP Fault resulted from APIs or SOAP invocation to external components or Web Services.
Internal Application Error	The Internal Application Error is defined as error / fault / exception raised resulted from an internal processing or run time error. For example, exceptions such as Null Pointer Exception, Class Type Casting, Array Out of Bound, etc. that occurred due to processing or run time error.

896

897 Figure 4 is an example illustrating the error hierarchy in terms of Error Category, Error Code and
898 Error Severity.

899

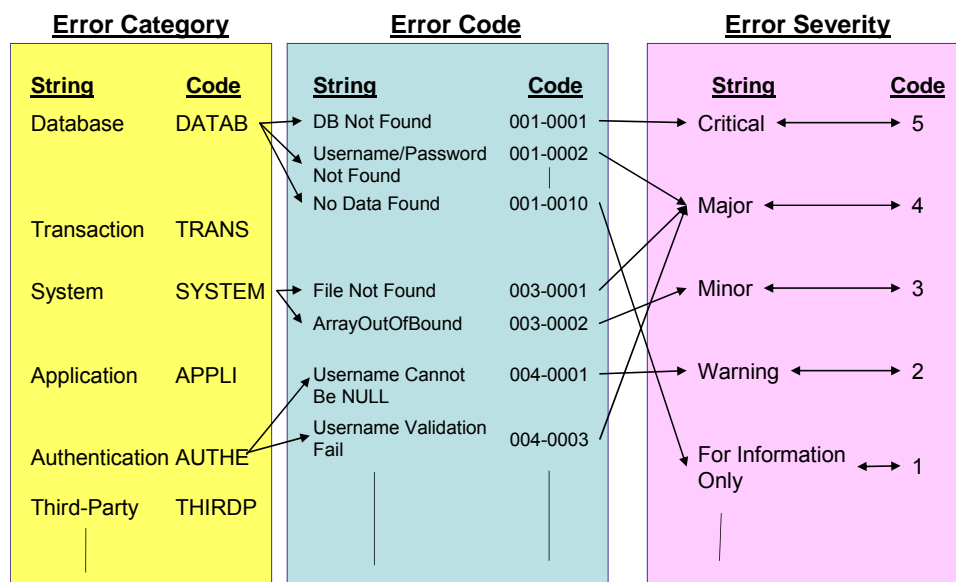


Figure 4: An Example of Error Hierarchy

900

901 For example, a database could give rise to a number of errors. For example, database not found,
902 invalid username and password, no data found, null field, duplicate key etc are the common
903 database errors. Each database error could have different severity. For example, database not
904 found or invalid username and password are critical to business logic. An illustration of the
905 resultant error code is defined as DATABX0001-CRITICAL.

906

907 2.2.3 Key Features

908 Implementations of the Error Management Functional Element are expected to provide the
909 following key features:

- 910 1. The Functional Element MUST provide the ability to create new Error Category.
- 911 2. The Functional Element MUST provide the ability to modify and delete defined Error
912 Category.

- 913 3. The Functional Element MUST provide the ability to all the information stored in the Error
 914 Category. This includes the capability to:
- 915 3.1 Add new Error Code(s) and descriptions into a Error Category
 - 916 3.2 Retrieve, modify and delete error code and descriptions
 - 917 3.3 Support Error Code(s) in numeric, alpha-numeric or string format
- 918 4. The Functional Element MUST provide a mechanism to capture the defined system state at
 919 which an error occurred.

920

921 In addition, the following key features could be provided to enhance the Functional Element
 922 further:

- 923 1. The Functional Element MAY provide the ability to manage Error Severity by enabling the
 924 capability to:
 - 925 1.1. Tag/Add to Error Code defined,
 - 926 1.2. Retrieve, modify and delete Severity tag to Error Code, and
 - 927 1.3. Retrieve information based on either Error Code or Severity.

928

929 **2.2.4 Interdependencies**

Direct Dependency	
Log Utility Functional Element	The Log Utility Functional Element helps to log the audit trial.
Notification Functional Element	The Notification Element helps to notify the target user via email, or short messaging service.

930

931 **2.2.5 Related Technologies and Standards**

Specifications	Specific References
XML Version 1.0	Extensible Markup Language (XML) 1.0 (Third Edition) W3C Recommendation 04 February 2004.
XML Schema	XML Schema Part 0: Primer Second Edition W3C Recommendation 28 October 2004 XML Schema Part 1: Structures Second Edition W3C Recommendation 28 October 2004 XML Schema Part 2: Datatypes Second Edition W3C Recommendation 28 October 2004
WSDL Version 1.1	Web Services Description Language (WSDL) 1.1 W3C Note 15 March 2001
SOAP Version 1.1	Simple Object Access Protocol (SOAP) 1.1 W3C Note 08 May 2000
Functional Elements Specification	OASIS Functional Elements Specification Committee Specifications 1.0, 16-Dec-2004

932

933 **2.2.6 Model**

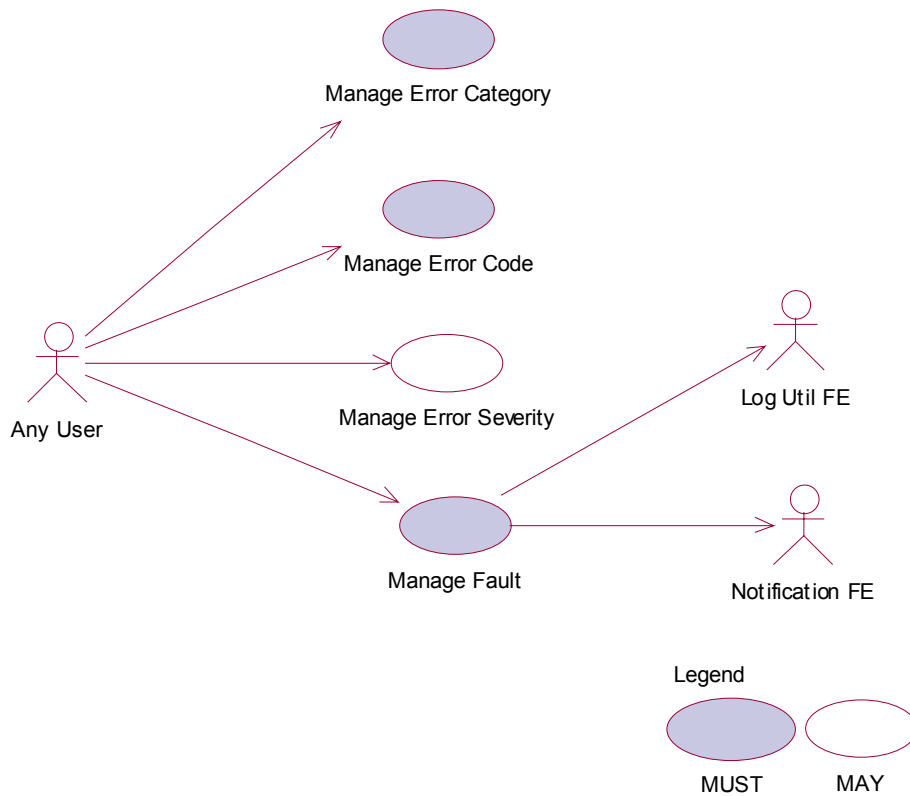


Figure 5: Model Of the Error Management Functional Element

934

935 **2.2.7 Usage Scenarios**

936 **2.2.7.1 Manage Error Category**

937 **2.2.7.1.1 Description**

938 This use case allows the error management administrator to manage Error Category.

939 **2.2.7.1.2 Flow of Events**

940 **2.2.7.1.2.1 Basic Flow**

941 The use case begins when the user wants to create/retrieve/update/delete an Error Category.

942 1: The user sends a request to manipulate an Error Category.

943 2: Based on the operation it specifies, one of the following sub-flows is executed:

944 If the operation is **'Create Error Category'**, the sub-flow 2.1 is executed.

945 If the operation is **'Retrieve Error Category'**, the sub-flow 2.2 is executed.

946 If the operation is **'Update Error Category'**, the sub-flow 2.3 is executed.

947 If the operation is **'Delete Error Category'**, the sub-flow 2.4 is executed.

948 2.1: Create Error Category.

949 2.1.1: The Functional Element gets category definition.

950 2.1.2: The Functional Element checks whether the category exists.

951 2.1.3: The Functional Element creates the category and save it in the error database.

952 2.2: Retrieve Error Category.

953 2.2.1: The Functional Element gets the Error Category name.

954 2.2.2: The Functional Element checks whether the category exists.

955 2.2.3: The Functional Element retrieves the Error Category's information from the Error

956 Management Data sources.

957 2.3: Update Error Category.

958 2.3.1: The Functional Element gets the Error Category name.

959 2.3.2: The Functional Element checks whether the Error Category exists.

960 2.3.3: The Functional Element updates the category definition and save it in the Error

961 Management Data sources.

962 2.4: Delete Error Category.

963 2.4.1: The Functional Element gets the Error Category name.

964 2.4.2: The Functional Element checks whether the Error Category name exists.

965 2.4.3: The Functional Element checks whether the Error Code associated to the Error

966 Category name exists.

967 • If Error Codes associated to the Error Category name exists, then basic sub-flow

968 2.4.4 is executed.

969 • If Error Codes associated to the Error Category name does not exist, then the

970 basic sub-flow 2.4.7 is executed.

971 2.4.4: Error Codes associated to the Error Category name exists.

972 • If the Error Severity associated to the respective Error Codes exists, the basic

973 sub-flow 2.4.5 is executed.

974 • If the Error Severity associated to the respective Error Code does not exist, then

975 the basic sub-slow 2.4.6 is executed.

976 2.4.5: The Error Severity Exist.

977 2.4.5.1: The Functional Element removes the error severities associated to the

978 respective Error Code from sub-flow 2.4.4.

979 2.4.6: The Error Severity Does Not Exist.

980 2.4.6.1 The Functional Element removes the respective Error Codes from sub-flow
981 2.4.3 from the Error Management Data sources.

982 2.4.7: The Error Codes Associated to the Error Category Name Does Not Exist.

983 2.4.7.1: The Functional Element removes the respective Error Codes associated to
984 the Error Category name (from sub-flow 2.4.3) from the Error Management Data
985 sources.

986 2.4.8: The Functional Element removes the Error Category name from the Error
987 Management Data sources.

988 3: The Functional Element returns the results of the operation to the end user and the use case
989 ends.

990 **2.2.7.1.2.2 Alternative Flows**

991 1: Error Category Already Exists.

992 1.1: If in the basic flow 2.1.2, the error category is already defined, the Functional Element
993 writes the system state variables into the Error Management Data Sources using Log Utility
994 Functional Element and notifies the system domain controller using the Notification
995 Functional Element and the use case ends.

996 1.1: If in the basic flow 2.1.2, the error category is already defined, the Functional Element
997 writes the system state variables into the Error Management Data Sources using Log Utility
998 Functional Element and notifies the system domain controller using the Notification
999 Functional Element and the use case ends.

1000

1001 2: Error Category Not Found.

1002 2.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the error category does not exist, the Functional
1003 Element writes the system state variables into the Error Management Data Sources using
1004 Log Utility Functional Element and notifies the system domain controller using the Notification
1005 Functional Element and the use case ends.

1006 **2.2.7.1.3 Special Requirements**

1007 None.

1008 **2.2.7.1.4 Pre-Conditions**

1009 None.

1010 **2.2.7.1.5 Post-Conditions**

1011 Once the Error Category is deleted, all the associated Error Code and its Error Severity will be
1012 removed.

1013

1014 **2.2.7.2 Manage Error Code**

1015 **2.2.7.2.1 Description**

1016 This use case allows the user to manage Error Code.

1017 **2.2.7.2.2 Flow of Events**

1018 **2.2.7.2.2.1 Basic Flow**

1019 The use case begins when the user wants to create/retrieve/update/delete an error code
1020 associated to an error category.

1021 1: The user sends a request to manipulate an error code.

1022 2: Based on the operation it specifies, one of the following sub-flows is executed:

1023 If the operation is '**Create Error Code**', the sub-flow 2.1 is executed.

1024 If the operation is '**Retrieve Error Code**', the sub-flow 2.2 is executed.

1025 If the operation is '**Update Error Code**', the sub-flow 2.3 is executed.

1026 If the operation is '**Delete Error Code**', the sub-flow 2.4 is executed.

1027 2.1: Create Error Code.

1028 2.1.1: The Functional Element gets the Error Category name

1029 2.1.2. The Functional Element gets Error Code definition for the Error Category.

1030 2.1.3: The Functional Element checks whether the Error Code exists.

1031 2.1.4: The Functional Element creates the Error Code for the Error Category name and
1032 saves it into the Fault Management database.

1033 2.2: Retrieve Error Code.

1034 2.2.1: The Functional Element gets the Error Category name

1035 2.2.2. The Functional Element gets the Error Code name.

1036 2.2.3: The Functional Element checks whether the Error Code exists.

1037 2.2.4. The Functional Element retrieves the Error Code's information from the error
1038 database.

1039 2.3: Update Error Code.

1040 2.3.1: The Functional Element gets the Error Category name.

1041 2.3.2. The Functional Element gets the Error Code name.

1042 2.3.3: The Functional Element checks whether the Error Code exists.

1043 2.3.4: The Functional Element updates the error code definition associated to the Error
1044 Category and save it in the Error Management Data sources.

1045 2.4: Delete Error Code.

1046 2.4.1: The Functional Element gets the Error Category name.

1047 2.4.2. The Functional Element gets the Error Code name.

1048 2.4.3: The Functional Element checks whether the Error Code exists.

1049 2.4.4: The Functional Element checks whether the Error Severity associated to the Error
1050 Category and Error Code exists. Depending on whether the Error Severity exists, one of
1051 the following sub-flows will be executed.

- 1052 • If the Error Severity exists, then basic sub-flow 2.4.5 is executed.
- 1053 • If the Error Severity does not exist, the basic sub-flow 2.4.6 is executed.

1054 2.4.5: Error Severity Exists.

1055 2.4.5.1: The Functional Element removes the Error Severity associated to the Error
1056 Category and Error Code from the Error Management Data sources.

1057 2.4.5.2: The Functional Element removes the Error Code associated to the Error
1058 Category name from the Error Management Data sources.

1059 2.4.6: Error Severity Does Not Exist

1060 2.4.6.1: The Functional Element removes the Error Code associated to the Error
1061 Category name from the Error Management Data sources.

1062 3: The Functional Element returns the results of the operation to the end user and the use case
1063 ends.

1064 **2.2.7.2.2.2 Alternative Flows**

1065 1: Error Code Already Exists.

1066 1.1: If in the basic flow 2.1.3, the Error Code associated to the Error Category name is
1067 already defined, the Functional Element writes the system state variables into the Error
1068 Management Data sources using the Log Utility Functional Element and notifies the system
1069 domain controller using the Notification Functional Element and the use case ends.

1070 2: Error Code Not Found.

1071 2.1: If in the basic flows 2.2.3, 2.3.3 and 2.4.3 the Error Code associated to the Error
1072 Category name does not exist, the Functional Element writes the system state variables into
1073 the Error Management Data sources using the Log Utility Functional Element and notifies the
1074 system domain controller using the Notification Functional Element and the use case ends.

1075 **2.2.7.2.3 Special Requirements**

1076 None.

1077 **2.2.7.2.4 Pre-Conditions**

1078 None.

1079 **2.2.7.2.5 Post-Conditions**

1080 None.

1081

1082 **2.2.7.3 Manage Error Severity**

1083 **2.2.7.3.1 Description**

1084 This use case allows the user to manage error severity.

1085 **2.2.7.3.2 Flow of Events**

1086 **2.2.7.3.2.1 Basic Flow**

1087 The use case begins when the user wants to create/retrieve/update/delete an Error Severity
1088 associated to an Error Category and Error Code.

1089 1: The user sends a request to manipulate an error severity.

1090 2: Based on the operation it specifies, one of the following sub-flows is executed:

1091 If the operation is '**Create Error Severity**', the sub-flow 2.1 is executed.

1092 If the operation is '**Retrieve Error Severity**', the sub-flow 2.2 is executed.

1093 If the operation is '**Update Error Severity**', the sub-flow 2.3 is executed.

1094 1. If the operation is '**Delete Error Severity**', the sub-flow 2.4 is executed

1095 2.1: Create Error Severity.

1096 2.1.1: The Functional Element gets Error Category name.

1097 2.1.2: The Functional Element gets Error Code name.

1098 2.1.3: The Functional Element gets Error Severity definition.

1099 2.1.4: The Functional Element checks whether the Error Severity associated to the Error
1100 Category and error Code name exists.

1101 2.1.5: The Functional Element creates the Error Severity associated to the Error
1102 Category name and Error Code name and saves it into the Error Management Data
1103 sources.

1104 2.2 Retrieve Error Severity.

1105 2.2.1: The Functional Element gets the Error Category name.

1106 2.2.2: The Functional Element gets the Error Code name.

1107 2.2.3. The Functional Element gets the Error Severity name.

1108 2.2.4: The Functional Element checks whether the Error Severity exists associated to the
1109 Error Category and Error Code names.

1110 2.2.5. The Functional Element retrieves the Error Severity's information associated to the
1111 Error Category and Error Code names from the Error Management Data sources.

1112 2.3: Update Error Severity.

1113 2.3.1: The Functional Element gets the Error Category name.

1114 2.3.2: The Functional Element gets the Error Code name.

1115 2.3.3. The Functional Element gets the Error Severity name.
1116 2.3.4: The Functional Element checks whether the Error Severity exists associated to the
1117 Error Category and Error Code names.
1118 2.3.5: The Functional Element updates the Error Severity definition associated to the
1119 Error Category and Error Code names and saves it into the Error Management Data
1120 sources.
1121 2.4: Delete Error Severity.
1122 2.4.1: The Functional Element gets the Error Category name.
1123 2.4.2: The Functional Element gets the Error Code name.
1124 2.4.3. The Functional Element gets the Error Severity name.
1125 2.4.4: The Functional Element checks whether the Error Severity exists associated to the
1126 Error Category and Error Code names.
1127 2.4.5: The Functional Element removes the Error Severity associated to the Error
1128 Category and Error Code names from the Error Management Data sources.
1129 3: The Functional Element returns the results of the operation to the end user and the use case
1130 ends.

1131 **2.2.7.3.2 Alternative Flows**

1132 1: Error Severity Already Exists.
1133 1.1: If in the basic flow 2.1.4, the Error Severity associated to the Error Category and Error
1134 Code names is already defined, the Functional Element writes the system state variables into
1135 the Error Management Data sources using the Log Utility Functional Element and notifies the
1136 system domain controller using the Notification Functional Element and the use case ends.
1137 2: Error Severity Not Found.
1138 2.1: If in the basic flows 2.2.4, 2.3.4 and 2.4.4, the Error Severity associated to the Error
1139 Category and Error Code names does not exist, the Functional Element writes the system
1140 state variables into the Error Management Data sources using the Log Utility Functional
1141 Element and notifies the system domain controller using the Notification Functional Element
1142 and the use case ends.

1143 **2.2.7.3.3 Special Requirements**

1144 None

1145 **2.2.7.3.4 Pre-Conditions**

1146 None

1147 **2.2.7.3.5 Post-Conditions**

1148 None

1149 **2.2.7.4 Manage Fault**

1150 **2.2.7.4.1 Description**

1151 This use case allows an application to manage error/fault depicted from a consumed service.

1152 **2.2.7.4.2 Flow of Events**

1153 **2.2.7.4.2.1 Basic Flow**

1154 The use case begins when the user wants to manage an application' fault arises.

1155 If it is the '**Internal Application Error**, then basic flow 1 is executed.

1156 If it is the '**External Application Error**, the basic flow 2 is executed.

1157 1. Internal Application Error.

1158 1.1. User sends the internal error detail information that needs to be tracked, together with
1159 Error Category, Error Code and Error Severity, which is an optional parameter, to the
1160 Functional Element. The internal error detailed information is described by Table 1.

1161 1.2 The Functional Element logs the System State Information as defined in Table 1 using
1162 the Log Utility Functional Element into the Error Management Data sources.

1163

S/N	Attributes of System State	Description	Mandatory / Optional
1	Time	The time where the fault occurred.	Mandatory
2	Class Name	The name of class where the fault occurred	Mandatory
3	Method Name	The name of the method where the fault occurred.	Mandatory
4	Input Parameters Names	The list of input parameters names for the said method name.	Mandatory
5	Input Parameters Types	The list of input parameter types associated to each of the input parameters names of the said method name.	Mandatory
6	Input Parameters Values	The list of input parameters values associated to each of the input parameters names of the said method name.	Mandatory
7	Expected Output Type	The expected output type of the said method name.	Optional

8	Fault	The fault that causes the exception.	Mandatory
9	Error Category	The Error Category assigned to the said Fault.	Mandatory
10	Error Code	The Error Code assigned to the said Fault.	Mandatory
11	Error Severity	The Error Severity assigned to the said Fault, if any.	Optional
12	Domain Controller Contact	The contact information of the domain controller. The contact information entails: Name of domain controller Email Id / Short Messaging Services (SMS) / Telephone / Mobile Phone Means of Notification	Mandatory

1164 Table 1 System State Information for Internal Application Error

1165

1166 2. External Application Error

1167 2.1 User sends error information that needs to be tracked, as well as Error Category, Error
1168 Code and optional Error Severity to the Functional Element. The external error information
1169 includes System State Information for Internal Application Error defined in Table 1.

1170 2.2 The Functional Element logs the System State Information as defined in Table 2 using
1171 the Log Utility Functional Element into the Error Management Data sources.

1172

S/No.	Attributes of System State	Description	Mandatory / Optional
1	Time	The time where the fault occurred.	Mandatory
2	Class Name	The name of class where the fault occurred	Mandatory
3	Method Name	The name of the method where the fault occurred.	Mandatory
4	Input Parameters Names	The list of input parameters names for the said method name.	Mandatory
5	Input Parameters Types	The list of input parameter types associated to each of	Mandatory

		the input parameters names of the said method name.	
6	Input Parameters Values	The list of input parameters values associated to each of the input parameters names of the said method name.	Mandatory
7	Expected Output Type	The expected output type of the said method name.	Optional
8	Fault	The fault that causes the exception.	Mandatory
9	Error Category	The Error Category assigned to the said Fault.	Mandatory
10	Error Code	The Error Code assigned to the said Fault.	Mandatory
11	Error Severity	The Error Severity assigned to the said Fault, if any.	Optional
12	Domain Controller Contact	The contact information of the domain controller. The contact information entails: Name of domain controller Email Id / Short Messaging Services (SMS) / Telephone / Mobile Phone Means of Notification	Mandatory
13*	Web Services Endpoint URL	The URL for the consumed web service.	Mandatory
14*	Invocation Type	The invocation type used for interface invocation, i.e. API or SOAP invocation.	Mandatory
15*	Consumed Web Service Name	The name of the consumed web service from within the application.	Mandatory
16*	Used Interface Name	The name of the interface used	Mandatory
17*	Used Interface Input Parameters Name	The list of input parameters names required for the said interface.	Mandatory

18*	Used Interface Input Parameters Types	The list of input parameters names types defined for the said interface.	Mandatory
19*	Used Interface Input Parameters Values	The list of input parameters values passed in for the said interface.	Mandatory
20*	SOAP Fault <Fault> Element	The content of the received SOAP Fault message <Fault> element.	Mandatory

1173 Table 2. System State Information for External Application

1174 Items indicated by the symbol “*” are the additional System State Information attributes
1175 which are applicable to External Application Error only.

1176 3. The Functional Element returns the result of the operation to the user and the use case ends.

1177 **2.2.7.4.2.2 Alternative Flow**

1178 1: Error Category Does Not Exist

1179 1.1: If in the basic flows 1.1 and 2.1, the Error Category Name is not defined, the Functional
1180 Element writes the system state variables into the Error Management Data sources using
1181 the Log Utility Functional Element and notifies the system domain controller and the use
1182 case ends.

1183

1184 2. Error Code Does Not Exist

1185 2.1: If in the basic flows 1.1 and 2.1, the Error Code associated to the Error Category is not
1186 defined, the Element writes the system state variables into the Error Management Data
1187 sources using the Log Utility Functional Element and notifies the system domain controller
1188 using the Notification Functional Element and the use case ends.

1189

1190 3. Error Severity Does Not Exist

1191 3.1: If in the basic flows 1.1 and 2.1, the Error Severity associated to the Error Category,
1192 and Error Code is not defined, the Functional Element writes the system state variables into
1193 the Error Management Data sources using the Log Utility Functional Element and notifies
1194 the system domain controller using the Notification Functional Element and the use case
1195 ends.

1196

1197 4. Log Utility Functional Element Not Available.

1198 4.1: If in the basic flows 1.2 and 2.2, the Log Utility Functional Element writes the system
1199 state variables into the Error Management Data sources using the Log Utility Functional
1200 Element and notifies the system domain controller using the Notification Functional
1201 Element and the use case ends.

1202

1203 **2.2.7.4.3 Special Requirements**

1204 None

1205 **2.2.7.4.4 Pre-Conditions**

1206 None

1207 **2.2.7.4.5 Post-Conditions**

1208 None

1209

1210

1211

1212 2.3 Event Handler Functional Element

1213 2.3.1 Motivation

1214 Information is in abundance in a service-oriented environment. However, not all information is
1215 applicable to a particular enterprise and there lies the need to control information flow in an
1216 organization. In a Web Service-enabled implementation, the Event Handler Functional Element
1217 can help to fulfill this need by:

1218 Managing the information flow through a subscription based mechanism,

1219 Streamlining information into meaningful categories so as to improve relevancy to a potential
1220 consumer of the information, and

1221 Refining information flow via a filtering mechanism

1222

1223 This Functional Element fulfills the following requirements from the Functional Elements
1224 Requirements, Working Draft 01a:

1225 Primary Requirements

- 1226 • MANAGEMENT-111,
- 1227 • PROCESS-005, and
- 1228 • PROCESS-100 to PROCESS-117.

1229 Secondary Requirements

- 1230 • None

1231 2.3.2 Terms Used

Terms	Description
Active Event Detection	Active Event Detection refers to the capability to periodically detect the occurrence of an external Event.
Channel	A Channel is a logical grouping of similar event types generated by the suppliers. When an Event is routed to a channel, all the Event Consumers who have subscribed to that Channel will be notified.
Event	An Event is an indication of an occurrence of an activity, such as the availability of a discounted air ticket. In such a case, it will trigger a follow-up action such as the URL where the ticket can be bought. Interested event consumer can then proceed with the purchase at the designated URL.
Event Consumer	An Event Consumer is a receiver of the events generated by an Event Supplier.
Event Supplier	An Event Supplier generates Event. It can be an application or a service, or even a person. Note that Event Suppliers are typically external to the Event Handler.
Filter	A Filter is a mechanism for defining Event that is of value to the Event Consumer.
Routing Rule	A Routing Rule defines how an Event is routed. An Event can be routed to a Channel or directly to an Event Consumer.

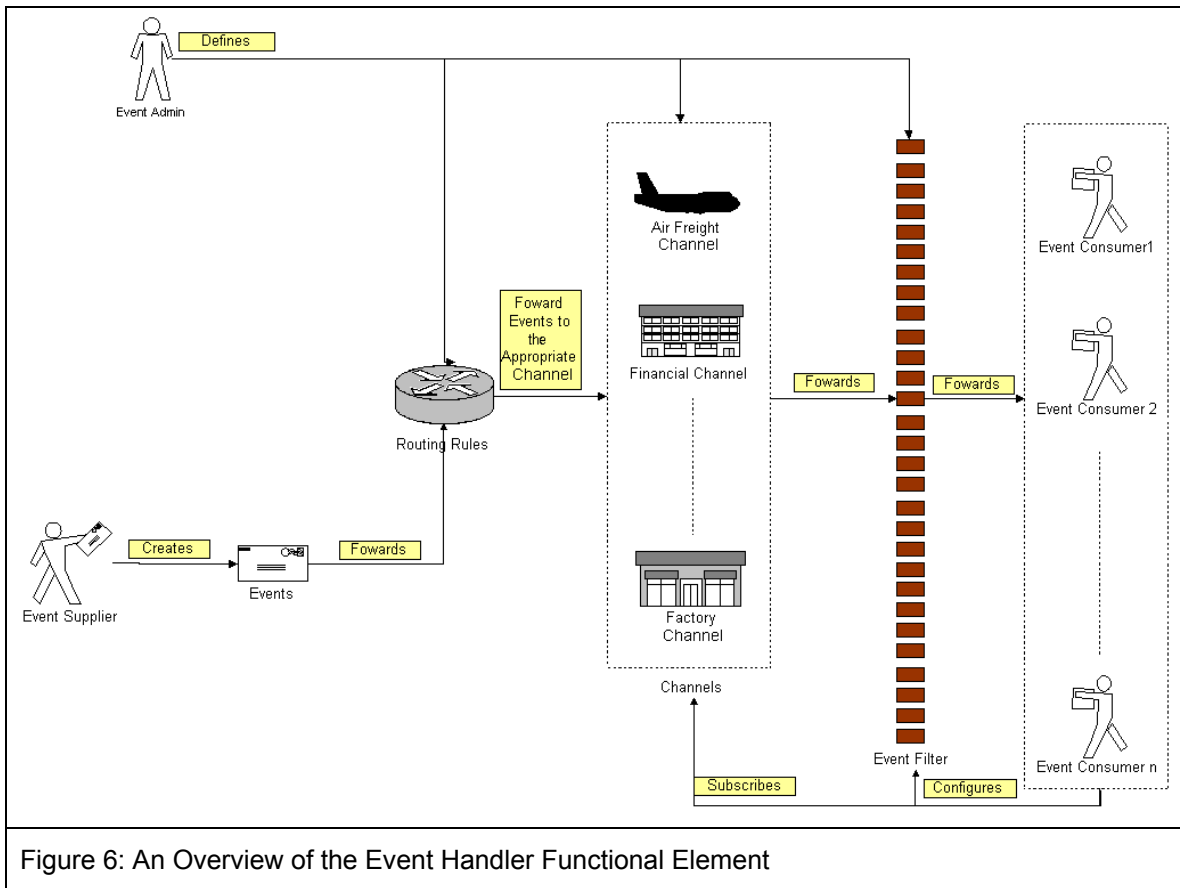


Figure 6: An Overview of the Event Handler Functional Element

1233

1234 Figure 3 depicts the basic concepts of how the participating entities collaborate together in the
 1235 Event Handler Functional Element. Beginning with the event supplier who generates an event,
 1236 the event is subsequently routed to the routing rules engine. Depending on the rules specified by
 1237 the event administrator on the engine, the event could be routed to an appropriate channel, for
 1238 example, the airfreight channel. In this case, a notification message will be sent to the subscribing
 1239 event consumers. In between that, there is a filtering engine to determine if a particular event is
 1240 meaningful to the intended recipients and this is configurable by the recipients themselves.

1241 2.3.3 Key Features

1242 Implementations of the Event Handler Functional Element are expected to provide the following
 1243 key features:

- 1244 1. The Functional Element MUST provide the capability to manage the creation (or registration)
 1245 and deletion of instances of the following concepts based on a pre-defined structure:
 - 1246 1.1. Event Supplier,
 - 1247 1.2. Event Consumer,
 - 1248 1.3. Event,
 - 1249 1.4. Filter,
 - 1250 1.5. Channel, and
 - 1251 1.6. Routing Rule.

- 1252 2. The Functional Element MUST provide the capability to manage all the information (attribute
1253 values) stored in such concepts. This includes the capability to retrieve and update
1254 attribute's values belonging to the concepts mentioned in Key Feature (1).
- 1255 3. The Functional Element MUST provide the capability to enable Event Suppliers to trigger
1256 relevant Events.
- 1257 4. The Functional Element MUST provide a mechanism to associate/unassociate Routing
1258 Rules to an Event.
- 1259 *Example: As shown in Figure 1, where an event can be routed to Air Freight or Financial*
1260 *Channel or even to all channels based on the Routing Rules that are associated*
1261 *with the Event.*
- 1262 5. As part of Key Feature (3), the Routing Rules must be able to route an event to all, specified
1263 Channels or individual Event Consumers.
- 1264 6. The Functional Element MUST enable Event Consumers to execute the following tasks to
1265 improve the relevancy of the incoming events”
- 1266 6.1. Subscribe/Unsubscribe to relevant Channel(s), and
1267 6.2. Apply a filter to the appropriate channel or event, which helps to refine the criteria of a
1268 useful event further.
- 1269 7. The Functional Element MUST provide the capability to notify relevant Event Consumers
1270 when an event occurs.
- 1271 Examples of notification types include SMS, email and Web Services invocations.
- 1272 8. As part of Key Feature (6), the notification must be able to handle differing requirements
1273 arising from different notification formats.
- 1274 *Example: If the incoming event contains 2 important attributes, the order or position of*
1275 *these 2 attributes must be configurable to suit the convenience of the Event*
1276 *Consumer. This is extremely important in the case of Web Service Invocations.*
- 1277 10. The Functional Element MUST provide a mechanism for managing the concepts specified
1278 across different application domains.
- 1279 *Example: Namespace control mechanism*
1280
- 1281 In addition, the following key features could be provided to enhance the Functional Element
1282 further:
- 1283 1. The Functional Element MAY provide a mechanism to enable active event detection.
- 1284 2. If Key Feature (1) is implemented, then the Functional Element MUST provide the following
1285 capabilities also:
- 1286 2.1. Non-intrusive detection
1287 *Example: The detection of a new event through periodic inspection of the audit log.*
- 1288 2.2. Configurable event detection schedule
1289 *Example: To inspect the audit log every 2 hours, where the duration between*
1290 *inspections is configurable.*
- 1291 2.3. Ability to retrieve relevant data from external source(s) for further event processing by
1292 Event Handler
1293 *Example: To retrieve Error Type and Message from audit log.*
- 1294 3. The Functional Element MAY provide the capability to record event processing within the
1295 Event Handler. The logging of event processing includes the occurrences of event, sending
1296 of notifications, warning and error messages generated in the processing of events.
- 1297 4. The Functional Element MAY provide the capability scheduled-based event notification.
1298

1299 **2.3.4 Interdependencies**

Direct Dependency	
Log Utility Functional Element	The Log Utility Functional Element helps to log the audit trail.

1300

Interaction Dependency	
Notification Functional Element	The Notification Functional Element helps to send SMS and email to the appropriate Event Consumer.

1301

1302 **2.3.5 Related Technologies and Standards**

1303 None

2.3.6 Model

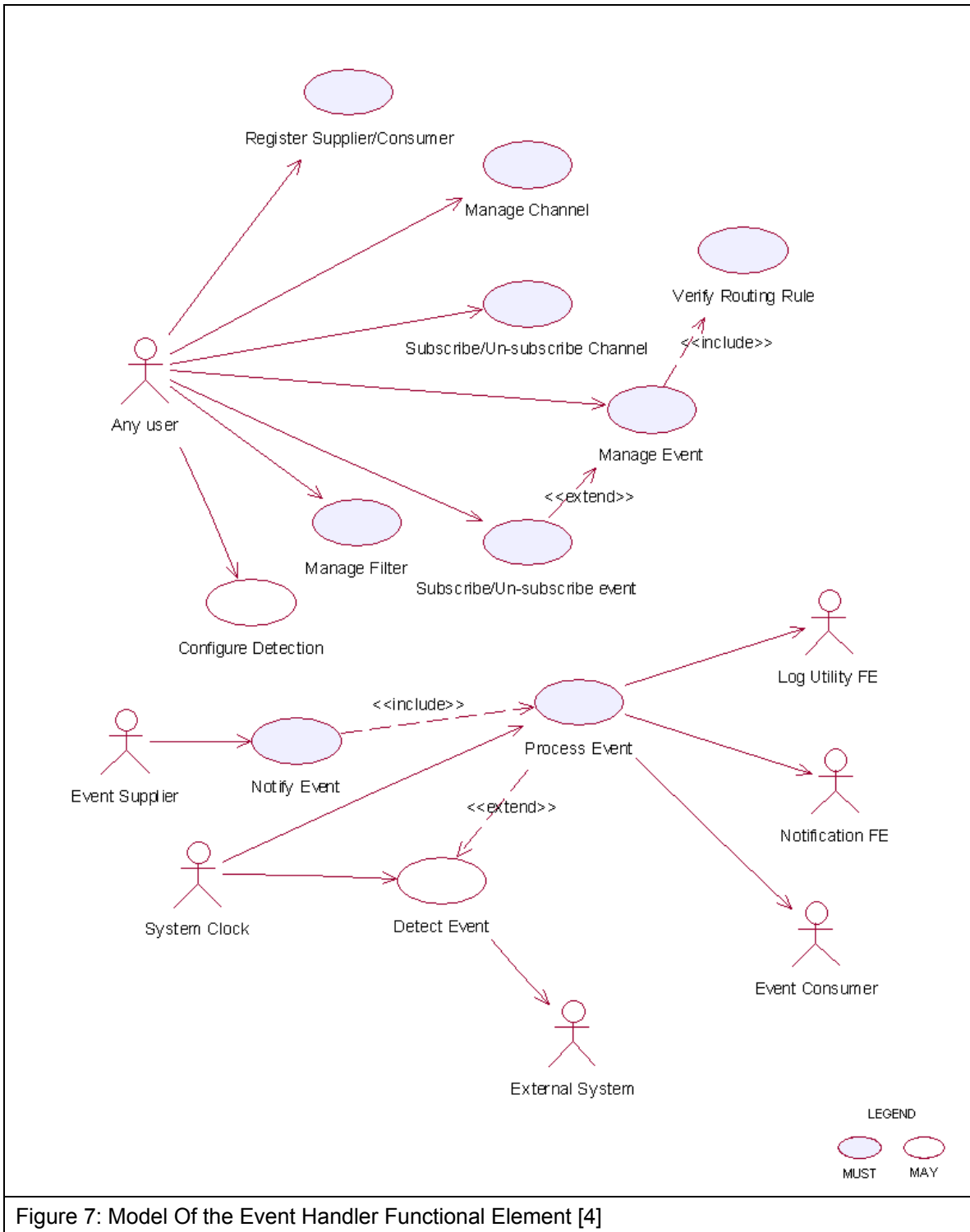


Figure 7: Model Of the Event Handler Functional Element [4]

1305 **2.3.7 Usage Scenarios**

1306 **2.3.7.1 Register Supplier/Consumer**

1307 **2.3.7.1.1 Description**

1308 This use case allows the user to register itself to the Event Handler Functional Element as an
1309 event supplier or an event consumer.

1310 **2.3.7.1.2 Flow of Events**

1311 **2.3.7.1.2.1 Basic Flow**

1312 The use case begins when the user of the Event Handler wants to register an event supplier or
1313 event consumer with the Event Handler.

1314 1: The user sends a request to Event Handler together with its profile data and operation.

1315 2: Based on the operation it specified, one of the following sub-flows is executed:

1316 If the operation is '**Register as supplier**', then sub-flow 2.1 is executed.

1317 If the operation is '**Register as consumer**', then sub-flow 2.2 is executed.

1318 If the operation is '**Un-register as supplier**', then sub-flow 2.3 is executed.

1319 If the operation is '**Un-register as consumer**', then sub-flow 2.4 is executed.

1320 If the operation is '**Update supplier**', then sub-flow 2.5 is executed.

1321 If the operation is '**Update consumer**', then sub-flow 2.6 is executed.

1322 If the operation is '**Retrieve supplier**', then sub-flow 2.7 is executed.

1323 If the operation is '**Retrieve consumer**', then sub-flow 2.8 is executed.

1324 2.1: Register as Supplier.

1325 2.1.1: The Functional Element gets the user profile data, i.e. namespace, name,
1326 description and type.

1327 2.1.2: The Functional Element registers the user as event supplier.

1328 2.1.3: The Functional Element returns the Supplier Id to the user.

1329 2.2: Register as Consumer.

1330 2.2.1: The Functional Element gets the user profile data, i.e. namespace, name,
1331 description and type.

1332 2.2.2: The Functional Element registers the user as event consumer.

1333 2.2.3: The Functional Element returns the Consumer Id to the user.

1334 2.3: Un-register as Supplier.

1335 2.3.1: The Functional Element gets the user namespace and name or User Id.

1336 2.3.2: The Functional Element checks whether the user is a supplier.

1337 2.3.3: The Functional Element removes the user as supplier.

- 1338 2.4: Un-register as Consumer.
- 1339 2.4.1: The Functional Element gets the user namespace and name or User Id.
- 1340 2.4.2: The Functional Element checks whether the user is a consumer.
- 1341 2.4.3: The Functional Element removes the user as consumer.
- 1342 2.5: Update Supplier.
- 1343 2.5.1: The Functional Element gets the user namespace and name or User Id together
1344 with the user profile.
- 1345 2.5.2: The Functional Element checks whether the user is a supplier.
- 1346 2.5.2: The Functional Element updates the user profile.
- 1347 2.6: Update Consumer.
- 1348 2.6.1: The Functional Element gets the user namespace and name or User Id together
1349 with the user profile.
- 1350 2.6.2: The Functional Element checks whether the user is a consumer.
- 1351 2.6.3: The Functional Element updates the user profile.
- 1352 2.7: Retrieve Supplier.
- 1353 2.7.1: The Functional Element gets the user namespace and name or User Id.
- 1354 2.7.2: The Functional Element checks whether the user is a supplier.
- 1355 2.7.3: The Functional Element returns the user profile.
- 1356 2.8: Retrieve Consumer.
- 1357 2.8.1: The Functional Element gets the user namespace and name or User Id.
- 1358 2.8.2: The Functional Element checks whether the user is a consumer.
- 1359 2.8.3: The Functional Element returns the user profile.
- 1360 3: The Functional Element returns the results to indicate the success or failure of this operation to
1361 the user and the use case ends.
- 1362 **2.3.7.1.2.2 Alternative Flows**
- 1363 1: Supplier Already Registered.
- 1364 1.1: If in the basic flow 2.1.2, the user already registered as supplier, Functional Element will
1365 return an error message to the user and the use case ends.
- 1366 2: Consumer Already Registered.
- 1367 2.1: If in the basic flow 2.2.2, the user already registered as consumer, Functional Element
1368 will return an error message to the user and the use case ends.
- 1369 3: Supplier or Consumer Not Registered.

1370 3.1: If in the basic flow 2.3.2, 2.4.2, 2.5.2, 2.6.2, 2.7.2, and 2.8.2, the user specified is not
1371 registered, Functional Element will return an error message to the user and the use case
1372 ends.

1373 4: Persistency Mechanism Error.

1374 4.1: If in the basic flow 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2,7 and 2.8, the Functional Element cannot
1375 perform data persistency, Functional Element will return an error message to the user and the
1376 use case ends.

1377

1378 **2.3.7.1.3 Special Requirements**

1379 None.

1380 **2.3.7.1.4 Pre-Conditions**

1381 None.

1382 **2.3.7.1.5 Post-Conditions**

1383 None.

1384 **2.3.7.2 Manage Channel**

1385 **2.3.7.2.1 Description**

1386 This use case allows the user to manage channels.

1387 **2.3.7.2.2 Flow of Events**

1388 **2.3.7.2.2.1 Basic Flow**

1389 The use case begins when the user wants to create/retrieve/update/delete a channel

1390 1: The user sends request to manipulate a channel.

1391 2: Based on the operation it specifies, one of the following sub-flows is executed:

1392 If the operation is '**Create Channel**', the sub-flow 2.1 is executed.

1393 If the operation is '**Retrieve Channel**', the sub-flow 2.2 is executed.

1394 If the operation is '**Update Channel**', the sub-flow 2.3 is executed.

1395 If the operation is '**Delete Channel**', the sub-flow 2.4 is executed.

1396 2.1: Create Channel.

1397 2.1.1: The Functional Element gets channel definition, i.e. namespace, channel name
1398 and description.

1399 2.1.2: The Functional Element checks whether the channel exists.

1400 2.1.3: The Functional Element creates the channel.

1401 2.2: Retrieve Channel.

1402 2.2.1: The Functional Element gets namespace, channel name and retrieve condition.

1403 2.2.2: The Functional Element retrieves the channel's information according to the
1404 condition.

1405 2.3: Update Channel.

1406 2.3.1: The Functional Element gets namespace, channel name and description.

1407 2.3.2: The Functional Element checks whether the channel exists.

1408 2.3.3: The Functional Element updates the channel definition.

1409 2.4: Delete Channel.

1410 2.4.1: The Functional Element gets namespace and channel name.

1411 2.4.2: The Functional Element checks whether the channel exists.

1412 2.4.3: The Functional Element removes the channel from the Functional Element.

1413 3: The Functional Element returns the results of the operation to the user and the use case ends.

1414 **2.3.7.2.2.2 Alternative Flows**

1415 1: Channel Already Exists.

1416 1.1: If in the basic flow 2.1.2, the channel is already defined, Functional Element returns an
1417 error message and the use case ends.

1418 2: Conditional Retrieving.

1419 2.1: In the basic flow 2.2.2:

1420 2.1 1: If the condition is the retrieval by channel name and the channel does not exist,
1421 then it will go to Alternative Flow 3.

1422 2.1.2: If the condition is the retrieval of one channel definition, it returns the definition of
1423 that channel and the use case ends.

1424 2.1.3: If the condition is the retrieval of all channels' information, it returns all channels
1425 definition and the use case ends.

1426 2.1.4: If the condition is the retrieval of channel through channel description, it will return
1427 all matched channels and the use case ends.

1428 2.1.5: If the condition is the retrieval of registered consumers, it returns the list of
1429 consumer registered on the channel and the use case ends.

1430 3: Channel Not Found.

1431 3.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the channel does not exist, Functional
1432 Element will return an error message and the use case ends.

1433 4: Consumer Not Found.

1434 4.1: If in the basic flow 2.1.3, 2.5.3 and 2.6.3, the event consumer does not exist,
1435 Functional Element will return an error message and the use case ends.

1436 5: Extension Point.

1437 5.1: If in the basic flow 2.1.3, and 2.3.3, the event consumers that subscribed to the
1438 channel are provided, the use case Subscribe/un-subscribe channel will be extended.

1439 **2.3.7.2.3 Special Requirements**

1440 None.

1441 **2.3.7.2.4 Pre-Conditions**

1442 None.

1443 **2.3.7.2.5 Post-Conditions**

1444 None.

1445 **2.3.7.3 Subscribe/Un-subscribe To Channel**

1446 **2.3.7.3.1 Description**

1447 This use case performs the subscription or un-subscription on a channel for an event consumer.

1448 **2.3.7.3.2 Flow of Events**

1449 **2.3.7.3.2.1 Basic Flow**

1450 The use case begins when the user wants to subscribe or un-subscribe to a channel.

1451 1: The user sends the request.

1452 2: Based on the operation it specifies, one of the following sub-flows is executed:

1453 If the operation is '**Subscribe to Channel**', then sub-flow 2.1 is executed.

1454 If the operation is '**Un-Subscribe to Channel**', then sub-flow 2.2 is executed.

1455 2.1: Subscribe To Channel.

1456 2.1.1: The Functional Element gets event consumer Id, or consumer namespace and
1457 consumer name, together with channel namespace and channel name.

1458 2.1.2: The Functional Element checks whether the channel exists.

1459 2.1.3: The Functional Element adds the subscription of the consumer to the channel.

1460 2.2: Un-Subscribe To Channel.

1461 2.2.1: The Functional Element gets event consumer Id, or consumer namespace and
1462 consumer name, together with channel namespace and channel name.

1463 2.2.2: The Functional Element checks whether the channel exists.

1464 2.2.3: The Functional Element removes the subscription of the consumer to the channel.

1465 3: The Functional Element returns the results of the operation to the user and the use case ends.

1466 **2.3.7.3.2.2 Alternative Flows**

1467 1: Channel Not Found.

1468 1.1: If in the basic flow 2.1.2 and 2.2.2, the channel specified does not exist, Functional
1469 Element will return an error message to the user and the use case ends.

1470 2: Event Consumer Not Found.

1471 2.1: If in the basic flow 2.1.2 and 2.2.2, the event consumer related does not exist, Functional
1472 Element will return an error message to the user and the use case ends.

1473 **2.3.7.3.3 Special Requirements**

1474 None.

1475 **2.3.7.3.4 Pre-Conditions**

1476 None.

1477 **2.3.7.3.5 Post-Conditions**

1478 None.

1479 **2.3.7.4 Manage Event**

1480 **2.3.7.4.1 Description**

1481 This use case describes the scenarios of managing events.

1482 **2.3.7.4.2 Flow of Events**

1483 **2.3.7.4.2.1 Basic Flow**

1484 The use case begins when the user wants to manage events.

1485 1: The user sends a request to the Functional Element.

1486 2: Based on the operation it specifies, one of the following sub-flows is executed:

1487 If the operation is '**Create Event**', then sub-flow 2.1 is executed.

1488 If the operation is '**Retrieve Event Information**', then sub-flow 2.2 is executed.

1489 If the operation is '**Update Event Definition**', then sub-flow 2.3 is executed.

1490 If the operation is '**Delete Event**', then sub-flow 2.4 is executed.

1491 If the operation is '**Assign Flow**', then sub-flow 2.5 is executed.

1492 If the operation is '**Un-Assign Flow**', then sub-flow 2.6 is executed.

1493 2.1: Create Event

1494 2.1.1: The Functional Element gets event definition including namespace, event name,
1495 event description, event routing rule, and event attributes definition.

1496 2.1.2: The Functional Element verifies the parameters.

1497 2.1.3: The Functional Element verifies the routing rule through use case verify routing
1498 rule.

1499 2.1.4: The Functional Element creates event definition by recording the definition of
1500 event.

- 1501 2.2: Retrieve Event.
- 1502 2.2.1: The Functional Element gets namespace, event name, and condition.
- 1503 2.2.2: The Functional Element retrieves the event definition according to the condition.
- 1504 2.3: Update Event Definition
- 1505 2.3.1: The Functional Element gets event definition including namespace, event name,
1506 event description, event routing rule, and event attributes definition.
- 1507 2.3.2: The Functional Element verifies the parameters.
- 1508 2.3.3: The Functional Element verifies the routing rule through use case verify routing
1509 rule.
- 1510 2.3.4: The Functional Element updates the event definition.
- 1511 2.4: Delete Event.
- 1512 2.4.1: The Functional Element gets namespace and event name.
- 1513 2.4.2: The Functional Element checks whether the event exists.
- 1514 2.4.3: The Functional Element deletes the event definition.
- 1515 2.5: Assign Flow.
- 1516 2.5.1: The Functional Element gets namespace, event name and flow name.
- 1517 2.5.2: The Functional Element checks whether the event exists and flow defined.
- 1518 2.5.3: The Functional Element assigns the flow to the event.
- 1519 2.6: Un-assign Flow.
- 1520 2.6.1: The Functional Element gets namespace, event name and flow name.
- 1521 2.6.2: The Functional Element checks whether the event exists and flow defined.
- 1522 2.6.3: The Functional Element un-assigns the flow to the event.
- 1523 3: The Functional Element returns the results of the operation to the user and the use case ends.
- 1524 **2.3.7.4.2.2 Alternative Flows**
- 1525 1: Event Already Exist.
- 1526 1.1: If in the basic flow 2.1.2, the event already exists, Functional Element will return an error
1527 message to the user and the use case ends.
- 1528 2: Parameters Are Invalid.
- 1529 2.1: If in the basic flow 2.1.2 and 2.3.2, the parameters provided are invalid, Functional
1530 Element will return an error message to the user and the use case ends.
- 1531 3: Event Not Found.
- 1532 3.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the event does not exist, Functional Element
1533 will return an error message to the user and the use case ends.

- 1534 4: Flow Not Defined.
- 1535 4.1: If in the basic flow 2.1.2 and 2.3.2, the flow does not exist, Functional Element will return
1536 an error message to the user and the use case ends.
- 1537 5: Condition Retrieve.
- 1538 5.1: In the basic flow 2.2.2:
- 1539 5.1.1: If the retrieving condition is the retrieval of event definition based on event name, it
1540 returns event definition and the use case ends.
- 1541 5.1.2: If the retrieving condition is the retrieval of all event definition, it returns all event
1542 definition and the use case ends.
- 1543 5.1.3: If the retrieving condition is the retrieval of events assigned to specified channel, it
1544 returns the list of event definitions.
- 1545 5.1.4: If the retrieving condition is the retrieval of channels associated with specified
1546 event, it returns the list of channel definition.
- 1547 6: Extension Point.
- 1548 6.1: If in the basic flow 2.1.4, and 2.3.4, the event consumers that subscribed to the event are
1549 provided, the use case Subscribe/Un-subscribe event will be extended.

1550 **2.3.7.4.3 Special Requirements**

1551 None.

1552 **2.3.7.4.4 Pre-Conditions**

1553 None.

1554 **2.3.7.4.5 Post-Conditions**

1555 None.

1556 **2.3.7.5 Subscribe/Un-subscribe To Event**

1557 **2.3.7.5.1 Description**

1558 This use case performs the subscription or un-subscription on an event for an event consumer.

1559 **2.3.7.5.2 Flow of Events**

1560 **2.3.7.5.2.1 Basic Flow**

1561 The use case begins when the user wants to subscribe or un-subscribe an event.

1562 1: The user sends a request.

1563 2: Based on the operation it specifies, one of the following sub-flows is executed:

1564 If the operation is '**Subscribe to Event**', then sub-flow 2.1 is executed.

1565 If the operation is '**Un-Subscribe to Event**', then sub-flow 2.2 is executed.

1566 2.1: Subscribe To Event.

1567 2.1.1: The Functional Element gets event consumer Id, or consumer namespace and
1568 consumer name, together with event namespace and event name.

1569 2.1.2: The Functional Element checks whether the event exists.

1570 2.1.3: The Functional Element adds the subscription of the consumer to the event.

1571 2.2: Un-Subscribe To Event.

1572 2.2.1: The Functional Element gets event consumer Id, or consumer namespace and
1573 consumer name, together with event namespace and event name.

1574 2.2.2: The Functional Element checks whether the event exists.

1575 2.2.3: The Functional Element removes the subscription of the consumer to the event.

1576 3: The Functional Element returns the results of the operation to the user and the use case ends.

1577 **2.3.7.5.2 Alternative Flows**

1578 1: Event Not Found.

1579 1.1: If in the basic flow 2.1.2 and 2.2.2, the event specified does not exist, Functional Element
1580 will return an error message to the user and the use case ends.

1581 2: Event Consumer Not Found.

1582 2.1: If in the basic flow 2.1.2 and 2.2.2, the event consumer related does not exist, Functional
1583 Element will return an error message to the user and the use case ends.

1584 **2.3.7.5.3 Special Requirements**

1585 None.

1586 **2.3.7.5.4 Pre-Conditions**

1587 None.

1588 **2.3.7.5.5 Post-Conditions**

1589 None.

1590 **2.3.7.6 Verify Routing Rule**

1591 **2.3.7.6.1 Description**

1592 This use case verifies the syntax of routing rule.

1593 **2.3.7.6.2 Flow of Events**

1594 **2.3.7.6.2.1 Basic Flow**

1595 The use case begins when the user wants to verify the correctness of a routing expression.

1596 1: The user sends a request.

1597 2: The Functional Element gets the routing expression.

- 1598 3: The Functional Element checks the syntax of routing expression.
1599 4: The Functional Element verifies the parameters.
1600 5: The Functional Element returns the status of the operation to the user and the use case ends.

1601 **2.3.7.6.2 Alternative Flows**

1602 1: Routing Rule Expression Syntax Error.

1603 1.1: If in the basic flow 3, there is a syntax error, Functional Element will return an error
1604 message to the user and the use case ends.

1605 2: Event Consumer Not Found.

1606 2.1: If in the basic flow 4, the event consumer related does not exist, Functional Element will
1607 return an error message to the user and the use case ends.

1608 **2.3.7.6.3 Special Requirements**

1609 None.

1610 **2.3.7.6.4 Pre-Conditions**

1611 None.

1612 **2.3.7.6.5 Post-Conditions**

1613 None.

1614 **2.3.7.7 Manage Filter**

1615 **2.3.7.7.1 Description**

1616 A filter is used to filter out certain events to those event consumers even though they are the
1617 intended receivers according to the routing rules.

1618 **2.3.7.7.2 Flow of Events**

1619 **2.3.7.7.2.1 Basic Flow**

1620 The use case begins when the user wants to create/retrieve/update/delete a filter.

1621 1: The user sends a request to manage a filter.

1622 2: Based on the operation it specifies, one of the following sub-flows is executed:

1623 If the operation is '**Create Filter**', then sub-flow 2.1 is executed.

1624 If the operation is '**Retrieve Filter**', then sub-flow 2.2 s executed.

1625 If the operation is '**Update Filter**', then sub-flow 2.3 is executed.

1626 If the operation is '**Delete Filter**', then sub-flow 2.4 is executed.

1627 2.1: Create Filter.

1628 2.1.1: The Functional Element gets filter definition, i.e. consumer namespace, consumer
1629 name, filter name, description, event name or channel name.

1630 2.1.2: The Functional Element checks whether the event or channel exists.
1631 2.1.3: The Functional Element saves the filter definition.
1632 2.2: Retrieve Filter.
1633 2.2.1: The Functional Element gets the filter name.
1634 2.2.2: The Functional Element retrieves the filter information according to the name.
1635 2.3: Update Filter.
1636 2.3.1: The Functional Element gets filter definition, i.e. consumer namespace, name, filter
1637 name, description, event name or channel name.
1638 2.3.2: The Functional Element checks the parameters.
1639 2.3.3: The Functional Element updates the filter definition.
1640 2.4: Delete Filter.
1641 2.4.1: The Functional Element gets namespace and filter name.
1642 2.4.2: The Functional Element checks whether the filter exists.
1643 2.4.3: The Functional Element removes the filter from the Functional Element.
1644 3: The Functional Element returns the results of the operation to the user and the use case ends.

1645 **2.3.7.7.2 Alternative Flows**

1646 1: Filter Already Exists.
1647 1.1: If in the basic flow 2.1.2, the filter is already defined, Functional Element will return an
1648 error message and the use case ends.
1649 2: Event Not Found.
1650 2.1: If in the basic flow 2.1.2 and 2.3.2, the event used does not exist, Functional Element will
1651 return an error message and the use case ends.
1652 3: Channel Not Found.
1653 3.1: If in the basic flow 2.1.2 and 2.3.2, the channel used does not exist, Functional Element
1654 will return an error message and the use case ends.
1655 4: Consumer Not Found.
1656 4.1: If in the basic flow 2.1.3, 2.5.3, and 2.6.3, the event consumer does not exist, Functional
1657 Element will return an error message and the use case ends.

1658 **2.3.7.7.3 Special Requirements**

1659 None.

1660 **2.3.7.7.4 Pre-Conditions**

1661 None.

1662 **2.3.7.7.5 Post-Conditions**

1663 None.

1664 **2.3.7.8 Notify Event**

1665 **2.3.7.8.1 Description**

1666 This use case allows the event supplier to notify an event to the Event Handler Functional
1667 Element. Once the Event Handler Functional Element receives the notification, it will process the
1668 event based on the processing logic defined.

1669 **2.3.7.8.2 Flow of Events**

1670 **2.3.7.8.2.1 Basic Flow**

1671 The use case begins when the user wants to notify an event.

1672 1: The user sends a notification.

1673 2: The Functional Element receives the notification with parameters, i.e. event supplier id or event
1674 supplier namespace and name.

1675 3: The Functional Element checks whether the event is defined and event supplier is registered.

1676 4: Include use case Process Event to process the notification of event.

1677 5: The Functional Element returns the status of the operation to the user and the use case ends.

1678 **2.3.7.8.2.2 Alternative Flows**

1679 1: User Is Not Registered.

1680 1.1: If in the basic flow 3, the user is not registered, Functional Element will return an error
1681 message to the user and the use case ends.

1682 2: Event Not Defined.

1683 2.1: If in the basic flow 3, the event is not defined, Functional Element will return an error
1684 message to the user and the use case ends.

1685 3: Error Returned.

1686 3.1: If in the basic flow 4, an error is returned by use case Process event, Functional Element
1687 will return an error message to the user and the use case ends.

1688 **2.3.7.8.3 Special Requirements**

1689 None.

1690 **2.3.7.8.4 Pre-Conditions**

1691 None.

1692 **2.3.7.8.5 Post-Conditions**

1693 None.

1694 **2.3.7.9 Configure Monitoring**

1695 **2.3.7.9.1 Description**

1696 This use case describes the capability of configuration on event monitoring. Based on the
1697 configuration, Event Handler will pro-actively check whether an event has happened.

1698 **2.3.7.9.2 Flow of Events**

1699 **2.3.7.9.2.1 Basic Flow**

1700 The use case begins when the user wants to configure the event monitoring.

1701 1: The user sends a request to manage a filter.

1702 2: Based on the operation it specifies, one of the following sub-flows is executed:

1703 If the operation is '**Add Configuration**', then sub-flow 2.1 is executed.

1704 If the operation is '**Remove Configuration**', then sub-flow 2.2 is executed.

1705 2.1: Add Configuration.

1706 2.1.1: The Functional Element gets configuration definition, i.e. configuration name,
1707 namespace, event name, connection parameters, condition that signifies the events and
1708 schedule.

1709 2.1.2: The Functional Element saves filter definition.

1710 2.2: Remove Configuration.

1711 2.2.1: The Functional Element gets configuration name.

1712 2.2.2: The Functional Element removes the configuration.

1713 3: The Functional Element returns the results of the operation to the user and the use case ends.

1714 **2.3.7.9.2.2 Alternative Flows**

1715 1: Configuration Exist.

1716 1.1: If in the basic flow 2.1.2, the configuration already exists, Functional Element will return
1717 an error message and the use case ends.

1718 **2.3.7.9.3 Special Requirements**

1719 None.

1720 **2.3.7.9.4 Pre-Conditions**

1721 None.

1722 **2.3.7.9.5 Post-Conditions**

1723 None.

1724 **2.3.7.10 Detect Event**

1725 **2.3.7.10.1 Description**

1726 This use case describes the event monitoring capability that Event Handler provides. Once Event
1727 Handler detects an event, it will trigger the pre-defined process for the event.

1728 **2.3.7.10.2 Flow of Events**

1729 **2.3.7.10.2.1 Basic Flow**

1730 The use case begins when the Functional Element clock generates the trigger.

1731 1: The Functional Element clock generates a trigger.

1732 2: The Functional Element receives the trigger and checks the condition for pre-defined
1733 monitoring sources.

1734 3: The Functional Element checks whether the event happens.

1735 4: The Functional Element returns the results of the operation and the use case ends.

1736 **2.3.7.10.2.2 Alternative Flows**

1737 1: External Functional Element Not Available.

1738 1.1: If in the basic flow 3, the external Functional Element is not available and the Event
1739 Handler cannot make a connection, Functional Element will return an error message and the
1740 use case ends.

1741 2: Data Not Available.

1742 2.1: If in the basic flow 3, the data that signifies the event cannot be accessed, Functional
1743 Element will return an error message and the use case ends.

1744 3: Extension Point.

1745 3.1: If in the basic flow 3, the event happens, Functional Element will extend to use case
1746 Process event.

1747 **2.3.7.10.3 Special Requirements**

1748 None.

1749 **2.3.7.10.4 Pre-Conditions**

1750 None.

1751 **2.3.7.10.5 Post-Conditions**

1752 None.

1753 **2.3.7.11 Process Event**

1754 **2.3.7.11.1 Description**

1755 This use case describes the core functionality of Event Handler. It is the engine that processes
1756 the events. Actor can be the Functional Element clock that triggers the scheduled event
1757 notification, or any user who wants to notify the event.

1758 **2.3.7.11.2 Flow of Events**

1759 **2.3.7.11.2.1 Basic Flow**

1760 The use case begins when there is a request to process the event.

1761 1: The user sends a request to process an event.

1762 2: Based on the actor of this use case, one of the sub-flows is executed.

1763 If the initiator is the Functional Element clock, then sub-flow '**Initiated By Functional Element**
1764 **Clock**' is executed.

1765 If the initiator is other than Functional Element clock, then sub-flow '**Initiated By Any User**' is
1766 executed.

1767 2.1: Initiated By Functional Element Clock.

1768 2.1.1: The Functional Element looks up scheduled events defined to find out time-due
1769 notification.

1770 2.1.2: The Functional Element retrieves the routing rule for the event.

1771 2.1.3: The Functional Element looks up the corresponding consumers based on the
1772 routing rule.

1773 2.1.4: The Functional Element retrieves filters defined and find out the event receivers.

1774 2.1.5: The Functional Element notifies or invokes the event consumers based on the
1775 routing rule defined.

1776 2.2: Initiated By Any User.

1777 2.2.1: The Functional Element retrieves the routing rule for the event.

1778 2.2.2: The Functional Element looks up the corresponding consumers.

1779 2.2.3: The Functional Element retrieves filters defined and find out the event receivers.

1780 2.2.4: The Functional Element notifies or invokes the event consumers based on the
1781 routing rule defined.

1782 3: The Functional Element logs the notification of event and the use case ends.

1783 **2.3.7.11.2.2 Alternative Flows**

1784 1: Notify Event.

1785 In basic flow 2.1.4 and 2.2.4, based on the type of consumer, one of the sub-flows is execute.

1786 If the consumer type is '**SMTP**', then sub-flow Notify via SMTP is executed.

1787 If the consumer type is '**SMS Gateway**', then sub-flow Notify via SMS Gateway is executed.

1788 If the consumer type is '**Notify RPC-Web Service**', then sub-flow Notify RPC-Web Service is
1789 executed.

1790 If the consumer type is '**Notify Document Style Web Service**' then sub-flow Notify Document
1791 style Web Service is executed.

1792 1.1: Notify via SMTP.

1793 1.1.1: The Functional Element gets the pre-defined message for event and forms the
1794 parameters.

1795 1.1.2: The Functional Element gets the parameters for SMTP server.

1796 1.1.3: The Functional Element sends out the pre-defined message and the use case
1797 ends.

1798 1.2: Notify via SMS Gateway.

1799 1.2.1: The Functional Element gets the pre-defined message for event and forms the
1800 parameters.

1801 1.2.2: The Functional Element gets the parameters for the SMS gateway.

1802 1.2.3: The Functional Element sends out the pre-defined message and the use case
1803 ends.

1804 1.3: Notify RPC-Web Service.

1805 1.3.1: The Functional Element gets the operation parameter.

1806 1.3.2: The Functional Element gets Web Services endpoint parameters.

1807 1.3.3: The Functional Element dynamically invokes the Web Service and the use case
1808 ends.

1809 1.4: Notify Document Style Web Service.

1810 1.4.1: The Functional Element gets the operation parameter.

1811 1.4.2: The Functional Element gets Web Services endpoint parameters.

1812 1.4.3: The Functional Element dynamically generates the SOAP message and sends to
1813 the Web Services and the use case ends.

1814 2: Flow Is Defined.

1815 If in the basic flow 2.1.2 and 2.2.1, a flow is defined for the event, Functional Element will perform
1816 the following steps:

1817 2.1: The Functional Element retrieves all the intended event consumers defined in the flow.

1818 2.2: The Functional Element will go to basic flow 2.2.

1819 2.3: The Functional Element will resume the execution from basic flow 2.1.2 or 2.2.1.

1820 3: Log Utility Not Available.

1821 3.1: If in the basic flow 3, the Log Utility Functional Element is not available, Functional
1822 Element will return an error message to the user and the use case ends.

- 1823 4: SMS Gateway Not Available.
- 1824 4.1: If in the Alternative Flow 1.2.3, the SMS Gateway is not available, Functional Element will
1825 return an error message to the user and the use case ends.
- 1826 5: SMTP Server Not Available.
- 1827 5.1: If in the Alternative Flow 1.1.3, the SMTP server is not available, Functional Element will
1828 return an error message to the user and the use case ends.
- 1829 6: RPC Web Service Not Available.
- 1830 6.1: If in the Alternative Flow 1.3.3, the Web Service is not available, Functional Element will
1831 return an error message to the user and the use case ends.
- 1832 7: Document Style Web Service Not Available.
- 1833 7.1: If in the Alternative Flow 1.4.3, document style Web Service is not available, Functional
1834 Element will return an error message to the user and the use case ends.
- 1835 **2.3.7.11.3 Special Requirements**
- 1836 **2.3.7.11.3.1 Supportability**
- 1837 The application server used must have a JMS service provided.
- 1838 **2.3.7.11.4 Pre-Conditions**
- 1839 None.
- 1840 **2.3.7.11.5 Post-Conditions**
- 1841 None.
- 1842

1843 2.4 Group Management Functional Element

1844 2.4.1 Motivation

1845 The Group Management Functional Element is expected to be an integral part of the User Access
1846 Management (UAM) functionalities. In a Web Service-enabled implementation, this Functional
1847 Element helps to provide the mechanism to manage users in a collective manner. This is
1848 important as it provides the flexibility of adopting either coarse or fine-grain access controls, or
1849 both.

1850

1851 This Functional Element fulfills the following requirements from the Functional Elements
1852 Requirements, Working Draft 01a:

1853 Primary Requirements

- 1854 • MANAGEMENT-050 to MANAGEMENT-053, and
- 1855 • MANAGEMENT-078

1856 Secondary Requirements

- 1857 • None

1858 2.4.2 Terms Used

Terms	Description
Group	A Group is a collection of individual users, and are typically grouped together as they have certain commonalities
Namespace	Namespace is use to segregate the instantiation of the application across different application domains. If a company has two separate standalone application, for example, an email application and an equipment booking application, then these two are considered as separate application domains.
User	A user is loosely defined to include both human and virtual users. Virtual users could include service users and application (or machine) users that are utilising other services in a SOA environment.
User Access Management / UAM	User Access Management or UAM refer to the concept of managing users in a holistic manner, considering all aspect which includes: Defining a set of basic user information that should be stored in any enterprise application. Providing a means to extend this basic set of user information when needed. Simplifying management by grouping related users together through certain criteria. Having the flexibility of adopting both coarse and fine grain access controls.

1859

1860 2.4.3 Key Features

1861 Implementations of the Group Management Functional Element are expected to provide the
1862 following key features:

- 1863 1. The Functional Element MUST provide a basic Group structure with a set of pre-defined
1864 attributes.
- 1865 2. The Functional Element MUST provide the capability to extend on the basic Group structure
1866 dynamically.
- 1867 3. As part of Key Feature (2), this dynamic extension MUST be definable and configurable at
1868 runtime implementation of the Functional Element.
- 1869 4. The Functional Element MUST provide the capability to manage the creation and deletion of
1870 instances of Groups based on defined structure.
- 1871 5. The Functional Element MUST provide the capability to manage all the information (attribute
1872 values) stored in such Groups. This includes the capability to retrieve and update attribute's
1873 values belonging to a Group.
- 1874 6. The Functional Element MUST provide a mechanism to manage the collection of users in a
1875 Group. This includes the capability to create, retrieve, update and delete users belonging to
1876 a Group.
- 1877 7. The Functional Element MUST provide a mechanism for managing Groups across different
1878 application domains.
- 1879 *Example: Namespace control mechanism*

1880

1881 In addition, the following key features could be provided to enhance the Functional Element
1882 further:

- 1883 1. The Functional Element MAY provide a mechanism to enable different Groups to be related
1884 to one another.
- 1885 2. The Functional Element MAY also provide a mechanism to enable hierarchical relationships
1886 between Groups.
- 1887 *Example: Parent and Child Relationship.*
- 1888 3. As an extension of Key Feature (2), the Functional Element MAY also provide the capability
1889 to enable Groups to be part of the collection of “users” of another Group.
- 1890 *Example: Adding of Group “Dept-A” to “Company-XYZ” – “Dept-A” is a Group, and also part*
1891 *of the collection of Group “Company-XYZ”.*
- 1892 4. The Functional Element MAY provide validity checks when managing information stored in a
1893 Group.
- 1894 *Example: Adding of User “john” – A validity check could be imposed to ensure that a user*
1895 *“john” exists before adding to into the Group.*
- 1896

1897 2.4.4 Interdependency

Direct Dependency	
User Management Functional Element	The User Management Functional Element is used to manage the user's attributes. The Group Management Functional Element in turn provides useful aggregation of the users. Together, they are able to achieve effective and efficient management of user information.

1898

1899 2.4.5 Related Technologies and Standards

1900 None.

1901

1902 **2.4.6 Model**

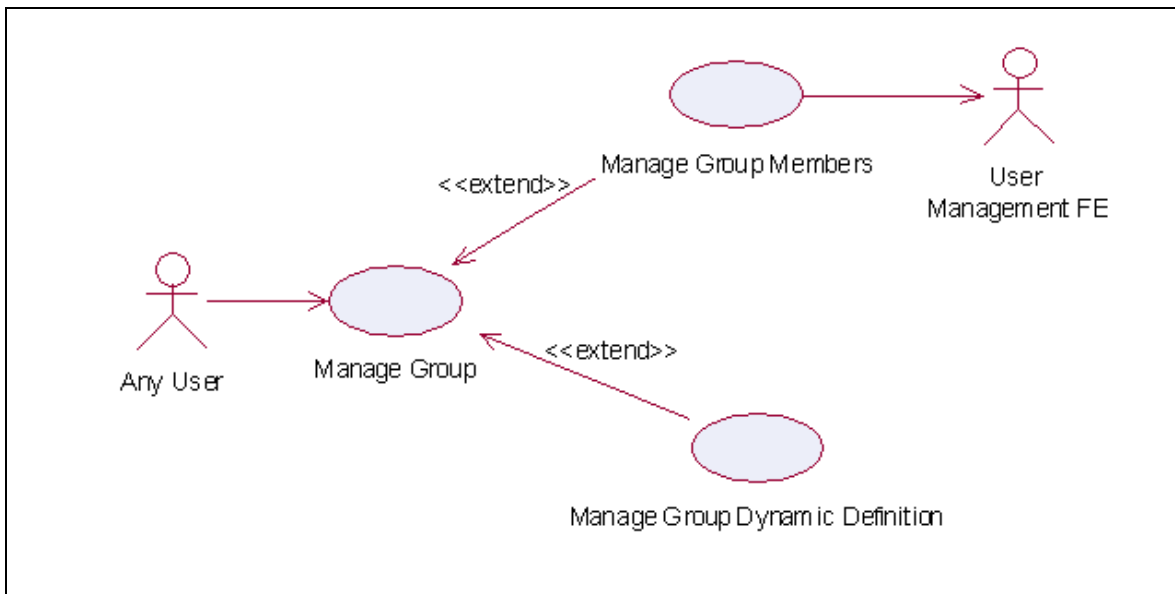


Figure 8: Model Of the Group Management Functional Element [5]

1903

1904 **2.4.7 Usage Scenarios**

1905 **2.4.7.1 Manage Group**

1906 This use case describes the management of a group, namely the creation, deletion, retrieval and
1907 update of the group.

1908 **2.4.7.1.1 Flow of Events**

1909 **2.4.7.1.1.1 Basic Flow**

1910 This use case starts when the user wants to manage group.

1911 If user wants to '**Create Group**', then basic flow 1 is executed.

1912 If user wants to '**Retrieve Group**', then basic flow 2 is executed.

1913 If user wants to '**Update Group**', then basic flow 3 is executed.

1914 If user wants to '**Delete Group**', then basic flow 4 is executed.

1915 1: Create Group.

1916 1.1: User provides the basic information that is necessary for creating a group.

1917 1.2: Functional Element creates the group and the use case ends.

1918 2: Retrieve Group.

1919 2.1: User provides the necessary information for retrieving the complete group's attributes.

1920 2.2: Functional Element returns the group's information and the use case ends.

- 1921 3: Update Group.
- 1922 3.1: User provides the necessary information for updating the group's attributes.
- 1923 3.2: Functional Element updates the group and the use case ends.
- 1924 4: Delete Group.
- 1925 4.1: User provides the necessary information for deleting a particular group.
- 1926 4.2: Functional Element deletes the group and the use case ends.
- 1927 **2.4.7.1.1.2 Alternative Flows**
- 1928 1: Group Exist.
- 1929 1.1: In basic flow 1.2, Functional Element detects an identical group. Functional Element
1930 returns an error message and the use case ends.
- 1931 2: Group Does Not Exist.
- 1932 2.1: In basic flow 2.2, 3.2 and 4.2, Functional Element cannot find a group that matches the
1933 user's criteria. Functional Element returns an error message and the use case ends.
- 1934 3: Save Updated Information.
- 1935 3.1: In basic flow 1.2, 2.2, 3.2 and 4.2, Functional Element fails to save the updated
1936 information. Functional Element returns an error message and the use case ends.
- 1937 **2.4.7.1.2 Special Requirements**
- 1938 None.
- 1939 **2.4.7.1.3 Pre-Conditions**
- 1940 None.
- 1941 **2.4.7.1.4 Post-Conditions**
- 1942 None.
- 1943 **2.4.7.2 Manage Group Members**
- 1944 **2.4.7.2.1 Description**
- 1945 This use case is an extension of the manage group use case. Specifically, it describes the
1946 scenarios to manage members in the group.
- 1947 **2.4.7.2.2 Flow of Events**
- 1948 **2.4.7.2.2.1 Basic Flow**
- 1949 This use case starts when the user wants to manage members in a group.
- 1950 If user wants to '**Create Members In A Group**', then basic flow 1 is executed.
- 1951 If user wants to '**Retrieve Members From A Group**', then basic flow 2 is executed.
- 1952 If user wants to '**Delete Members From A Group**', then basic flow 3 is executed.

- 1953 1: Create Members In A Group.
- 1954 1.1: User provides the necessary information for retrieving the group.
- 1955 1.2: Functional Element adds members to the group and the use case ends.
- 1956 2: Retrieve Members In A Group.
- 1957 2.1: User provides the necessary information for retrieving the group.
- 1958 2.2: Functional Element returns the members and the use case ends.
- 1959 3: Delete Members From Group.
- 1960 3.1: User provides the necessary information for retrieving the group.
- 1961 3.2: User provides the necessary information for deleting members in the group.
- 1962 3.3: Functional Element deletes members from group and the use case ends.
- 1963 **2.4.7.2.2 Alternative Flows**
- 1964 1: Group Does Not Exist.
- 1965 1.1: In basic flow 1.1, 2.1 and 3.1, Functional Element cannot find the group requested.
- 1966 Functional Element returns an error message and the use case ends.
- 1967 2: Members Does Not Exist
- 1968 2.1: In basic flow 3.3, the Functional Element attempts to delete a non-existence member.
- 1969 Functional Element returns an error message and the use case ends.
- 1970 **2.4.7.2.3 Special Requirements**
- 1971 None.
- 1972 **2.4.7.2.4 Pre-Conditions**
- 1973 None.
- 1974 **2.4.7.2.5 Post-Conditions**
- 1975 None.
- 1976 **2.4.7.3 Manage Group Dynamic Definition**
- 1977 **2.4.7.3.1 Description**
- 1978 This use case describes scenario involved in managing the dynamic group definition.
- 1979 **2.4.7.3.2 Flow of Events**
- 1980 **2.4.7.3.2.1 Basic Flow**
- 1981 This use case starts when the user wants to manage dynamic group definition. This include
- 1982 create, retrieve, update and delete dynamic group definition.
- 1983 If user wants to '**Create Dynamic Definition For A Group**', then basic flow 1 is executed.

1984 If user wants to '**Retrieve Dynamic Definition For A Group**', then basic flow 2 is executed.

1985 If user wants to '**Delete Dynamic Definition For A Group**', then basic flow 3 is executed.

1986 If user wants to '**Update Dynamic Definition For A Group**', then basic flow 4 is executed.

1987

1988 1: Create Dynamic Definition For A Group.

1989 1.1: User provides the additional definition for the group.

1990 1.2: Functional Element creates the additional definition for the group and the use case ends.

1991 2: Retrieve Dynamic Definition For A Group.

1992 2.1: User provides the necessary information to retrieve a particular group.

1993 2.2: Functional Element returns the additional definition for the group and the use case ends.

1994 3: Delete Dynamic Definition For Group.

1995 3.1: User provides the necessary information to retrieve a particular group.

1996 3.2: Functional Element deletes the dynamic definition belonging to the group and the use case ends.

1997

1998 4: Update Dynamic Definition For Group.

1999 4.1: User provides the necessary information to retrieve a particular group.

2000 4.2: User provides the necessary dynamic definition that needs to be updated.

2001 4.3: Functional Element update the dynamic definition and the use case ends.

2002 **2.4.7.3.2 Alternative Flows**

2003 1: Group Does Not Exist.

2004 1.1: In basic flow 1.1, 2.1, 3.1 and 4.1, Functional Element cannot find the group specified.

2005 Functional Element returns an error message and the use case ends.

2006 2: Dynamic Group Definition Already Exists.

2007 2.1: In basic flow 1.2, Functional Element returns the error message and the use case ends.

2008 3: Dynamic Group Definition Does Not Exist.

2009 3.1: In basic flow 4.3, Functional Element cannot update the dynamic group definition.

2010 Functional Element returns an error message and the use case ends.

2011 **2.4.7.3.3 Special Requirements**

2012 None.

2013 **2.4.7.3.4 Pre-Conditions**

2014 None.

2015 **2.4.7.3.5 Post-Conditions**

2016 None.

2017 **2.5 Identity Management Functional Element**

2018 **2.5.1 Motivation**

2019 As secured Web Services become rampant, with each having its own authentication and
2020 authorisation management, users are finding it difficult to keep track of their accounts and
2021 passwords. Through the use of Identity Management, users can now voluntarily establish links
2022 between their accounts so that they need not sign in multiple times to access enterprise-level
2023 Web Services. This mechanism is known as Single Sign-On (SSO). SSO can further be extended
2024 to access Web Services from across different business organisations that have prior agreements
2025 to trust and transact with each other (also known as a circle of trust). This mechanism, which
2026 involves federating and signing-in of identity's accounts across different trusted organisations, is
2027 known as Federated Identity Single Sign-On.

2028

2029 Identity Management is about the management of information pertaining to an entity as well as
2030 the process of identification, authentication and authorization of resources to that entity.

2031

2032 Identity management generally covers the following aspects:

2033 Basic user accounts management facilities

2034 User authentication mechanism(s)

2035 User authorisation mechanism(s)

2036 Generation of audit trails for user activities

2037

2038 This Functional Element fulfills the following requirements from the Functional Elements
2039 Requirements, Working Draft 01a:

2040 Primary Requirements

- 2041 • SECURITY-001,
- 2042 • SECURITY-003 (all),
- 2043 • SECURITY -004 (all),
- 2044 • SECURITY -040 and
- 2045 • SECURITY -041.

2046 Secondary Requirements

- 2047 • None

2048

2049 **2.5.2 Terms Used**

Terms	Description
Assertion	Assertion refers to a piece of data produced by an Assertion Authority regarding either an act of authentication performed on a subject, attribute information about a subject, or authorization permissions applying to the subject with respect to a specified resource.

Assertion Authority	An entity within a trusted circle that provides authentication assertions.
Access Policy	A logically defined, executable and testable set of rules or behavior for access control.
Entity	Entity can refer to a person, an organization, a resource or a service.
Federated Identity	An identity that has been associated, connected or binded with other accounts for a same given Principal.
Identity	Identity refers to a set of information that an entity can use to uniquely describe itself.
Identity Provider	An entity that creates, maintains, and manages identity information for Principals and provides Principal authentication to other service providers within a trusted circle.
Identity Repository	Identity Repository refers to the storage of the identity information. Common examples of identity repositories are relational databases, text files etc.
Principal	Principal refers to an entity whose identity can be authenticated. Also known as Subject.
Resource	A resource in an application is defined to encompass users, services, data / information, transaction and security
Security Markup Assertion Language	Security Markup Assertion Language refers to the set of specifications describing assertions that are encoded in XML, profiles for attaching the assertions to various protocols and frameworks, the request/response protocol used to obtain assertions, and bindings of this protocol to various transfer protocols (for example, SOAP and HTTP).
Single Sign-On (SSO)	The ability to use proof of an existing authentication session with an identity provider to create authenticated sessions with other service providers.
Subject	Subject – see Principal.

2050

2051 The following terms mentioned in this document are used in accordance with the terms defined in
2052 the Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML) v1.1
2053 specification.

2054 Assertion [section 2.3.2]

2055 AudienceRestrictionCondition [section 2.3.2.1.3]

2056 AuthenticationQuery [section 3.3.3]

2057 AuthenticationStatement [section 2.4.3]

2058 KeyInfo [section 5.4.5]

2059 Request [section 3.2.2]

2060 Response [section 3.4.2]

2061 Subject [section 2.4.2.1]

2062

2063 2.5.3 Key Features

2064 Implementations of the Identity Management Functional Element are expected to provide the
2065 following key features:

- 2066 1. The Functional Element MUST be have the mechanism to access an Identity Repository.
- 2067 2. The Functional Element MUST provide the capability to manage the creation and deletion of
2068 instances of Identity in the said Identity Repository.
- 2069 3. The Functional Element MUST have the mechanisms to manage all the information (attribute
2070 values) stored in such Identities. This includes the capability to:
 - 2071 3.1. Retrieve and update attribute's values belonging to a Identity,
 - 2072 3.2. Encrypt sensitive user information,
 - 2073 3.3. Authenticate a user, and
 - 2074 3.4. Assign/Unassign Access Policy (or Policies).

2075 *Example: Different levels of privileges to access protected resources.*

- 2076 4. As part of Key Feature (3.3), the authentication of an Identity MUST be achieved at least
2077 through the use of a password.
- 2078 5. As part of Key Feature (3.3), the Functional Element MUST also provide the capability to use
2079 an Assertion Authority for Single Sign-On (SSO) authentication.
- 2080 6. As part of Key Feature (5), the SSO message exchange and protocol MUST use an
2081 approved standard. Recommendations are available in section 2.5.5.
- 2082 7. As part of Key Feature (3.4), a mechanism MUST be provided to verify the Identity's Access
2083 Policy on protected Resources.
- 2084 8. The Functional Element MUST provide the capability to create audit trails.

2085 *Example: Timestamp of an Identity's access to Resources.*

2086

2087 In addition, the following key features could be provided to enhance the Functional Element
2088 further:

- 2089 1. The Functional Element MAY provide an Identity Repository.
- 2090 2. If Key Feature (1) is provided, the Functional Element MUST provide the capability to
2091 manage the creation and deletion of instances of Identities based on a pre-defined structure.
- 2092 3. The Functional Element MAY provide additional storage in the Identity Repository for an
2093 Identity to customise its preferences.
 - 2094 *Example: Identity's preferred subscription of notifications/alerts for news.*
- 2095 4. The Functional Element MAY provide a capability to use an Identity Provider for Federated
2096 Identity SSO authentication.
- 2097 5. If Key Feature (4) is provided, the Federated Identity SSO message exchange and protocol
2098 MUST use an approved standard.

2099

2100 2.5.4 Interdependencies

Direct Dependencies	
User Management Functional Element	The User Management Functional Element is being used for account management.
Role and Access Management Functional Element	The Role and Access Management Functional Element is being used for access control and authorization

Log Utility Functional Element	The Log Utility Functional Element is being used for logging and creation of audit trails.
--------------------------------	--------------------------------------------------------------------------------------------

2101

2102 **2.5.5 Related Technologies and Standards**

Specifications	Specific References
Web Services Security v1.0 [6]	Web Services Security: SOAP Message Security 1.0 (WS-Security 2004) – OASIS Standard 2004, 01 March 2004
Security Assertion Markup Language (SAML) v1.1. [7]	<p>Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML) V1.1 – OASIS Standard, 2 September 2003</p> <p>Bindings and Profiles for the OASIS Security Assertion Markup Language (SAML) V1.1 – OASIS Standard, 2 September 2003, in particular the two schemas below:</p> <ul style="list-style-type: none"> • Assertion Schema • Protocol Schema
Liberty Alliance Project Specifications	<p>Liberty Alliance ID-FF 1.2 Specifications [8]</p> <p>Liberty Alliance ID-WSF 1.0 Specifications [9]</p>
WS-Federation [10]	Web Services Federation Language (WS-Federation) - 08 July 2003

2103

2104

2105 **2.5.6 Model**

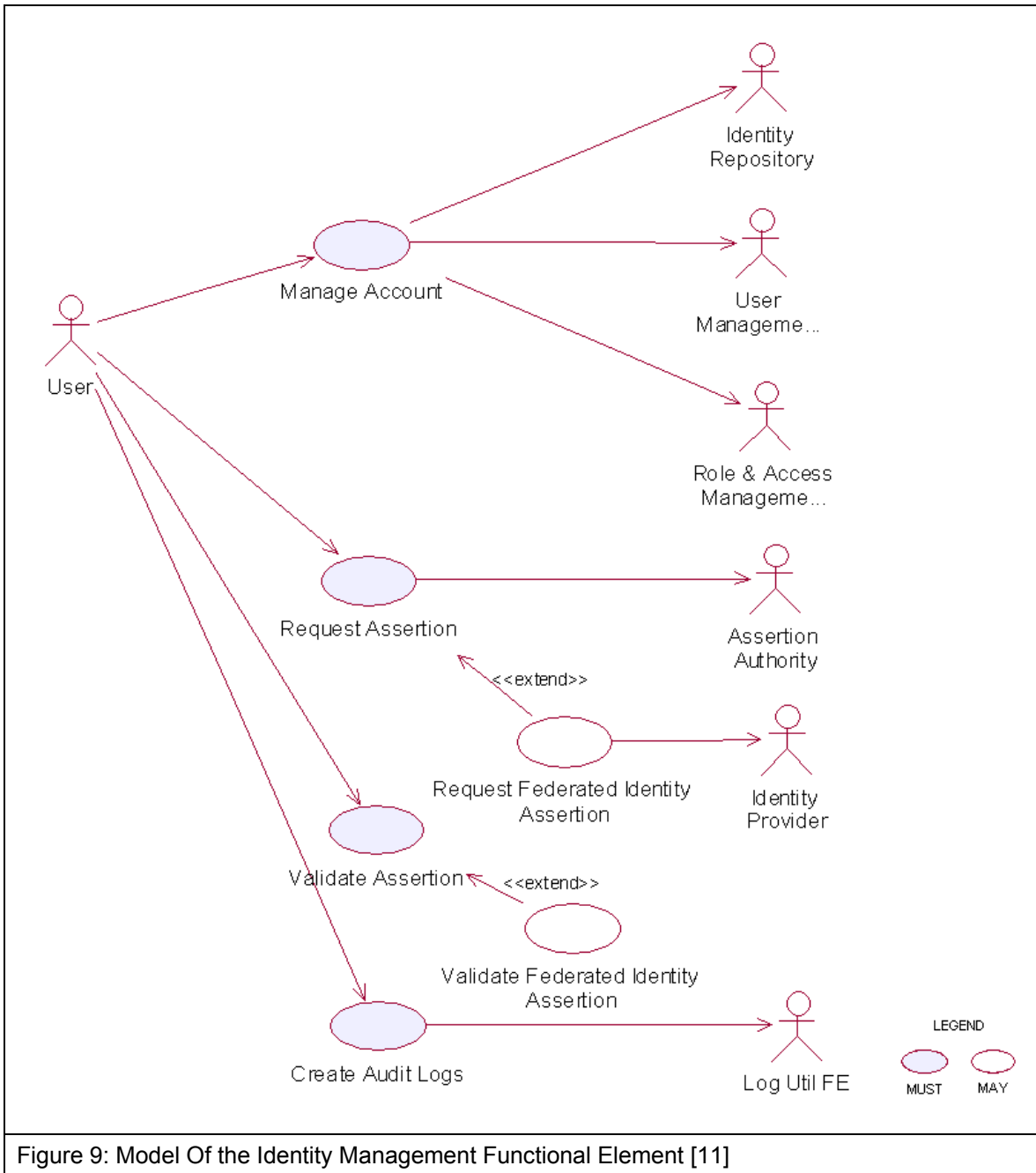


Figure 9: Model Of the Identity Management Functional Element [11]

2106

2107 **2.5.7 Usage Scenarios**

2108 **2.5.7.1 Manage Account**

2109 **2.5.7.1.1 Description**

2110 This use case describes the creation/retrieval/update/deletion of an identity's account. An
2111 identity's account usually consists of two elements: i) the user information and ii) the associated
2112 access policy.

2113 As Identity Management Functional Element leverages on the User Management Functional
2114 Element and Role and Access Management Functional Element to provide for these
2115 functionalities, please refer to these Functional Elements' use cases for details.

2116 **2.5.7.2 Request Assertion**

2117 **2.5.7.2.1 Description**

2118 This use case describes the composition of either 1) an authentication query or 2) an
2119 authorisation decision query and sending it to the assertion authority.

2120 **2.5.7.2.2 Flow of Events**

2121 **2.5.7.2.2.1 Basic Flow**

2122 This use case starts when the user wants to compose a query to the assertion authority.

2123 If the user requests for an authentication query, then sub-flow 1 is executed.

2124 If the user requests for an authorisation decision query, then sub-flow 2 is executed.

2125 1: Request for Authentication Assertion

2126 1.1: The user composes a valid SAML Request with an AuthenticationQuery and sends it to
2127 the assertion authority.

2128 1.2: The user waits for an SAML Response from the assertion authority.

2129 1.3: The user obtains the SAML Assertion from the SAML Response and use case ends.

2130 2: Request for Authorisation Decision Assertion

2131 2.1: The user composes a valid SAML Request with an AuthorizationDecisionQuery and
2132 sends it to the assertion authority.

2133 2.2: The user waits for an SAML Response from the assertion authority.

2134 2.3: The user obtains the SAML Assertion from the SAML Response and use case ends.

2135 **2.5.7.2.2.2 Alternative Flows**

2136 1: Invalid Request

2137 1.1: If in basic flow 1.1 or 2.1, if any of the parameters passed into the request is invalid, the
2138 Functional Element flag an exception and use case ends.

2139 2: Error message from assertion authority

2140 2.1: If in basic flow 1.3 or 2.3, the assertion authority is unable to return an assertion (e.g.
2141 user has not logged on etc.), it returns an error code and an error message.

2142 2.2: The Functional Element flag an error with the error message attached and use case
2143 ends.

2144 **2.5.7.2.3 Special Requirements**

2145 None.

2146 **2.5.7.2.4 Pre-Conditions**

2147 None.

2148 **2.5.7.2.5 Post-Conditions**

2149 None.

2150 **2.5.7.3 Validate Assertion**

2151 **2.5.7.3.1 Description**

2152 This use case describes the validation of either 1) the Authentication Assertion or 2) the
2153 Authorisation Decision Assertion

2154 **2.5.7.3.2 Flow of Events**

2155 **2.5.7.3.2.1 Basic Flow**

2156 This use case starts when the user wants to check if the assertion it is a valid assertion from the
2157 assertion authority.

2158 1: The user passes the assertion to the Functional Element for validation.

2159 2: The Functional Element checks if the assertion is signed by the assertion authority.

2160 3: The Functional Element checks for an un-expired assertion.

2161 4: The Functional Element checks if the assertion has an AudienceRestrictionCondition and
2162 verifies that the service provider using the Functional Element is in the audience list.

2163 5: Based on the type of assertion, one of the sub-flows is executed.

2164 • If the user wants to check for a valid authentication assertion, then sub-flow 5.1 is executed.

2165 • If the user wants to check for a valid authorisation decision assertion, then sub-flow 5.2 is
2166 executed.

2167 5.1: Validate Authentication Statement

2168 5.1.1: The Functional Element checks if the assertion has indeed an
2169 AuthenticationStatement.

2170 5.1.2: The Functional Element checks if the Subject in the AuthenticationStatement
2171 matches the userid of the principal.

2172 5.1.3: The Functional Element verifies the Subject with its KeyInfo.

- 2173 5.1.4: The Functional Element returns the status code to the user and use case ends.
- 2174 5.2: Validate Authorisation Decision Statement
- 2175 5.2.1: The Functional Element checks if the assertion has indeed an
2176 AuthorizationDecisionStatement.
- 2177 5.2.2: The Functional Element checks if the Resource in the
2178 AuthorizationDecisionStatement matches the id of the requested resource.
- 2179 5.2.3: The Functional Element determines if the decision is Permit.
- 2180 5.2.4: The Functional Element returns the status code to the user and use case ends.
- 2181 **2.5.7.3.2 Alternative Flows**
- 2182 1: Signature Error
- 2183 1.1: If in basic flow 2, the Functional Element is unable to verify that the signature is from the
2184 assertion authority, it returns an error and use case ends.
- 2185 2: Expired Assertion
- 2186 2.1: If in basic flow 3, the Functional Element finds that the assertion has already expired, it
2187 returns an error and use case ends.
- 2188 3: Audience Error
- 2189 3.1: If in basic flow 4, the service provider is not in the AudienceRestrictionCondition, the
2190 Functional Element returns an error and use case ends.
- 2191 4: Invalid Authentication Assertion
- 2192 4.1: If in basic flow 5.1.1, the Functional Element is unable to find an
2193 AuthenticationStatement, it returns an error and use case ends.
- 2194 5: Mismatch Subject
- 2195 5.1: If in basic flow 5.1.2, the Functional Element is unable to match the Subject in
2196 AuthenticationStatement, it returns an error and use case ends.
- 2197 6: Subject Error
- 2198 6.1: If in basic flow 5.1.3, the Functional Element is unable to verify the Subject with the
2199 KeyInfo, it returns an error and use case ends.
- 2200 7: Invalid Authorisation Decision Assertion
- 2201 7.1: If in basic flow 5.2.1, the Functional Element is unable to find an
2202 AuthorizationDecisionStatement, it returns an error and use case ends.
- 2203 8: Mismatch Resource
- 2204 8.1: If in basic flow 5.2.2, the Functional Element is unable to match the resource in
2205 AuthorizationDecisionStatement, it returns an error and use case ends.
- 2206 **2.5.7.3.3 Special Requirements**
- 2207 None.

2208 **2.5.7.3.4 Pre-Conditions**

2209 None.

2210 **2.5.7.3.5 Post-Conditions**

2211 None.

2212 **2.5.7.4 Create Audit Logs**

2213 **2.5.7.4.1 Description**

2214 This use case describes logging all identity management activities for audit purposes.

2215 **2.5.7.4.2 Flow of Events**

2216 **2.5.7.4.2.1 Basic Flow**

2217 This use case starts when any of other Functional Element use cases are triggered.

2218 1: The Functional Element opens an audit log file.

2219 2: The Functional Element writes a timestamp identity management activity message into the
2220 audit log file.

2221 3: The Functional Element closes the audit log file and the use case ends.

2222 **2.5.7.4.2.2 Alternative Flows**

2223 1: Log File Not Created

2224 1.1: If in the basic flow 1, the Functional Element cannot open the audit file, it creates a new
2225 audit file and use case continues.

2226 2: Error Writing Log

2227 2.1: If in the basic flow 2, the Functional Element has error writing to file, it will flag an
2228 exception and the use case ends.

2229 **2.5.7.4.3 Special Requirements**

2230 None.

2231 **2.5.7.4.4 Pre-Conditions**

2232 None.

2233 **2.5.7.4.5 Post-Conditions**

2234 None.

2235 **2.6 Information Catalogue Functional Element (new)**

2236 **2.6.1 Motivation**

2237 There is a huge amount of information that is stored in the WWW that include product catalogues.
2238 Enable the capability to provide a generic facility to quickly and easily expose catalogues and/or
2239 orders as web services. Eg. Amazon.com Web Service, Google.com Web Service, etc.

2240 Provide a framework that will enable the ability to harness and access huge amount of product-
2241 related information and present them as catalogue for:

- 2242 • Quick and easy definition of product/information catalogues
- 2243 • Customisation of catalogues for specific needs or marketing niche
- 2244 • Easy maintenance of storefronts/catalogues over the network
- 2245 • Outsourcing of catalogue management together with multilingual support

2246

2247 This Functional Element fulfills the following requirements from the Functional Elements
2248 Requirements:

2249 Primary Requirements

- 2250 • PROCESS-200,
- 2251 • PROCESS-201, and
- 2252 • PROCESS-202.

2253 Secondary Requirements

- 2254 • PROCESS-203,
- 2255 • PROCESS-204,
- 2256 • PROCESS-205, and
- 2257 • PROCESS-206.

2258 **2.6.2 Terms Used**

Terms	Description
Data source	Data source refers to any kind of information storage and retrieval databases like RDBMS, LDAP, ODBMS, XMLDB, XML Files, TEXT Files, etc.
Data source type	Data source type refers to the various kinds of data storage format or structure like XML, HTML, TEXT, Databases, Tables, Rows, Columns in RDBMS, Collections, Nodes, Files & Tags in XMLDB, that are used to store and retrieve information from different data sources

2259 **2.6.3 Key Features**

2260 Implementations of the Information Catalogue Functional Element are expected to provide the
2261 following key features:

- 2262 1. The Functional Element MUST provide the capability to *define and maintain Catalogue*
2263 *Structures*.
 - 2264 1.1. The capability to define the name for the catalogue structure
 - 2265 1.2. The capability to *define the format* of the catalogue information
 - 2266 1.3. The capability to *choose the data source* to store and retrieve the catalogue information
- 2267 2. The Functional Element MUST provide the capability to *organize and manage all the*
2268 *information* stored in the Catalogue Structures.

- 2269 3. The Functional Element MUST provide the capability to *execute basic searches* like
 2270 categorical, names, keywords on the catalogue information.
 2271 4. The Functional Element MUST provide the capability to return results formatted based on the
 2272 Catalogue Structure.

2273

2274 In addition, the following key features could be provided to enhance the Information Catalogue
 2275 Functional Element further:

- 2276 1. The Functional Element MAY provide the ability to enable secured access to catalogue
 2277 structure as well as catalogue information.
 2278 2. The Functional Element MAY provide the ability to present catalogue information in different
 2279 languages, i.e. multi-lingual support.
 2280 3. The Functional Element MAY provide the ability to import catalogue structure and information
 2281 from different data sources.
 2282 4. The Functional Element MAY provide the ability to export catalogue structure and information
 2283 to different data sources.

2284

2285 **2.6.4 Interdependencies**

Direct Dependency	
Search Functional Element	The Search Functional Element helps to perform basic search on the catalogue information.

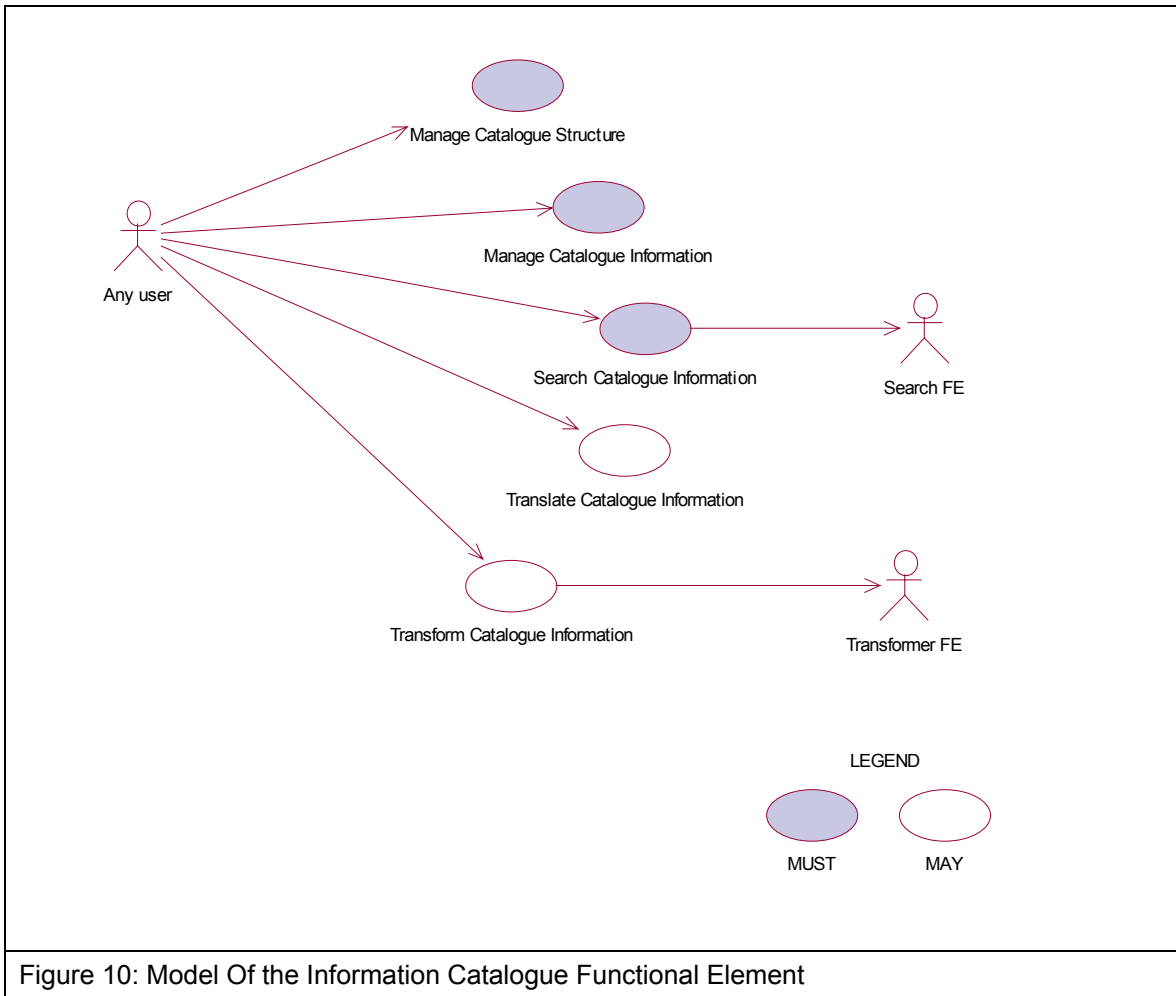
2286

Interaction Dependency	
User Management Functional Element	The User Management Functional Element helps to provide user definition and management.
Role & Access Functional Element	The Role & Access Functional Element helps to provide role and access definition and management.
Transformer Functional Element	The Transformer Functional Element helps to provide the import and export catalogue information capabilities.

2287 **2.6.5 Related Technologies and Standards**

2288 None
 2289

2290 **2.6.6 Model**



2291

2292 **2.6.7 Usage Scenario**

2293 **2.6.7.1 Manage Catalogue Structure**

2294 **2.6.7.1.1 Description**

2295 This use case allows any users to configure and manage various data source(s), type(s) and
2296 structure(s) on which information is to be stored and retrieved.

2297 **2.6.7.1.2 Flow of Events**

2298 **2.6.7.1.2.1 Basic Flow**

2299 This use case starts when users / other Functional Elements wishes to configure and manage
2300 various data source(s), type(s) and structure(s).

- 2301 1. Users / Other Functional Elements initiates a request to configure data source, type and
2302 structure by providing name, format, and definition of the data source(s) to be added, removed or
2303 retrieved.

- 2304 2. The Functional Element checks whether the data source configuration file exists.
- 2305 3. Based on the operation it specified, one of the following sub-flows is executed:
- 2306 If the operation is '**Create Data Source, Type and Structure**', then sub-flow 3.1 is executed.
- 2307 If the operation is '**View Data Source, Type and Structure**', then sub-flow 3.2 is executed.
- 2308 If the operation is '**Remove Data Source, Type and Structure**', then sub-flow 3.3 is executed.
- 2309 3.1. Create Data Source, Type and Structure.
- 2310 3.1.1. The Functional Element checks whether the same data source, type, and structure
- 2311 has been created.
- 2312 3.1.2. The Functional Element appends the new data source, type and structure in the
- 2313 data source configuration specified.
- 2314 3.2. View Data Source, Type and Structure.
- 2315 3.2.1. The Functional Element retrieves all the data source, type and structure
- 2316 information from the data source configuration file.
- 2317 3.2.2. The Functional Element returns the data source(s), type(s) and structure(s).
- 2318 3.3. Delete Data Source, Type and Structure.
- 2319 3.3.1. The Functional Element checks whether the data source, type and structure exist
- 2320 in the data source configuration based on data source id from the data source
- 2321 configuration file.
- 2322 3.3.2. The Functional Element removes the old data source, type and structure from the
- 2323 data source configuration file.
- 2324 4. The Functional Element returns a success or failure flag indicating the status of the operation
- 2325 being performed and use case ends.

2326 **2.6.7.1.2.2 Alternative Flows**

- 2327 1. Data Source Configuration File Not Found.
- 2328 1.1. If in Basic Flow 2, the data source configuration does not exist, Functional Element
- 2329 creates empty data source configuration.
- 2330 2. Duplicate Data Source, Type and Structure.
- 2331 2.1. If in Sub Flow 3.1.1, the same data source, type and structure have been defined already
- 2332 in data source configuration, Functional Element throws an exception with error code as
- 2333 'Duplicate Data Source, Type, and Structure'.
- 2334 3. Data Source, Type, and Structure Do Not Exist.
- 2335 3.1. If in Sub Flow 3.2.1 and 3.3.1, a particular data source, type and structure cannot be
- 2336 found in the specified data source configuration, Functional Element throws an exception with
- 2337 error code as 'Data Source, Type, and Structure does not exist'.

2338 **2.6.7.1.3 Special Requirements**

- 2339 None.

2340 **2.6.7.1.4 Pre-Conditions**

2341 None.

2342 **2.6.7.1.5 Post-Conditions**

2343 None.

2344 **2.6.7.2 Manage Catalogue Information**

2345 **2.6.7.2.1 Description**

2346 This use case describes the management of catalogue information, namely the creation, deletion,
2347 retrieval and update of the catalogue information.

2348 **2.6.7.2.2 Flow of Events**

2349 **2.6.7.2.2.1 Basic Flow**

2350 The use case begins when the user wants to create/view/update/delete catalogue information.

2351 1. The user sends request to manipulate catalogue information.

2352 2. Based on the operation it specifies, one of the following sub-flows is executed:

2353 If the operation is '**Create Catalogue Information**', the sub-flow 2.1 is executed.

2354 If the operation is '**View Catalogue Information**', the sub-flow 2.2 is executed.

2355 If the operation is '**Update Catalogue Information**', the sub-flow 2.3 is executed.

2356 If the operation is '**Delete Catalogue Information**', the sub-flow 2.4 is executed.

2357 2.1. Create Catalogue Information

2358 2.1.1. User provides the basic information that is necessary for creating catalogue
2359 information.

2360 2.1.2. The Functional Element checks whether the catalogue information exists.

2361 2.1.3. The Functional Element creates the catalogue.

2362 2.2. View Catalogue Information

2363 2.2.1. User provides the necessary information for retrieving the complete catalogue's
2364 attributes.

2365 2.2.2. The Functional Element checks whether the catalogue information exists.

2366 2.2.3. The Functional Element returns the catalogue's information.

2367 2.3. Update Catalogue Information

2368 2.3.1. User provides the necessary information for updating the catalogue's attributes.

2369 2.3.2. The Functional Element checks whether the catalogue information exists.

2370 2.3.3. The Functional Element updates the catalogue.

2371 2.4. Delete Catalogue Information

- 2372 2.4.1. User provides the necessary information for deleting particular catalogue
2373 information.
- 2374 2.4.2. The Functional Element checks whether the catalogue information exists.
- 2375 2.4.3. Functional Element deletes the catalogue information.
- 2376 **2.6.7.2.2 Alternative Flows**
- 2377 1. Catalogue Information Exist.
- 2378 1.1. In Sub Flow 2.1.2, Function Element detects an identical catalogue information.
2379 Functional Element returns an error message and the use case ends.
- 2380 2. Catalogue Information Does Not Exist.
- 2381 2.1. In Sub Flow 2.2.2, 2.3.2, and 2.4.2, Functional Element cannot find the catalogue
2382 information that matches the user's criteria. Functional Element returns an error message
2383 and the use case ends.
- 2384 3. Save Updated Catalogue Information.
- 2385 3.1. In Sub Flow 2.1.3, 2.2.3, 2.3.3, and 2.4.3, Functional Element fails to save the updated
2386 catalogue information. Functional Element returns an error message and the use case ends.
- 2387 **2.6.7.2.3 Special Requirements**
- 2388 None.
- 2389 **2.6.7.2.4 Pre-Conditions**
- 2390 None.
- 2391 **2.6.7.2.5 Post-Conditions**
- 2392 None.
- 2393 **2.6.7.3 Search Catalogue Information**
- 2394 **2.6.7.3.1 Description**
- 2395 This use case allows any users to perform search on various types of disparate catalogues that
2396 are configured to be searched and returns the matching results.
- 2397 **2.6.7.3.2 Flow of Events**
- 2398 **2.6.7.3.2.1 Basic Flow**
- 2399 This use case starts when users / other Functional Elements wishes to perform information
2400 search on any given catalogue.
- 2401 1. Users / other Functional Elements initiates a request to perform information search on a given
2402 catalogue by providing information to be searched, the catalogue type(s) and the catalogue
2403 structure(s).
- 2404 2. The Functional Element checks for the existence of the specified catalogue type(s) and
2405 structure(s).

- 2406 3. The Functional Element validates the catalogue type(s) and structure(s) against the set of
2407 supported data type(s) and structure(s) configured within the Functional Element that are
2408 available for information search.
- 2409 4. The Functional Element performs information search based on the search parameters given by
2410 the users or the other Functional Elements.
- 2411 5. The Functional Element returns the result of the information search performed to the users or
2412 other Functional Elements and use case ends.

2413 **2.6.7.3.2 Alternative Flows**

- 2414 1. Catalogue(s) Are Not Available.
- 2415 1.1. In Basic Flow 2, if the identified catalogue is not available, Functional Element displays
2416 an error message and exits the use case.
- 2417 2. Invalid Catalogue Type and Structure.
- 2418 2.1. In Basic Flow 3, if the catalogue type and structure are invalid, Functional Element
2419 displays catalogue type and structure failure message and prompts for the data source type
2420 and structure again and performs another search.
- 2421 3. No Matching Result.
- 2422 3.1. In Basic Flow 4, if the search results in no matching results, Functional Element displays
2423 a message "No search results found" and performs another search.

2424 **2.6.7.3.3 Special Requirements**

2425 None.

2426 **2.6.7.3.4 Pre-Conditions**

2427 None.

2428 **2.6.7.3.5 Post-Conditions**

2429 None.

2430 **2.6.7.4 Translate Catalogue Information**

2431 **2.6.7.4.1 Description**

2432 This use case allows the user to translate a catalogue information file from one language to
2433 another language.

2434 **2.6.7.4.2 Flow of Events**

2435 **2.6.7.4.2.1 Basic Flow**

2436 This use case starts when a user wants to translate a catalogue information file from one
2437 language to another language.

- 2438 1. The user set the file name to be translated and the destination language.
- 2439 2. The system checks whether the particular destination language as output can be translated
2440 within all the supported translation methods available.

- 2441 4. Select the appropriate method based on the destination language.
- 2442 5. Invoke the translate method and save the catalogue information which is translated in that
2443 particular destination language.
- 2444 6: Return the results and the use case ends.
- 2445 **2.6.7.4.2.2 Alternative Flows**
- 2446 1. If in Basic Flow 2 there is no method to do the translation, the system return error message to
2447 the user and this use case ends.
- 2448 **2.6.7.4.3 Special Requirements**
- 2449 None.
- 2450 **2.6.7.4.4 Pre-Conditions**
- 2451 None.
- 2452 **2.6.7.4.5 Post-Conditions**
- 2453 None.
2454
- 2455 **2.6.7.5 Transform Catalogue Information**
- 2456 **2.6.7.5.1 Description**
- 2457 This use case allows the user to transform a catalogue information file from one format to another
2458 format.
- 2459 **2.6.7.5.2 Flow of Events**
- 2460 **2.6.7.5.2.1 Basic Flow**
- 2461 This use case starts when a user wants to transform a catalogue information file from one format
2462 to another format.
- 2463 1. The user set the file name to be transformed and the destination format.
- 2464 2. This use case call the TRANSFORMER functional elements' transform flow.
- 2465 3. Return the results from the transformer functional elements' transform flow and the use case
2466 ends.
- 2467 **2.6.7.5.2.2 Alternative Flows**
- 2468 1. If in Basic Flow 2 there is no method to do the transformation, the system return error message
2469 to the user and this use case ends.
- 2470 **2.6.7.5.3 Special Requirements**
- 2471 None.

2472 **2.6.7.5.4 Pre-Conditions**

2473 None.

2474 **2.6.7.5.5 Post-Conditions**

2475 None.

2476

2477 **2.7 Information Reporting Functional Element (new)**

2478 **2.7.1 Motivation**

2479 Information reporting is quite common in enterprise applications nowadays. In many scenarios,
2480 an enterprise does need to present its business information to, for example, business partners,
2481 sales representatives, and customers, in some form of information reporting. An information
2482 report is filled with the data that is retrieved from a data source using some type of queries. Such
2483 kind of information reporting is also used internally within an enterprise, or even within an
2484 individual department, to verify the business performance and other business scenarios.
2485

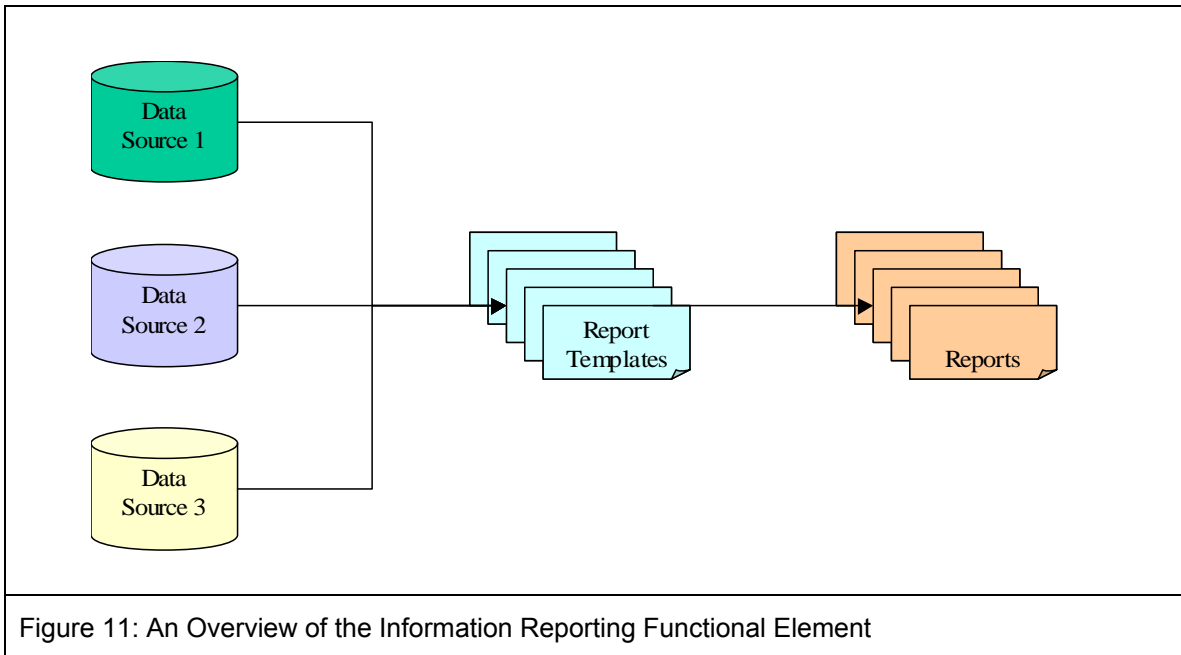


Figure 11: An Overview of the Information Reporting Functional Element

2486 This Functional Element aims to provide the core features of information reporting solution to be
2487 used in general enterprise applications. It fulfills the following requirements from the Functional
2488 Elements Requirements:
2489

- 2490 • Primary Requirements:
 - 2491 • DELIVERY-100,
 - 2492 • DELIVERY-101,
 - 2493 • DELIVERY-102,
 - 2494 • DELIVERY-103, and
 - 2495 • DELIVERY-104.
- 2496 • Secondary Requirements:
 - 2497 • DELIVERY-105, and
 - 2498 • DELIVERY-106.

2499 **2.7.2 Terms Used**

2500

Terms	Description
-------	-------------

Data source	A Data Source refers to any kind of information storage and retrieval databases like RDBMS, LDAP, ODBMS, XMLDB, XML Files, TEXT Files, etc.
Query	A query refers to a predefined method to query a data source to retrieve information stored in that data source. An example is SQL SELECT statement, which is used to retrieve information from a relational database.
Report Template	A report template is a document (such as an XML file) that is used to describe or show the report format and related settings.

2501

2502 **2.7.3 Key Features**

2503 Implementations of the Information Reporting Functional Element are expected to provide the
2504 following key features:

- 2505 1. The Functional Element **MUST** provide an approach to capture the report templates and
2506 provide the guidelines how to secure the report templates.
- 2507 2. The Functional Element **MUST** be able to generate reports in the format defined by report
2508 templates.
- 2509 3. The Functional Element **MUST** provide a way to specify data sources where information is
2510 retrieved to fill out the generated reports.
- 2511 4. The Functional Element **MUST** provide an approach to capture user-defined queries, and
2512 **MUST** be able to execute user-defined queries to retrieve information to fill out the generated
2513 reports.
- 2514 5. The Functional Element **MUST** be able to store and retrieve generated reports as stated in
2515 key feature #2.
- 2516 6. The Functional Element **MUST** provide a security approach to control report access. A
2517 considered approach is to use user, role, and access management.

2518

2519 In addition, the following key features could be provided to enhance the Information Reporting
2520 Functional Element further:

- 2521 1. The Functional Element **MAY** provide an approach, such as an IDE, to design report
2522 templates.
- 2523 2. The Functional Element **MAY** provide the capability to export reports to different electronic
2524 file formats.
- 2525 3. The Functional Element **MAY** provide the capability to log the activities of report access.
- 2526 4. The Functional Element **MAY** allow the users to subscribe to the reports they want to
2527 receive.

2528

2529 **2.7.4 Interdependencies**

Interaction Dependency	
Transformer Functional Element	The Transformer Functional Element helps to provide the import and export report information capabilities.
Notification Functional Element	The Notification Functional Element helps to send SMS / email to the appropriate Report Subscriber.

2530 **2.7.5 Related Technologies and Standards**

2531 None.

2532

2533 **2.7.6 Model**

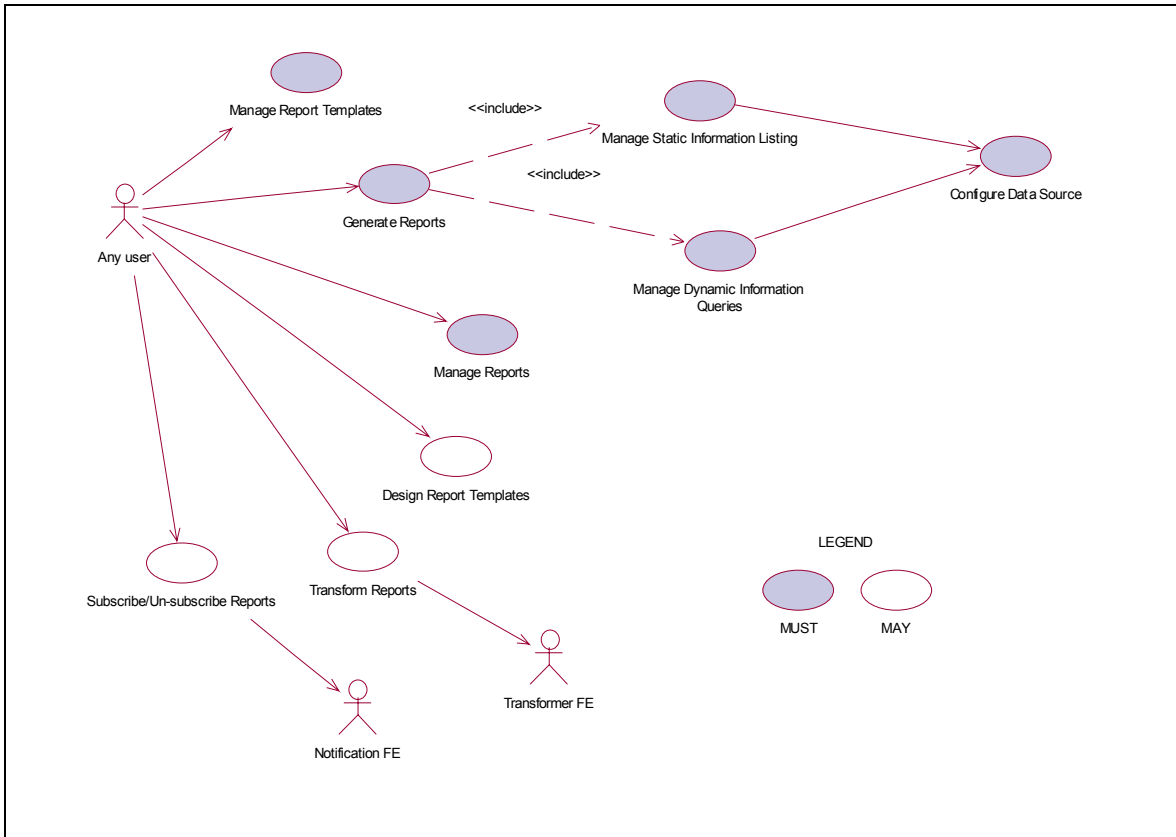


Figure 12: Model Of the Information Reporting Functional Element

2534

2535 **2.7.7 Usage Scenario**

2536 **2.7.7.1 Manage Report Templates**

2537 **2.7.7.1.1 Description**

2538 This use case allows any users to create, update, remove and view reporting templates.

2539 **2.7.7.1.2 Flow of Events**

2540 **2.7.7.1.2.1 Basic Flow**

2541 The use case begins when the user wants to create/view/update/delete reporting templates.

2542 1: Any user initiates a request type to the Functional Element stating whether to create, view,
2543 update, or delete reporting templates.

- 2544 2: The Functional Element checks whether the reporting template exists.
- 2545 3: Based on the operation it specified, one of the following sub-flows is executed:
- 2546 • If the operation is '**Create Reporting Template**', then sub-flow 3.1 is executed.
 - 2547 • If the operation is '**View Reporting Template**', then sub-flow 3.2 is executed.
 - 2548 • If the operation is '**Update Reporting Template**', then sub-flow 3.3 is executed.
 - 2549 • If the operation is '**Delete Reporting Template**', then sub-flow 3.4 is executed.
- 2550 3.1: Create Reporting Template.
- 2551 3.1.1: Any user provides reporting template information to be created.
- 2552 3.1.2: The Functional Element checks for the duplicate reporting template information.
- 2553 3.1.3: The Functional Element creates the reporting template information, if it does not
2554 exist and the use case ends.
- 2555 3.2: View Reporting Template.
- 2556 3.2.1: The Functional Element retrieves all the reporting templates.
- 2557 3.2.2: The Functional Element returns the reporting template information to any user and
2558 the use case ends.
- 2559 3.3: Update Reporting Template.
- 2560 3.3.1: Any user provides reporting template information to be updated.
- 2561 3.3.2: The Functional Element checks for the availability of reporting template
2562 information.
- 2563 3.3.3: The Functional Element updates the reporting template information, if it exist and
2564 the use case ends.
- 2565 3.4: Delete Reporting Template.
- 2566 3.4.1: Any user provides reporting template information to be removed.
- 2567 3.4.2: The Functional Element removes the reporting template information.
- 2568 4: The Functional Element responses the status of the operation whether it is successful or failure
2569 to any user and the use case ends.

2570 **2.7.7.1.2.2 Alternative Flows**

- 2571 1: Reporting Template Information Not Found.
- 2572 1.1: In the Sub Flow 3.2.1, 3.3.2, & 3.4.1, if the reporting template information cannot be
2573 found, Functional Element throws exception with error code as 'Reporting Template does not
2574 exist'.
- 2575 2: Duplicate Reporting Template Information.
- 2576 2.1: In the Sub Flow 3.1.2, If the same reporting template information has been defined,
2577 Functional Element throws exception with error code as 'Duplicate reporting template
2578 information'.

2579 **2.7.7.1.3 Special Requirements**

2580 None.

2581 **2.7.7.1.4 Pre-Conditions**

2582 None.

2583 **2.7.7.1.5 Post-Conditions**

2584 None.

2585

2586 **2.7.7.2 Generate Reports**

2587 This use case allows any user to generate reports, which includes Static Information Listing and
2588 Dynamic Information Queries.

2589 **2.7.7.2.1 Flow of Events**

2590 **2.7.7.2.1.1 Basic Flow**

2591 This use case starts when the user of the data source wishes to generate reports that include
2592 Static Information Listing and Dynamic Information Queries.

2593 1: Any user initiates a request type to the Functional Element stating whether to generate reports
2594 that includes Static Information Listing or Dynamic Information Queries.

2595 2: Based on the operation it specified, one of the following basic flows is executed:

2596 • If the operation is 'Manage Static Information Listing', then Manage Static Information
2597 Listing Basic Flow is executed.

2598 • If the operation is 'Manage Dynamic Information Queries', then Manage Dynamic
2599 Information Queries Basic Flow is executed.

2600 3: Whenever a report is generated using a particular reporting template, the respective report
2601 subscribers are notified via email using NOTIFICATION Functional Element and the use case
2602 ends.

2603

2604 **2.7.7.3 Manage Static Information Listing**

2605 **2.7.7.3.1 Description**

2606 This use case allows any users to create, view, update, and delete Static Information Listing.

2607 **2.7.7.3.2 Flow of Events**

2608 **2.7.7.3.2.1 Basic Flow**

2609 This use case starts when the users of the data source wishes to create, view, update, and delete
2610 Static Information Listing.

2611 1: Any user initiates a request type to the Functional Element stating whether to create, view,
2612 update, or delete Static Information Listing.

2613 2: The Functional Element checks whether the Static Information Listing exists.

2614 3: Based on the operation it specified, one of the following sub-flows is executed:

- 2615 • If the operation is '**Create Static Information Listing**', then sub-flow 3.1 is executed.
- 2616 • If the operation is '**View Static Information Listing**', then sub-flow 3.2 is executed.
- 2617 • If the operation is '**Update Static Information Listing**', then sub-flow 3.3 is executed.
- 2618 • If the operation is '**Delete Static Information Listing**', then sub-flow 3.4 is executed.

2619 3.1: Create Static Information Listing.

2620 3.1.1: Any user provides Static Information Listing to be created.

2621 3.1.2: The Functional Element checks for the duplicate Static Information Listing.

2622 3.1.3: The Functional Element creates the Static Information Listing, if it does not exist and the
2623 use case ends.

2624 3.2: View Static Information Listing.

2625 3.2.1: The Functional Element retrieves all the Static Information Listing.

2626 3.2.2: The Functional Element returns the Static Information Listing to any user and the use case
2627 ends.

2628 3.3: Update Static Information Listing.

2629 3.3.1: Any user provides Static Information Listing to be updated.

2630 3.3.2: The Functional Element checks for the availability of Static Information Listing.

2631 3.3.3: The Functional Element updates the Static Information Listing, if it exist and the use case
2632 ends.

2633 3.4: Delete Static Information Listing.

2634 3.4.1: Any user provides Static Information Listing to be removed.

2635 3.4.2: The Functional Element removes the Static Information Listing.

2636 4: The Functional Element responses the status of the operation whether it is successful or failure
2637 to any user and the use case ends.

2638 **2.7.7.3.2.2 Alternative Flows**

2639 1: Static Information Listing Not Found.

2640 1.1: In the Sub Flow 3.2.1, 3.3.2, & 3.4.1, if the Static Information Listing cannot be found,
2641 Functional Element throws exception with error code as 'Static Information Listing does not
2642 exist'.

2643 2: Duplicate Static Information Listing.

2644 2.1: In the Sub Flow 3.1.2, If the same Static Information Listing has been defined, Functional
2645 Element throws exception with error code as 'Duplicate Static Information Listing'.

2646 **2.7.7.3.3 Special Requirements**

2647 This use case requires the following three elements:

- 2648 • A data source
2649 • A static information query
2650 • A reporting template

2651 **2.7.7.3.4 Pre-Conditions**

2652 None.

2653 **2.7.7.3.5 Post-Conditions**

2654 None.

2655

2656 **2.7.7.4 Manage Dynamic Information Queries**

2657 **2.7.7.4.1 Description**

2658 This use case allows any users to create, view, update, and delete dynamic information queries.

2659 **2.7.7.4.2 Flow of Events**

2660 This use case starts when the users of the data source wishes to create, view, update, or delete
2661 dynamic information queries.

2662 1: Any user initiates a request type to the Functional Element stating whether to create, view,
2663 update, or delete Dynamic Information Queries.

2664 2: The Functional Element checks whether the Dynamic Information Query exists.

2665 3: Based on the operation it specified, one of the following sub-flows is executed:

- 2666 • If the operation is '**Create Dynamic Information Query**', then sub-flow 3.1 is executed.
2667 • If the operation is '**View Dynamic Information Query**', then sub-flow 3.2 is executed.
2668 • If the operation is '**Update Dynamic Information Query**', then sub-flow 3.3 is executed.
2669 • If the operation is '**Delete Dynamic Information Query**', then sub-flow 3.4 is executed.

2670 3.1: Create Dynamic Information Query.

2671 3.1.1: Any user provides Dynamic Information Query to be created.

2672 3.1.2: The Functional Element checks for the duplicate Dynamic Information Query.

2673 3.1.3: The Functional Element creates the Dynamic Information Query, if it does not exist
2674 and the use case ends.

2675 3.2: View Dynamic Information Query.

2676 3.2.1: The Functional Element retrieves all the Dynamic Information Queries.

2677 3.2.2: The Functional Element returns the Dynamic Information Query to any user and
2678 the use case ends.

- 2679 3.3: Update Dynamic Information Query.
- 2680 3.3.1: Any user provides Dynamic Information Query to be updated.
- 2681 3.3.2: The Functional Element checks for the availability of Dynamic Information Query.
- 2682 3.3.3: The Functional Element updates the Dynamic Information Query, if it exist and the
2683 use case ends.
- 2684 3.4: Delete Dynamic Information Query.
- 2685 3.4.1: Any user provides Dynamic Information Query to be removed.
- 2686 3.4.2: The Functional Element removes the Dynamic Information Query.
- 2687 4: The Functional Element responses the status of the operation whether it is successful or failure
2688 to any user and the use case ends.

2689 **2.7.7.4.2.1 Alternative Flows**

- 2690 1: Dynamic Information Query Not Found.
- 2691 1.1: In the Sub Flow 3.2.1, 3.3.2, & 3.4.1, if the Dynamic Information Query cannot be found,
2692 Functional Element throws exception with error code as 'Dynamic Information Query does not
2693 exist'.
- 2694 2: Duplicate Dynamic Information Query.
- 2695 2.1: In the Sub Flow 3.1.2, If the same Dynamic Information Query has been defined,
2696 Functional Element throws exception with error code as 'Duplicate Dynamic Information
2697 Query'.

2698 **2.7.7.4.3 Special Requirements**

- 2699 This use case requires the following three elements:
- 2700 • A data source
- 2701 • A dynamic information query
- 2702 • A reporting template

2703 **2.7.7.4.4 Pre-Conditions**

2704 None.

2705 **2.7.7.4.5 Post-Conditions**

2706 None.

2707

2708 **2.7.7.5 Manage Reports**

2709 **2.7.7.5.1 Description**

2710 This use case allows any users to view, update, and delete reports.

2711 **2.7.7.5.2 Flow of Events**

2712 **2.7.7.5.2.1 Basic Flow**

2713 This use case starts when the users of the data source wishes to view, update, or delete reports.

2714 1: Any user initiates a request type to the Functional Element stating whether to view, update, or
2715 delete reports.

2716 2: The Functional Element checks whether the report exists.

2717 3: Based on the operation it specified, one of the following sub-flows is executed:

- 2718 • If the operation is '**View Report**', then sub-flow 3.1 is executed.
- 2719 • If the operation is '**Update Report**', then sub-flow 3.2 is executed.
- 2720 • If the operation is '**Delete Report**', then sub-flow 3.3 is executed.

2721 3.1: View Report.

2722 3.1.1: The Functional Element retrieves all the reports.

2723 3.1.2: The Functional Element returns the report information to any user and the use
2724 case ends.

2725 3.2: Update Report.

2726 3.2.1: Any user provides report information to be updated.

2727 3.2.2: The Functional Element checks for the availability of report information.

2728 3.2.3: The Functional Element updates the report information, if it exist and the use case
2729 ends.

2730 3.3: Delete Report.

2731 3.3.1: Any user provides report information to be removed.

2732 3.3.2: The Functional Element removes the report information.

2733 4: The Functional Element responses the status of the operation whether it is successful or failure
2734 to any user and the use case ends.

2735 **2.7.7.5.2.2 Alternative Flows**

2736 1: Report Information Not Found.

2737 1.1: In the Sub Flow 3.1.1, 3.2.2, & 3.3.1, if the report information cannot be found, Functional
2738 Element throws exception with error code as 'Report does not exist'.

2739 **2.7.7.5.3 Special Requirements**

2740 None.

2741 **2.7.7.5.4 Pre-Conditions**

2742 None.

2743 **2.7.7.5.5 Post-Conditions**

2744 None.

2745

2746 **2.7.7.6 Configure Data Source**

2747 **2.7.7.6.1 Description**

2748 This use case allows any users to create, view, update, and delete data source.

2749 **2.7.7.6.2 Flow of Events**

2750 **2.7.7.6.2.1 Basic Flow**

2751 This use case starts when the users of the data source wishes to create, view, update, or delete
2752 data source.

2753 1: Any user initiates a request type to the Functional Element stating whether to create, view,
2754 update, or delete source.

2755 2: The Functional Element checks whether the data source exists.

2756 3: Based on the operation it specified, one of the following sub-flows is executed:

- 2757 • If the operation is '**Create Data Source**', then sub-flow 3.1 is executed.
- 2758 • If the operation is '**View Data Source**', then sub-flow 3.2 is executed.
- 2759 • If the operation is '**Update Data Source**', then sub-flow 3.3 is executed.
- 2760 • If the operation is '**Delete Data Source**', then sub-flow 3.4 is executed.

2761 3.1: Create Data Source.

2762 3.1.1: Any user provides data source information to be created.

2763 3.1.2: The Functional Element checks for the duplicate data source information.

2764 3.1.3: The Functional Element creates the data source information, if it does not exist and the use
2765 case ends.

2766 3.2: View Data Source.

2767 3.2.1: The Functional Element retrieves all the data sources.

2768 3.2.2: The Functional Element returns the data source information to any user and the use case
2769 ends.

2770 3.3: Update Data Source.

2771 3.3.1: Any user provides data source information to be updated.

2772 3.3.2: The Functional Element checks for the availability of data source information.

2773 3.3.3: The Functional Element updates the data source information, if it exist and the use case
2774 ends.

2775 3.4: Delete Data Source.

2776 3.4.1: Any user provides data source information to be removed.
2777 3.4.2: The Functional Element removes the data source information.
2778 4: The Functional Element responses the status of the operation whether it is successful or failure
2779 to any user and the use case ends.

2780 **2.7.7.6.2 Alternative Flows**

2781 1: Data Source Information Not Found.

2782 1.1: In the Sub Flow 3.2.1, 3.3.2, & 3.4.1, if the data source information cannot be found,
2783 Functional Element throws exception with error code as 'Data source does not exist'.

2784 2: Duplicate Data Source Information.

2785 2.1: In the Sub Flow 3.1.2, If the same data source information has been defined, Functional
2786 Element throws exception with error code as 'Duplicate data source information'.

2787 **2.7.7.6.3 Special Requirements**

2788 None.

2789 **2.7.7.6.4 Pre-Conditions**

2790 None.

2791 **2.7.7.6.5 Post-Conditions**

2792 None.

2793

2794 **2.7.7.7 Design Report Templates**

2795 **2.7.7.7.1 Description**

2796 This use case allows any users to design reporting templates.

2797 **2.7.7.7.2 Flow of Events**

2798 **2.7.7.7.2.1 Basic Flow**

2799 The use case begins when the user wants to design reporting templates.

2800 1: Any user provides reporting template information to be designed.

2801 2: The Functional Element checks for the duplicate reporting template information designed.

2802 3: The Functional Element designs and saves the reporting template information, if it does not
2803 exist and the use case ends.

2804 **2.7.7.7.2 Alternative Flows**

2805 1: Duplicate Reporting Template Design Information.

2806 1.1: In the Basic Flow 2, if the same reporting template information has been designed,
2807 Functional Element throws exception with error code as 'Duplicate reporting template design
2808 information'.

2809 **2.7.7.7.3 Special Requirements**

2810 None.

2811 **2.7.7.7.4 Pre-Conditions**

2812 None.

2813 **2.7.7.7.5 Post-Conditions**

2814 None.

2815

2816 **2.7.7.8 Transform Reports**

2817 **2.7.7.8.1 Description**

2818 This use case allows the user to transform a report information file from one format to another
2819 format.

2820 **2.7.7.8.2 Flow of Events**

2821 **2.7.7.8.2.1 Basic Flow**

2822 This use case starts when a user wants to transform a report information file from one format to
2823 another format.

2824 1: The user set the file name to be transformed and the destination format.

2825 2: This use case call the TRANSFORMER functional elements' transform flow.

2826 3: Return the results from the transformer functional elements' transform flow and the use case
2827 ends.

2828 **2.7.7.8.2.2 Alternative Flows**

2829 1: If in Basic Flow 2 there is no method to do the transformation, the system return error message
2830 to the user and this use case ends.

2831 **2.7.7.8.3 Special Requirements**

2832 None.

2833 **2.7.7.8.4 Pre-Conditions**

2834 None.

2835 **2.7.7.8.5 Post-Conditions**

2836 None.
2837

2838 **2.7.7.9 Subscribe/Un-subscribe Reports**

2839 **2.7.7.9.1 Description**

2840 This use case performs the subscription or un-subscription on desired reports for any user.

2841 **2.7.7.9.2 Flow of Events**

2842 **2.7.7.9.2.1 Basic Flow**

2843 The use case begins when the user wants to subscribe or un-subscribe those desired reports.

2844 1: The user sends a request.

2845 2: Based on the operation it specifies, one of the following sub-flows is executed:

- 2846 • If the operation is '**Subscribe to Report**', then sub-flow 2.1 is executed.
- 2847 • If the operation is '**Un-Subscribe to Report**', then sub-flow 2.2 is executed.

2848 2.1: Subscribe To Report.

2849 2.1.1: The Functional Element gets user id, together with those desired report name.

2850 2.1.2: The Functional Element checks whether the report exists.

2851 2.1.3: The Functional Element adds the subscription of the user to the report.

2852 2.2: Un-Subscribe To Report.

2853 2.2.1: The Functional Element gets user id, together with those desired report name.

2854 2.2.2: The Functional Element checks whether the report exists.

2855 2.2.3: The Functional Element removes the subscription of the user to the report.

2856 3: The Functional Element returns the results of the operation to the user and the use case ends.

2857 **2.7.7.9.2.2 Alternative Flows**

2858 1: Report Not Found.

2859 1.1: If in the basic flow 2.1.2 and 2.2.2, the report specified does not exist, Functional
2860 Element will return an error message to the user and the use case ends.

2861 2: User Not Found.

2862 2.1: If in the basic flow 2.1.2 and 2.2.2, the user related does not exist, Functional Element
2863 will return an error message to the user and the use case ends.

2864 **2.7.7.9.3 Special Requirements**

2865 None.

2866 **2.7.7.9.4** **Pre-Conditions**

2867 None.

2868 **2.7.7.9.5** **Post-Conditions**

2869 None.

2870 **2.8 Key Management Functional Element (new)**

2871 **2.8.1 Motivation**

2872 The Key Management Functional Element is expected to be related Web Services security. To
2873 enable Web Services security, cryptographic keys are used for digital signatures and encryption.
2874 XKMS defines a Web services interface to a public key infrastructure. With development of
2875 XKMS standard, more and more PKI providers adopt XKMS to remove its complexity without
2876 sacrificing its benefits. Application developers will only ever need to worry about implementing
2877 XKMS clients for key management. As such it will cover aspects that include.

2878

2879 This Functional Element fulfills the following requirements from the Functional Elements
2880 Requirements, Working Draft Version 2.0 (fws-fe-2.0-requirements-doc-wd-01.doc):

2881 Primary Requirement

- 2882
 - SECURITY-010.

2883

2884 **2.8.2 Terms Used**

Terms	Description
PKI	PKI is a system of digital certificates, Certificate Authorities, and other registration authorities that verify and authenticate the validity of each party involved in an Internet transaction.
XML Key Management Specification (XKMS)	This specification addresses protocols for distributing and registering public keys, suitable for use in conjunction with the standards for XML Signature, XML Encryption and WS-Security.
the XML Key Information Service Specification (X-KISS)	The X-KISS is a specification that defines a protocol for a XKMS-compliant service that resolves public key information. It allows a client of such a service to delegate part or all of the tasks required to process <ds:KeyInfo>.
X-KRSS	XML Key Registration Service Specification defines a protocol for a web service that accepts registration of public key information.
Proof of Possession (POP)	Performing an action with a private key to demonstrate possession of it. An example is to create a signature using a registered private signing key to prove possession of it.

2885

2886 **2.8.3 Key Features**

2887 Implementations of the Key Management Functional Element are expected to provide the
2888 following key features:

- 2889 1. The Functional Element MUST provide the capability to register a key or a key pair with an
2890 XKMS-compliant service.
- 2891 2. The Functional Element MUST provide the capability to revoke a registered key or key pair
2892 with an XKMS-compliant service.

- 2893 3. The Functional Element MUST provide the capability to recover a registered key or key pair
2894 with an XKMS-compliant service.
- 2895 4. The Functional Element MUST provide the capability to retrieve a public key registered with
2896 an XKMS-compliant service. The public can in turn be used to encrypt a document or verify
2897 a signature.
- 2898 5. The Functional Element MUST provide the capability to ensure that a public key registered
2899 with an XKMS-compliant service is valid and has not expired or been revoked.

2900

2901 In addition, the following key features could be provided to enhance the Functional Element
2902 further:

- 2903 1. The Functional Element MAY provide the capability to generate key pairs.

2904

2905 2.8.4 Interdependencies

Interaction Dependencies	
SecureSOAP Management	The SecureSOAP Management Functional Element may make use key management facilities provided by this functional element to do security related operations.
Identity Management	The Identity Management Functional Element may make use of key management facility to obtain KeyInfo.

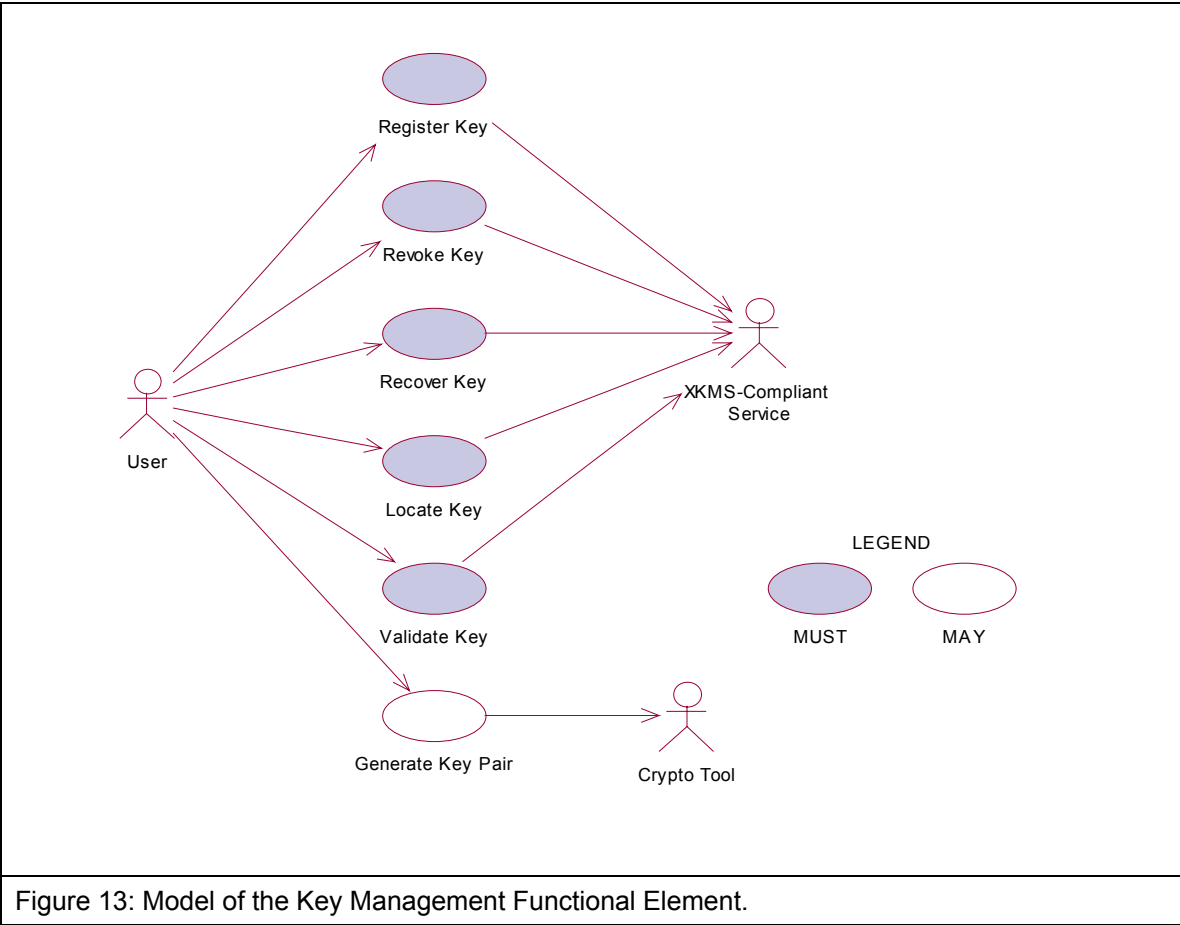
2906

2907 2.8.5 Related Technologies and Standards

Standards / Specifications	Specific References
Public Key Infrastructure (PKI)	PKI is a system of digital certificates, Certificate Authorities, and other registration authorities that verify and authenticate the validity of each party involved in an Internet transaction In this Functional Element, the private key and public key are generated for the Functional Element to sign and encrypt SOAP messages. The Functional Element uses the session key to encrypt the SOAP message. The digital certificate is attached to the SOAP message after the Functional Element has signed the SOAP message.
XML-Signature Syntax and Processing, W3C Recommendation 12 th Feb 2002	This specification addresses authentication, non-repudiation and data-integrity issues. In addition, it also specifies the XML syntax and processing rules for creating and representing digital signatures. In this Functional Element, both the digital signature on the SOAP message and validation of the signed SOAP message is done based on this specification.
XML-Encryption Syntax and Processing, W3C Recommendation 10 th Dec 2002	This specification addresses data privacy by defining a process for encrypting data and representing the result in XML document. In this Functional Element, the encryption and decryption of SOAP messages are done based on this specification.

XML Key Management Specification (XKMS)	This specification addresses protocols for distributing and registering public keys, suitable for use in conjunction with the standards for XML Signature, XML Encryption and WS-Security. It comprises two parts – the XML Key Information Service Specification (X-KISS) and the XML Key Registration Service Specification (X-KRSS).
-----------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2908 **2.8.6 Model**
 2909



2910

Figure 13: Model of the Key Management Functional Element.

2911 **2.8.7 Usage Scenarios**

2912 **2.8.7.1 Register Key**

2913 **2.8.7.1.1 Description**

2914 This use case allows any user to register a key or key pair with a XKMS-compliant service.

2915 **2.8.7.1.2 Flow of Events**

2916 **2.8.7.1.2.1 Basic Flow**

2917 This use case starts when any user wants to register a key or key pair with a XKMS-compliant
2918 service. The register request is used to assert a binding of information to a public key pair.
2919 Generation of the public key pair MAY be performed by either the client or the XKMS-compliant
2920 service.

2921 1: The user sends request to register a key or key pair by providing necessary registering
2922 information, which include key information, a prototype of the requested assertion, optional
2923 additional information to authenticate the user. If the public key pair to be registered is generated
2924 by the user, the user may provide Proof of Possession of the private key.

2925 2: On receipt of a registering request from the user, the functional element transforms the request
2926 to X-KRSS request format and sends to targeted XKMS-compliant service.

2927 3: The XKMS-compliant service verifies the authentication and Proof of Possession information
2928 provided if any. If the service accepts the request, an assertion is registered. The service returns
2929 part or all of the registered assertion in format of X-KRSS to the functional element.

2930 4: The Functional Element passes the response from the service to the user and the use case
2931 ends.

2932 **2.8.7.1.2.2 Alternative Flows**

2933 1: Information Not Enough.

2934 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
2935 not enough to form a X-KRSS request, Functional Element returns general error message
2936 and ends the use case.

2937 2: POP Needed.

2938 2.1: If in the basic flow 2, Functional Element checks that key pair is generated but the POP
2939 is not provided by the user in the request message, the Functional Element returns an error
2940 and ends the use case.

2941 **2.8.7.1.3 Special Requirements**

2942 **2.8.7.1.4 Pre-Conditions**

2943 None.

2944 **2.8.7.1.5 Post-Conditions**

2945 None.

2946

2947 **2.8.7.2 Revoke Key**

2948 **2.8.7.2.1 Description**

2949 The use case allows any user to revoke previously issued assertions.

2950 **2.8.7.2.2 Flow of Events**

2951 **2.8.7.2.2.1 Basic Flow**

2952 This use case starts when any user wants to revoke previous issued assertions.

2953 1: The user sends request to revoke a key or key pair by providing information, which include key
2954 information, a prototype of the requested assertion, optional additional information to authenticate
2955 the user. If the public key pair to be registered is generated by the user, the user may provide
2956 Proof of Possession of the private key.

2957 2: On receipt of a revoking request from the user, the Functional Element transforms the request
2958 to X-KRSS request format and sends to targeted XKMS-compliant service.

2959 3: The XKMS-compliant service verifies the authentication and Proof of Possession information
2960 provided if any. If the service accepts the request, an assertion is revoked. The service returns
2961 response in X-KRSS to indicate that the assertion is revoked.

2962 4: The Functional Element passes the response from the service to the user and the use case
2963 ends.

2964 **2.8.7.2.3 Alternative Flows**

2965 1: Information Not Enough.

2966 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
2967 not enough to form an X-KRSS request, Functional Element returns general error message
2968 and ends the use case.

2969 2: POP Needed.

2970 2.1: If in the basic flow 2, Functional Element checks that key pair is generated but the POP
2971 is not provided by the user in the request message, the Functional Element returns an error
2972 and ends the use case.

2973 **2.8.7.2.4 Special Requirements**

2974 None.

2975 **2.8.7.2.5 Pre-Conditions**

2976 None.

2977 **2.8.7.2.6 Post-Conditions**

2978 If the use case was successful, the assertion issued previously would be revoked.

2979

2980

2981 **2.8.7.3 Recover Key**

2982 This use case allows any user to recover previously issued assertions.

2983 **2.8.7.3.1 Flow of Events**

2984 **2.8.7.3.1.1 Basic Flow**

2985 This use case starts when any user wants to recover previous issued assertions.

2986 1: The user sends request to recover a key or key pair by providing information, which include
2987 key information, a prototype of the requested assertion, optional additional information to
2988 authenticate the user. If the public key pair to be registered is generated by the user, the user
2989 may provide Proof of Possession of the private key.

2990 2: On receipt of a recover request from the user, the Functional Element transforms the request
2991 to X-KRSS request format and sends to targeted XKMS-compliant service.

2992 3: The XKMS-compliant service verifies the authentication and Proof of Possession information
2993 provided if any. If the service accepts the request, an assertion is recovered. The service returns
2994 response in X-KRSS to indicate that the assertion is recovered.

2995 4: The Functional Element passes the response from the service to the user and the use case
2996 ends.

2997 **2.8.7.3.1.2 Alternative Flows**

2998 1: Information Not Enough.

2999 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
3000 not enough to form an X-KRSS request, Functional Element returns general error message
3001 and ends the use case.

3002 2: POP Needed.

3003 2.1: If in the basic flow 2, Functional Element checks that key pair is generated but the POP
3004 is not provided by the user in the request message, the Functional Element returns an error
3005 and ends the use case.

3006 **2.8.7.3.2 Special Requirements**

3007 None.

3008 **2.8.7.3.3 Pre-Conditions**

3009 None.

3010 **2.8.7.3.4 Post-Conditions**

3011 If the use case successes, the registered assertion is recovered in the XKMS-compliant service.

3012

3013 **2.8.7.4 Locate Key**

3014 **2.8.7.4.1 Description**

3015 This use case allows users to retrieve a public key registered with an XKMS-compliant service.
3016 The public key can be in turn be used to encrypt a document or verify a signature.

3017 **2.8.7.4.1.1 Basic Flow**

3018 This use case starts when any user wants to retrieve a public key registered with an XKMS-
3019 compliant service.

3020 1: The user sends request to retrieve a public key registered with an XKMS-compliant service by
3021 providing related information.

3022 2: On receipt of a recover request from the user, the Functional Element transforms the request
3023 to X-KISS request format and sends to targeted XKMS-compliant service.

3024 3: The XKMS-compliant service may obtain an X509V3 certificate. The certificate is parsed to
3025 obtain the public key value that is return to the Functional Element in the format of X-KISS.

3026 4: The Functional Element checks the response message is issued by the target XKMS-compliant
3027 service; ensures that the response message has not been modified; and confirms that the
3028 response message corresponds to the request that made by the user.

3029 5: The Functional Element passes the response from the service to the user and the use case
3030 ends.

3031 **2.8.7.4.1.2 Alternative Flows**

3032 1: Information Not Enough.

3033 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
3034 not enough to form an X-KISS request, Functional Element returns general error message
3035 and ends the use case.

3036 2: Fault Response.

3037 2.1: If in basic flow 4, Functional Element detects the response message has problem in
3038 authenticity, integrity and does not correspond to the request, Functional Element returns
3039 general error message and ends the use case.

3040 **2.8.7.4.2 Special Requirements**

3041 None.

3042 **2.8.7.4.3 Pre-Conditions**

3043 None.

3044 **2.8.7.4.4 Post-Conditions**

3045 None.

3046

3047 **2.8.7.5 Validate Key**

3048 This use case enables the user to obtain an assertion specifying the status of the binding
3049 between the public key and other data, for example a name or a set of extended attributes.

3050 **2.8.7.5.1 Flow of Events**

3051 **2.8.7.5.1.1 Basic Flow**

3052 This use case starts when the user wants to obtain the status of the binding of a public key with
3053 an assertion.

3054 1: The user sends request to validate a key or key pair by providing necessary validating
3055 information defined in X-KISS, which include key information, a prototype of the requested
3056 assertion, optional additional information to authenticate the user. If the public key pair to be
3057 registered is generated by the user, the user may provide Proof of Possession of the private key.

3058 2: On receipt of a registering request from the user, the Functional Element transforms the
3059 request to XKRSS request format and sends to targeted XKMS-compliant service.

3060 3: The XKMS-compliant service verifies the authentication and Proof of Possession information
3061 provided if any. If the service accepts the request, an assertion is registered. The service returns
3062 part or all of the registered assertion in format of XKRSS to the functional element.

3063 4: The Functional Element checks the response message is issued by the target XKMS-compliant
3064 service; ensures that the response message has not been modified; and confirms that the
3065 response message corresponds to the request that made by the user.

3066 5: The Functional Element passes the response from the service to the user and the use case
3067 ends.

3068 **2.8.7.5.1.2 Alternative Flows**

3069 1: Information Not Enough.

3070 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
3071 not enough to form an X-KISS request, Functional Element returns general error message
3072 and ends the use case.

3073 2: Fault Response.

3074 2.1: If in basic flow 4, Functional Element detects the response message has problem in
3075 authenticity, integrity and does not correspond to the request, Functional Element returns
3076 general error message and ends the use case.

3077 **2.8.7.5.2 Special Requirements**

3078 None.

3079 **2.8.7.5.3 Pre-Conditions**

3080 None.

3081 **2.8.7.5.4 Post-Conditions**

3082 None.

3083

3084 **2.8.7.6 Generate Key Pair**

3085 This use case enables the user to generate key pair using the desired cryptographic tool.

3086 **2.8.7.6.1 Flow of Events**

3087 **2.8.7.6.1.1 Basic Flow**

3088 This use case starts when the user wants to obtain generate key pair using the desired
3089 cryptographic tool.

3090 1: The user sends request to generate key pair by specifying related information.

3091 2: On receipt of request from the user, the functional element validates the provided information
3092 and dispatch the request to Crypto Tool to generate key pair.

3093 3: The Crypto Tool generates key pair and returns them to the Functional Element according to
3094 the request.

3095 4: The Functional Element checks and dispatches the message to the user and the use case
3096 ends.

3097 **2.8.7.6.1.2 Alternative Flows**

3098 1: Invalid Input Parameter.

3099 1.1: If in the basic flow 2, Functional Element detects the information provided by the user is
3100 not valid to generate key pair, Functional Element returns general error message and ends
3101 the use case.

3102 **2.8.7.6.2 Special Requirements**

3103 None.

3104 **2.8.7.6.3 Pre-Conditions**

3105 None.

3106 **2.8.7.6.4 Post-Conditions**

3107 If the use case successes, a key pair is generated and stored in the key store specified by the
3108 user.

3109

3110

3111 **2.9 Log Utility Functional Element**

3112 **2.9.1 Motivation**

3113 In a Web Service-enabled implementation, the Log Utility Functional Element can help to
3114 organise the diagnostic output that may be generated by the implementation. In order to achieve
3115 that, the following capabilities should be provided. They include:

- 3116 Logging information into different data sources,
- 3117 Allowing user defined log format to be used,
- 3118 Capability for storing log information, and
- 3119 Providing the capability to analyse the information log.

3120

3121 This Functional Element fulfills the following requirements from the Functional Elements
3122 Requirements, Working Draft 01a:

3123 Primary Requirements

- 3124 • MANAGEMENT-007, [**To be fulfilled in next working draft*]
- 3125 • MANAGEMENT-110,
- 3126 • MANAGEMENT-112 to MANAGEMENT-114, and
- 3127 • PROCESS-009.

3128 Secondary Requirements

- 3129 • MANAGEMENT-006,
- 3130 • MANAGEMENT-095,
- 3131 • MANAGEMENT-111,
- 3132 • PROCESS-008,
- 3133 • PROCESS-115, and
- 3134 • PROCESS-118.

3135

3136 **2.9.2 Terms Used**

Terms	Description
Log Category	A Log Category holds information about a log structure. This information includes the name of the log, the data source the log is to be stored and the format of the log.

3137

3138 **2.9.3 Key Features**

3139 Implementations of the Log Utility Functional Element are expected to provide the following key
3140 features:

- 3141 1. The Functional Element MUST provide the capability to define a Log Category and manage
3142 it. This includes:

- 3143 1.1. The capability to define the format of the log information,
3144 1.2. The capability to choose the data source to logged to, and
3145 1.3. The capability to define the name of the log category.
3146 2. The Functional Element MUST provide the capability to manage logging of events/records.
3147 This includes:
3148 2.1. The capability to insert a new record into the log,
3149 *Examples of a log record could include events, transactions status, usages status or*
3150 *users' activities.*
3151 2.2. The capability to search and return result sets of search on log records, and
3152 2.3. The capability to archive or delete obsolete log records.

3153

3154 In addition, the following key features could be provided to enhance the Functional Element
3155 further:

- 3156 1. The Functional Element MAY also provide the capability to perform conditional search or
3157 viewing of log records.
3158 2. The Functional Element MAY provide the capability to perform basic statistical analysis on
3159 log records. Basic statistical analysis capabilities include:
3160 2.1. Minimum and maximum value calculations on numerical values,
3161 2.2. Mean values calculations on numerical values, and
3162 2.3. Standard deviation calculations on numerical values.

3163

3164 **2.9.4 Interdependencies**

3165 None

3166 **2.9.5 Related Technologies and Standards**

3167 None

3168 **2.9.6 Model**

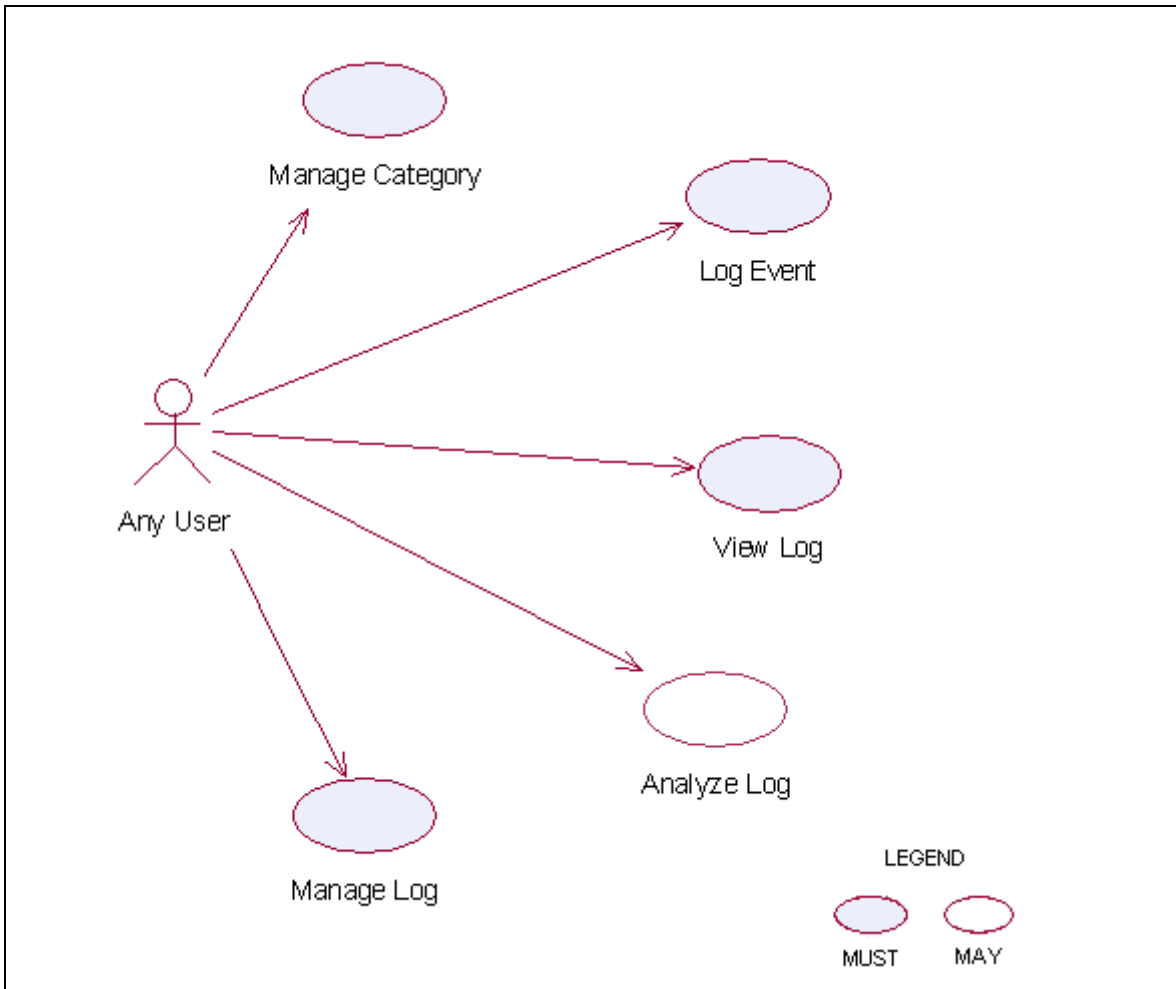


Figure 14: Model Of the Log Utility Functional Element [12]

3169

3170 **2.9.7 Usage Scenarios**

3171 **2.9.7.1 Manage Category**

3172 **2.9.7.1.1 Description**

3173 This use case allows any user to manage log category. Log category defines the data fields that
3174 the user wants to log.

3175 **2.9.7.1.2 Flow of Events**

3176 **2.9.7.1.2.1 Basic Flow**

3177 This use case starts when users wants to manage the log category.

3178 1: The users send the request to the Functional Element. The request contains the operations
3179 the users want to perform.

3180 2: The Functional Element receives the request. Based on the operation specified, one of the
3181 following sub-flows is executed.

3182 If the operation is **'Create Log Category'**, then sub-flow 2.1 is executed.

3183 If the operation is **'Retrieve Log Category Information'**, then sub-flow 2.2 is executed.

3184 If the operation is **'Delete Log Category'**, then sub-flow 2.3 is executed.

3185 2.1: Create Log Category.

3186 2.1.1: The Functional Element gets the following data from the users.

3187 • Category name

3188 • The definition of category

3189 • The data source where the log is located

3190 2.1.2: The Functional Element checks the uniqueness of the category name.

3191 2.1.3: The Functional Element connects to the data source according to the specified
3192 data source.

3193 2.1.4: The Functional Element creates the empty log in the data source.

3194 2.1.5: The Functional Element writes the category name and its definition in its own
3195 category definition record and the use case end.

3196 2.2: Retrieve Log Category Information.

3197 2.2.1: The Functional Element gets the category name.

3198 2.2.2: The Functional Element checks the existence of this category.

3199 2.2.3: The Functional Element retrieves the definition of this category.

3200 2.2.4: The Functional Element returns the definition of this category to the user and the
3201 use case ends.

3202 2.3: Delete Log Category.

3203 2.3.1: The Functional Element gets the category name.

3204 2.3.2: The Functional Element checks the existence of this category.

3205 2.3.3: The Functional Element deletes its own records of category definition and the use
3206 case ends.

3207 **2.9.7.1.2.2 Alternative Flows**

3208 1: Category Already Exists.

3209 1.1: In sub-flow 2.1.2, if the category name is already used by others, the Functional Element
3210 returns an error message and the use case ends.

3211 2: Data Source Not Available.

3212 2.1: In sub-flow 2.1.3, if the data source is not available, the Functional Element returns an
3213 error message and the use case ends.

- 3214 3: Create Log Error.
- 3215 3.1: In sub-flow 2.1.4, if the log cannot be created on the specified data source, the
3216 Functional Element returns an error message and the use case ends.
- 3217 4: Category Does Not Exist.
- 3218 4.1: In sub-flow 2.2.1 and 2.3.1, the category cannot be found in Functional Element category
3219 definition, the Functional Element returns an error message and the use case ends.
- 3220 5: Delete Category Error.
- 3221 5.1: In sub-flow 2.3.3, the log category cannot be deleted, the Functional Element returns an
3222 error message and the use case ends.
- 3223 **2.9.7.1.3 Special Requirements**
- 3224 None
- 3225 **2.9.7.1.4 Pre-Conditions**
- 3226 None.
- 3227 **2.9.7.1.5 Post-Conditions**
- 3228 If the use case was successful, the category definition is saved to the Functional Element and an
3229 empty log is created in the specified data source. Otherwise, the Functional Element's state is
3230 unchanged.
- 3231 **2.9.7.2 Log Event**
- 3232 **2.9.7.2.1 Description**
- 3233 The use case allows any user to log any event.
- 3234 **2.9.7.2.2 Flow of Events**
- 3235 **2.9.7.2.2.1 Basic Flow**
- 3236 This use case starts when users want to write to a log.
- 3237 1: The users provide the event data, category name he/she wants to log to the Functional
3238 Element.
- 3239 2: The Functional Element gets the definition of the category.
- 3240 3: The Functional Element connects the log data source.
- 3241 4: The Functional Element writes the log record into the end of the log file and the use case ends.
- 3242 **2.9.7.2.2.2 Alternative Flows**
- 3243 1: Category Does Not Exist.
- 3244 1.1: If in basic flow 2, the category that the users want to write does not exist, the Functional
3245 Element returns an error message and the use case ends.
- 3246 2: Data Source Not Available.

3247 2.1: If in basic flow 3, the data source is not available, the Functional Element returns an error
3248 message and the use case ends.

3249 3: Data Not Match.

3250 3.1: If in basic flow 4, the data provided by the users for logging does not match with the
3251 category definition in the Functional Element, the Functional Element returns an error
3252 message and the use case ends.

3253 **2.9.7.2.3 Special Requirements**

3254 None.

3255 **2.9.7.2.4 Pre-Conditions**

3256 None.

3257 **2.9.7.2.5 Post-Conditions**

3258 If the use case was successful, the log record is saved to the Functional Element. Otherwise, the
3259 Functional Element's state is unchanged.

3260 **2.9.7.3 View Log**

3261 **2.9.7.3.1 Description**

3262 The use case allows users to retrieve the log content.

3263 **2.9.7.3.2 Flow of Events**

3264 **2.9.7.3.2.1 Basic Flow**

3265 This use case starts when users want to view a log.

3266 1: The users specify the category name and the search criteria, such as searching by event type
3267 or searching by time period (starting time and end time).

3268 2: The Functional Element connects to the data storage where the log records are stored.

3269 3: The Functional Element retrieves the log content and returns to the service users and the use
3270 case ends.

3271 **2.9.7.3.2.2 Alternative Flows**

3272 1: Search Criteria Not Valid.

3273 1.1: If in basic flow 1 and 3, the search criteria specified by the users is invalid for Search
3274 Service, the Functional Element returns an error message and the use case ends.

3275 **2.9.7.3.3 Special Requirements**

3276 None.

3277 **2.9.7.3.4 Pre-Conditions**

3278 None.

3279 **2.9.7.3.5 Post-Conditions**

3280 None.

3281 **2.9.7.4 Analyze Log Data**

3282 **2.9.7.4.1 Description**

3283 The use case allows users to analyze the log data, i.e., to get statistics of certain event. The
3284 service users may get statistical results on the log data, such as the cumulative events and mean
3285 of two numerical values.

3286 **2.9.7.4.2 Flow of Events**

3287 **2.9.7.4.2.1 Basic Flow**

3288 This use case starts when users want to analyze the log data.

3289 1: The users specify the items to analyze, i.e. field name and category name.

3290 2: The users specify the analysis method, option among max, min and mean.

3291 3: The Functional Element retrieves the definition of the category and validates the parameters
3292 provided by the users.

3293 4: The Functional Element connects to the data source and retrieves the log data.

3294 5: The Functional Element analyses the log data and does statistics on the data with respect to
3295 what is specified in Step 1 and 2.

3296 6: The Functional Element returns the analyzed result and the use case ends.

3297 **2.9.7.4.2.2 Alternative Flows**

3298 1: Invalid Item Specified.

3299 1.1: If in basic flow 1, the analyze items specified by the users are invalid, i.e. invalid field and
3300 invalid data source, the Functional Element returns an error message and the use case ends.

3301 2: Category Does Not Exist.

3302 2.1: If in basic flow 3, the category that the users want to write to does not exist, the
3303 Functional Element returns an error message and the use case ends.

3304 3: Data Source Not Available.

3305 3.1: If in basic flow 4, the data source is not available, the Functional Element returns an error
3306 message and the use case ends.

3307 **2.9.7.4.3 Special Requirements**

3308 **2.9.7.4.3.1 Supportability**

3309 Only basic statistic methods of numerical value are supported.

3310 **2.9.7.4.4 Pre-Conditions**

3311 None.

3312 **2.9.7.4.5 Post-Conditions**

3313 None.

3314 **2.9.7.5 Manage Log**

3315 **2.9.7.5.1 Description**

3316 The use case allows users to drop log and backup log.

3317 **2.9.7.5.2 Flow of Events**

3318 **2.9.7.5.2.1 Basic Flow**

3319 The use case starts when the users want to drop and backup a log of a specific data source.

3320 1: The users specify the function name to the Functional Element.

3321 2: Based on the operation specified, one of the following sub-flows is executed.

3322 If the operation is '**Delete Log**', then sub-flow 2.1 is executed.

3323 If the operation is '**Backup Log**', then sub-flow 2.2 is executed.

3324 2.1: Delete Log

3325 2.1.1: The Functional Element gets category name from the users.

3326 2.1.2: The Functional Element retrieves the definition of the category.

3327 2.1.3: The Functional Element connects to the corresponding data source.

3328 2.1.4: The Functional Element deletes the log from the data source.

3329 2.2: Backup Log

3330 2.2.1: The Functional Element gets the category name and the destination file name from
3331 the users.

3332 2.2.2: The Functional Element retrieves the definition of the category.

3333 2.2.3: The Functional Element connects to the corresponding data source.

3334 2.2.4: The Functional Element read the original log and writes it to the destination file.

3335 **2.9.7.5.2.2 Alternative Flows**

3336 1: Category Does Not Exist.

3337 1.1: If in basic flow 2.1.2 and 2.2.2 the category that the users want to write does not exist,
3338 the Functional Element returns an error message and the use case ends.

3339 2: Data Source Not Available.

3340 2.1: If in basic flow 2.1.4 and 2.2.4, the data source is not available, the Functional Element
3341 returns an error message and the use case ends.

3342 **2.9.7.5.3 Special Requirements**

3343 None.

3344 **2.9.7.5.4 Pre-Conditions**

3345 None.

3346 **2.9.7.5.5 Post-Conditions**

3347 None.

3348 **2.10 Notification Functional Element**

3349 **2.10.1 Motivation**

3350 In a Web Service-enabled implementation, timely information is crucial for the management of
3351 resources that it encompasses. Other uses of this Functional Element include broadcasting of
3352 information to other services and this could span across both the wired and wireless medium. In
3353 order to fulfill these needs, this Functional Element will cover the following aspects which include:

3354 Providing the capability to configure and link with the various gateways so as to enable messages
3355 dissemination, and

3356 Providing the capability to send instantaneous or scheduled messages to the intended audiences.

3357

3358 This Functional Element fulfills the following requirements from the Functional Elements
3359 Requirements, Working Draft 01a:

3360 Primary Requirements

- 3361 • DELIVERY-003, and
- 3362 • PROCESS-118.

3363 Secondary Requirements

- 3364 • MANAGEMENT-205,
- 3365 • PROCESS-005,
- 3366 • PROCESS-102,
- 3367 • PROCESS-107, and
- 3368 • PROCESS-110.

3369

3370 **2.10.2 Terms Used**

Terms	Description
Default Notification Channel	Default Notification Channel refers to the particular channel setting or value that is assigned automatically by the Functional Element and remains in effect unless canceled or overridden.
Device Type	Device Type refers to devices such as Mobile Phone, Numeric Pager, Alphanumeric Numeric Pager and Desktop etc.
Notification Channel	Notification Channel refers to the various messaging channels such as SMS (Short Message Service), Numeric Message, Alpha-numeric Message and E-mail Message etc.
Schedule Type	Schedule Type refers to the various types of Scheduling format such as ONCE, DAILY, WEEKLY, and MONTHLY.
SMS	Short Message Service
SMS Gateway	A device that enable sending of numeric, alpha-numeric and SMS messages.
SMTP	Simple Mail Transfer Protocol

SMTP Server	SMTP server supports email notifications.
-------------	-------------------------------------------

3371

3372 **2.10.3 Key Features**

3373 Implementations of the Notification Functional Element are expected to provide the following key
3374 features:

- 3375 1. The Functional Element MUST support notifications using both the SMS and SMTP
3376 protocols.
- 3377 2. The Functional Element MUST provide the capability to configure supported SMS gateway(s)
3378 and the SMTP servers where applicable.
- 3379 *Example: The capability to configure the username and password for SMTP server's*
3380 *authentication.*
- 3381 3. The Functional Element MUST provide the capability to send notifications to single and
3382 multiple recipients.
- 3383 4. The Functional Element MUST provide the capability to structure a notification based on the
3384 selected protocol(s).

3385

3386 In addition, the following key features could be provided to enhance the Functional Element
3387 further:

- 3388 1. The Functional Element MAY provide the capability to send notifications either instantly or
3389 based on a pre-defined schedule.
- 3390 2. If Key Feature (1) is provided, the Functional Element MAY also provide the capability to
3391 send scheduled messages in the following manner:
- 3392 2.1. Hourly,
3393 2.2. Daily,
3394 2.3. Weekly, and
3395 2.4. Monthly (based on a particular date or particular day of the week).

3396

3397 **2.10.4 Interdependencies**

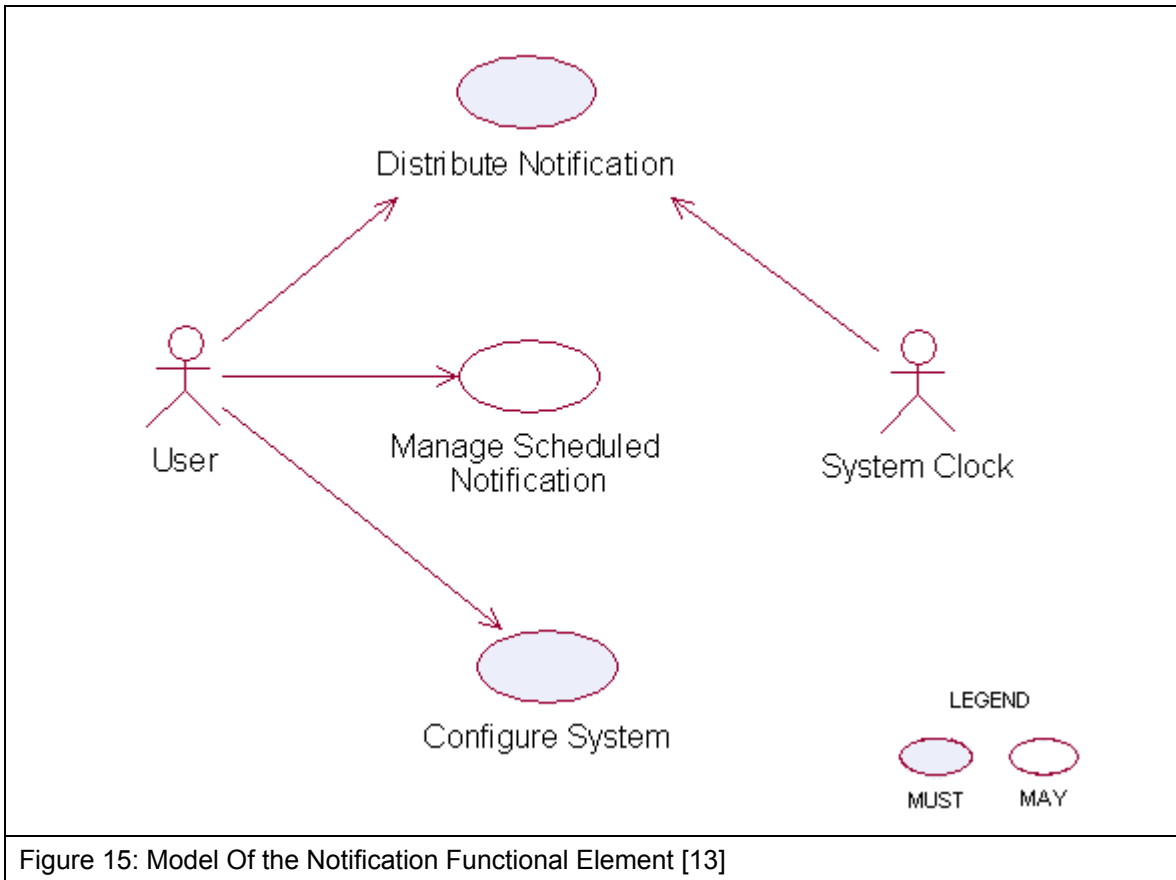
3398 None

3399 **2.10.5 Related Technologies and Standards**

Technologies	Description
Short Message Service (SMS)	Short Message Service is a feature available with some wireless phones that allow users to send and/or receive short alphanumeric messages. This Functional Element is heavily reliance on this for transmission of messages to a pager and hand phone.
Simple Mail Transfer Protocol (SMTP)	A protocol used to send e-mail on the Internet. SMTP is a set of rules regarding the interaction between a program sending e-mail and a program receiving e-mail. This Functional Element is heavily reliance on this for transmission of messages to the designated email account.

3400

3401 **2.10.6 Model**



3402 **2.10.7 Usage Scenarios**

3403 **2.10.7.1 Distribute Notification**

3404 **2.10.7.1.1 Description**

3405 This use case allows the Functional Element to distribute messages to intended recipients.

3406 **2.10.7.1.2 Flow of Events**

3407 **2.10.7.1.2.1 Basic Flow**

3408 This use case starts when the service user or system clock wishes to send message to recipient.

3409 1: The Functional Element decides to send messages to recipients. Based on the operation
3410 specified, one of the following sub-flows is executed.

3411 If the request is **'Initiated By The User'**, then sub-flow 1.1 is executed.

3412 If the request is **'Initiated By The System Clock'** then sub-flow 1.2 is executed.

3413 1.1: Initiated By The User

3414 1.1.1: The Functional Element receives the request from the service user.

3415 1.1.2: The Functional Element validates passed parameters such as message type,
3416 recipient address, and message key and message length.

3417 1.1.3: The Functional Element checks the availability of the connection.

3418 1.1.4: The Functional Element sends message to recipient(s) and the use case end

3419 1.2 : Initiated By The System Clock

3420 1.2.1: The Functional Element checks scheduled message(s) and end date for scheduled
3421 message.

3422 1.2.2: Once the Functional Element detects scheduled messages, one of the sub-flows is
3423 executed.

- 3424 • If the Functional Element detects the scheduled notification is once, the '**Activate**
3425 **Once Notification**' sub-flow 1.2.2.1 is executed.
- 3426 • If the Functional Element detects the scheduled notification is daily, the '**Activate**
3427 **Daily Notification**' sub-flow 1.2.2.2 is executed.
- 3428 • If the Functional Element detects the scheduled notification is weekly, the
3429 '**Activate Weekly Notification**' sub-flow 1.2.2.3 is executed.
- 3430 • If the Functional Element detects the scheduled notification is Monthly, the
3431 '**Activate Monthly Notification**' sub-flow 1.2.2.4 is executed.

3432 1.2.2.1: Activate Once Notification.

3433 1.2.2.1.1: The Functional Element compares the system time with the scheduled
3434 message's time and gets notification details if both times are match.

3435 1.2.2.2: Activate Daily Notification.

3436 1.2.2.2.1: The Functional Element compares the system time with the scheduled
3437 message's time and gets notification details if both times are match.

3438 1.2.2.3: Activate Weekly Notification.

3439 1.2.2.3.1: The Functional Element compares the system date and time with the
3440 scheduled message's date and time and gets notification details if both date &
3441 time are match.

3442 1.2.2.4: Activate Monthly Notification.

3443 1.2.2.4.1: The Functional Element compares the system date and time with the
3444 scheduled message's date and time and gets notification ID if both date & time
3445 are match.

3446 1.2.3: The Functional Element extracts the list of recipient(s) and message(s).

3447 1.2.4: The Functional Element checks the availability of connection.

3448 1.2.5: The Functional Element sends message to recipient(s) and the use case ends.

3449 **2.10.7.1.2.2 Alternative Flows**

3450 1: Unsupported Message Type/Recipient Address/Message.

3451 1.1: If in basic flow 1.1.2, Functional Element detects unsupported message type, recipient
3452 address or message, the Functional Element returns an error message and the use case
3453 ends.

3454 2: Connection Fail.

3455 2.1: If in basic flow 1.1.3 and 1.2.4, the Functional Element is unable to detect connection
3456 type, the Functional Element returns an error message and the use case ends

3457 3: Delete Scheduled Message.

3458 3.1: If in basic flow 1.2.1, if the Functional Element detects that the scheduled message has
3459 expired, the Functional Element will proceed to delete those messages.

3460 **2.10.7.1.3 Special Requirements**

3461 **2.10.7.1.3.1 Supportability**

3462 None

3463 **2.10.7.1.4 Pre-Conditions**

3464 None.

3465 **2.10.7.1.5 Post-Conditions**

3466 None.

3467 **2.10.7.2 Manage Scheduled Notification**

3468 **2.10.7.2.1 Description**

3469 This use case allows the service user to maintain the notification information. This includes
3470 adding, changing and deleting notification information from the Functional Element.

3471 **2.10.7.2.2 Flow of Events**

3472 **2.10.7.2.2.1 Basic Flow**

3473 This use case starts when the service user wishes to schedule notification message(s).

3474 1: The Functional Element requests the service user to specify the function he/she would like to
3475 perform (such as create, update and delete notification message).

3476 2: Once the Functional Element user provides the requested information, one of the sub-flows is
3477 executed.

3478 If the service user provides '**Create Notification**', then sub-flow 2.1 is executed.

3479 If the service user provides '**Delete Notification**', then sub-flow 2.2 is executed.

3480 2.1 Create Notification

3481 2.1.1: The Functional Element receives the request from the service user.

3482 2.1.2: The Functional Element validates passed parameters such as schedule type,
3483 message type, recipient address, message key and the message length.

3484 2.1.3: The Functional Element generates and assigns a unique Notification ID and adds
3485 the notification information to the Functional Element and ends use case.

3486 2.2: Delete Notification

3487 2.2.1: The Functional Element requests the service user to provide the Notification
3488 information.

3489 2.2.2: The Functional Element retrieves the existing Notification information.

3490 2.2.3: The Functional Element deletes the Notification record and use case ends.

3491 **2.10.7.2.2.2 Alternative Flows**

3492 1: Invalid Parameters.

3493 1.1: If in basic flow 2.1.2, if the Functional Element detects invalid parameters such as
3494 schedule type, date & time, recipient address, message key and message, the Functional
3495 Element returns an error message and the use case ends.

3496 **2.10.7.2.3 Special Requirements**

3497 None.

3498 **2.10.7.2.4 Pre-Conditions**

3499 None.

3500 **2.10.7.2.5 Post-Conditions**

3501 If the use case was successful, the schedule message information is added to Functional
3502 Element. Otherwise, the Functional Element's state is unchanged.

3503 **2.10.7.3 Configure System**

3504 **2.10.7.3.1 Description**

3505 This use case allows the service user to maintain the notification Functional Element behaviors.
3506 This includes configuration of supported Notification Channel, Default Notification Channel,
3507 Schedule Types, and SMS and SMTP Gateway.

3508 **2.10.7.3.2 Flow of Events**

3509 **2.10.7.3.2.1 Basic Flow**

3510 1: The Functional Element requests the service user to specify or configure the function he/she
3511 would like to perform (such as create, update and delete configuration parameters).

3512 2: Once the Functional Element user provides the requested information, one of the sub-flows is
3513 executed.

3514 If user wishes to configure '**Notification Channel**', then sub-flow 2.1 is executed.

3515 If user wishes to configure '**Default Notification Channel**', then sub-flow 2.2 is executed.

3516 If user wishes to configure '**Schedule Types**', then sub-flow 2.3 is executed.

3517 If user wishes to configure '**SMTP server and SMS Gateway**', then sub-flow 2.4 is executed.

- 3518 2.1 Notification Channel.
- 3519 2.1.1: The Functional Element receives the request from the service user.
- 3520 2.1.2: The Functional Element validates passed parameters such as Notification Channel
3521 information.
- 3522 2.1.3: The Functional Element generates and assigns a unique Notification Channel ID
3523 and adds the notification information to the Functional Element and the use case ends.
- 3524 2.2: Default Notification Channel.
- 3525 2.2.1: The Functional Element requests the service user to provide the Default
3526 Notification information.
- 3527 2.2.2: The Functional Element validates passed parameters such as Default Notification
3528 Channel information.
- 3529 2.2.3: The Functional Element updates existing Default Notification or create new Default
3530 Notification information and the use case ends.
- 3531 2.3 Schedule Types.
- 3532 2.3.1: The Functional Element receives the request from the service user.
- 3533 2.3.2: The Functional Element validates passed parameters such as Schedule Type.
- 3534 2.3.3: The Functional Element generates and assigns a unique Schedule Type ID and
3535 adds the Schedule Type information to the Functional Element and the use case ends.
- 3536 2.4: SMTP server and SMS Gateway.
- 3537 2.4.1: The Functional Element requests the service user to provide the SMTP server and
3538 SMS Gateway information.
- 3539 2.4.2: The Functional Element validates passed parameters such as SMTP server and
3540 SMS Gateway information.
- 3541 2.4.3: The Functional Element updates existing SMTP server and SMS Gateway or
3542 create new SMTP server and SMS Gateway information and the use case ends.
- 3543 **2.10.7.3.2.2 Alternative Flows**
- 3544 1: Invalid Parameters.
- 3545 1.1: If in sub-flow 2.1.2, 2.2.2, 2.3.2 and 2.4.2, if the Functional Element detects invalid
3546 parameters such as Notification Channel, Default Notification Channel, and SMTP server,
3547 Schedule Types and SMS Gateway information, the Functional Element returns an error
3548 message and the use case ends
- 3549 **2.10.7.3.3 Special Requirements**
- 3550 None.
- 3551 **2.10.7.3.4 Pre-Conditions**
- 3552 None.

3553 **2.10.7.3.5 Post-Conditions**

3554 None.

3555 **2.11 Phase and Lifecycle Management Functional Element**

3556 **2.11.1 Motivation**

3557 The Phase and Lifecycle Management Functional Element is expected to be an integral part of
3558 the User Access Management (UAM) functionalities that is expected to be needed by a Web
3559 Service-enabled implementation. This FE is expected to fulfill the needs arising out of managing
3560 the dynamic status of user information across the whole lifecycle. As such it will cover aspects
3561 that include:

3562 Basic lifecycle management facilities,

3563 Basic phase management facilities, and

3564 Management of user information in phases across the whole lifecycle.

3565

3566 This Functional Element fulfills the following requirements from the Functional Elements
3567 Requirements, Working Draft 01a:

3568 Primary Requirements

- 3569 • MANAGEMENT-070 to MANAGEMENT-078

3570 Secondary Requirements

- 3571 • None

3572

3573 **2.11.2 Terms Used**

Terms	Description
Group	A Group is a collection of individual users, and are typically grouped together as they have certain commonalities
Namespace	Namespace is use to segregate the instantiation of the application across different application domains. If a company has two separate standalone application, for example, an email application and an equipment booking application, then these two are considered as separate application domains
Phase/lifecycle	Phase/lifecycle refers to the phases a project goes through between when it is conceived and when it is completed. As an example, a construction related project could have the following phases: <ul style="list-style-type: none">• Project Initiation• Design• Construction• Maintenance.
User	A user is loosely defined to include both human and virtual users. Virtual users could include service users and application (or machine) users that are utilising other services in a SOA environment.

User Access Management (UAM)	<p>User Access Management or UAM refer to the concept of managing users in a holistic manner, considering all aspect which includes:</p> <p>Defining a set of basic user information that should be stored in any enterprise application.</p> <p>Providing a means to extend this basic set of user information when needed..</p> <p>Simplifying management by grouping related users together through certain criteria.</p> <p>Having the flexibility of adopting both coarse/fine grain access control.</p>
------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

3574

3575 **2.11.3 Key Features**

3576 Implementations of the Phase and Lifecycle Management Functional Element are expected to
 3577 provide the following key features:

- 3578 1. The Functional Element MUST provide basic structures based on a set of pre-defined
 3579 attributes for Lifecycle and Phase.
- 3580 2. The Functional Element MUST provide the capability to manage the creation and deletion of
 3581 instances of Lifecycle and Phase based on the pre-defined structures.
- 3582 3. The Functional Element MUST provide a means to manage the lifecycles and phases
 3583 contained within. This includes:
- 3584 3.1. The capability to retrieve and update a lifecycle or phase
- 3585 3.2. The capability to add/remove phases from a lifecycle
- 3586 4. The Functional Element MUST provide a mechanism to manage the collection of users in a
 3587 Phase. This includes:
- 3588 4.1. The capability to assign and un-assign users belonging to a Phase.
- 3589 4.2. The users could be individual Users or Groups.
- 3590 5. The Functional Element MUST provide a mechanism for managing Groups across different
 3591 application domains.

3592 *Example: Namespace control mechanism*

3593

3594 **2.11.4 Interdependencies**

Direct Dependency	
Group Management Functional Element	The Group Management Functional Element is used to achieve effective and efficient management of user's information in each of the different phases..

3595

3596 **2.11.5 Related Technologies and Standards**

3597 None.

3598 **2.11.6 Model**

3599

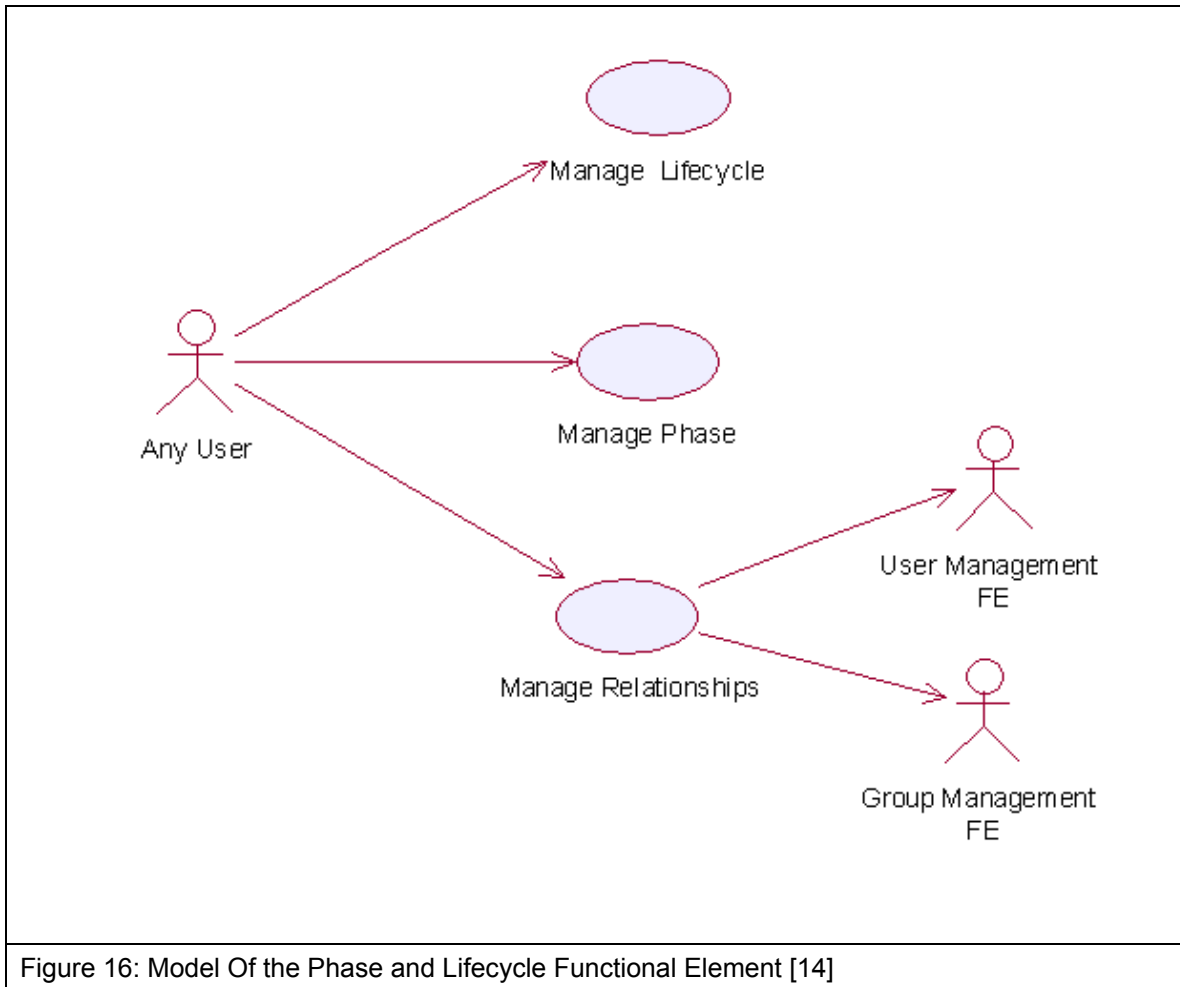


Figure 16: Model Of the Phase and Lifecycle Functional Element [14]

3600 **2.11.7 Usage Scenarios**

3601 **2.11.7.1 Manage Lifecycle**

3602 **2.11.7.1.1 Description**

3603 This use case is used to create, update, retrieve and delete the lifecycle.

3604 **2.11.7.1.2 Flow of Events**

3605 **2.11.7.1.2.1 Basic Flow**

3606 This use case starts when the user wants to manage phase in lifecycle.

3607 If user wants to '**Create Lifecycle**', then basic flow 1 is executed.

3608 If user wants to '**Retrieve Lifecycle**', then basic flow 2 is executed.

3609 If user wants to '**Update Lifecycle**', then basic flow 3 is executed.

3610 If user wants to '**Delete Lifecycle**', then basic flow 4 is executed.

3611 1: Create Lifecycle.

- 3612 1.1: User provides information to create lifecycle.
- 3613 1.2: Functional Element creates lifecycle and the use case ends.
- 3614 2: Retrieve Lifecycle
- 3615 2.1: User provides the lifecycle name, lifecycle namespace.
- 3616 2.2: Functional Element returns the lifecycle information and the use case ends.
- 3617 3: Update Lifecycle.
- 3618 3.1: User provides the lifecycle information.
- 3619 3.2: Functional Element updates the lifecycle-phase and the use case ends.
- 3620 4: Delete Lifecycle.
- 3621 4.1: User provides lifecycle name and lifecycle namespace.
- 3622 4.2: Functional Element deletes the lifecycle and the use case ends.
- 3623 **2.11.7.1.2.2 Alternative Flows**
- 3624 1: Lifecycle Does Not Exist.
- 3625 1.1: In basic flow 2.1, 3.1 and 4.1, if lifecycle can not be found based on lifecycle name and
3626 lifecycle namespace provided by user, Functional Element returns an error message and the
3627 use case ends.
- 3628 2: Creation Of Lifecycle Fails.
- 3629 2.1: In basic flow 1.2, if lifecycle cannot be created, the Functional Element returns an error
3630 message and the use case ends
- 3631 **2.11.7.1.3 Special Requirements**
- 3632 None.
- 3633 **2.11.7.1.4 Pre-Conditions**
- 3634 None.
- 3635 **2.11.7.1.5 Post-Conditions**
- 3636 None.
- 3637 **2.11.7.2 Manage Phase**
- 3638 **2.11.7.2.1 Description**
- 3639 This use case describes the management of different phases in a project.
- 3640 **2.11.7.2.2 Flow of Events**
- 3641 **2.11.7.2.2.1 Basic Flow**
- 3642 This use case starts when the user wants to manage phase.

3643 If user wants to '**Create Phase**', then basic flow 1 is executed.
3644 If user wants to '**Retrieve Phase**', then basic flow 2 is executed.
3645 If user wants to '**Update Phase**', then basic flow 3 is executed.
3646 If user wants to '**Delete Phase**', then basic flow 4 is executed.
3647 1: Create Phase.
3648 1.1: User provides information to create phase.
3649 1.2: Functional Element creates phase and the use case ends.
3650 2: Retrieve Phase.
3651 2.1: User provides phase name, lifecycle name and lifecycle namespace.
3652 2.2: Functional Element returns the phase information and the use case ends.
3653 3: Update Phase.
3654 3.1: User provides the phase information.
3655 3.2: Functional Element updates the phase and the use case ends.
3656 4: Delete Phase.
3657 4.1: User provides phase name, lifecycle name and lifecycle namespace
3658 4.2: Functional Element deletes phase and the use case ends.

3659 **2.11.7.2.2 Alternative Flows**

3660 1: Phase Does Not Exist.
3661 1.1: In basic flow 2.1, 3.1 and 4.1 if phase cannot be found based on phase name, lifecycle
3662 name and lifecycle namespace provided by user, Functional Element returns an error
3663 message and the use case ends.
3664 2: Creation of phase fails.
3665 2.1: In basic flow 1.2, if phase cannot be created, the Functional Element returns an error
3666 message and the use case ends

3667 **2.11.7.2.3 Special Requirements**

3668 None.

3669 **2.11.7.2.4 Pre-Conditions**

3670 None.

3671 **2.11.7.2.5 Post-Conditions**

3672 None.

3673 **2.11.7.3 Manage Relationship**

3674 **2.11.7.3.1 Description**

3675 This use case describes the management of the relationship between user/group and phase in a
3676 lifecycle.

3677 **2.11.7.3.2 Flow of Events**

3678 **2.11.7.3.2.1 Basic Flow**

3679 This use case starts when the user wants to manage the relationship between the user/group and
3680 phase.

3681 If user refers to '**Create Relationship**', basic flow 1 is executed.

3682 If user refers to '**Update Relationship**', basic flow 2 is executed.

3683 If user wants to '**Retrieve Relationship**', basic flow 3 is executed.

3684 If user refers to '**Delete Relationship**', basic flow 4 is executed.

3685 1: Create Relationship.

3686 1.1: User provides user/group, phase and phase information.

3687 1.2: Functional Element creates relationship and the use case ends.

3688 2: Update Relationship.

3689 2.1: User provides user/group name and user/group namespace.

3690 2.2: Functional Element updates the relationship and the use case ends.

3691 3: Retrieve Relationship.

3692 3.1: User provides user/group name and user/group namespace.

3693 3.2: Functional Element returns the relationship and the use case ends.

3694 4: Delete Relationship.

3695 4.1: User provides user/group name and user/group namespace.

3696 4.2: Functional Element deletes relationship between phases and users/groups and the use
3697 case ends.

3698 **2.11.7.3.2.2 Alternative Flows**

3699 1: Phase Does Not Exist.

3700 1.1: In basic flow 1,2, 2.2, 3.2 and 4.2, if the phase does not exist, the Functional Element
3701 returns an error message and the use case ends.

3702 2: User/Group Does Not Exist.

3703 1.1: In basic flow 1,2, 2.2, 3.2 and 4.2, if the user/group does not exist, the Functional
3704 Element returns an error message and the use case ends.

3705 **2.11.7.3.3 Special Requirements**

3706 None.

3707 **2.11.7.3.4 Pre-Conditions**

3708 None.

3709 **2.11.7.3.5 Post-Conditions**

3710 None.

3711 **2.12 Policy Management Functional Element (new)**

3712 **2.12.1 Motivation**

3713

3714 The Policy Management Functional Element helps enterprise to meet new challenges for IT
3715 security as the enterprise applications are now accessible from both the external partners and the
3716 customer applications. This Functional Element also helps to build consolidated view of the
3717 security configuration across all applications to ensure consistent application of a security policy
3718 across all Web Services. It also provides the mechanism for security policy management,
3719 establishment, selection and viewing for enterprises to dynamically configure the relevant policy
3720 required to protect their interests.

3721

3722 This Functional Element fulfills the following requirements from the Functional Elements
3723 Requirements:

3724 Primary Requirements

- 3725
 - SECURITY-110 to SECURITY-119.

3726 Secondary Requirements

- 3727
 - None

3728 **2.12.2 Terms Used**

Terms	Description
XACML	eXtensible Access Control Markup Language. It is an XML-based language for access control that has been standardized in OASIS

3729

```

<?xml version="1.0"?>
<policy ...>
  <xacml>
    <object href="/user_info/name" />
    <rule>
      <acl>
        <subject>
          <uid>normal_user</uid>
        </subject>
        <action name="read" permission="permit" />
      </acl>
    </rule>
  </xacml>
  <xacml>
    <object href="/user_info/salary" />
    <rule>
      <acl>
        <subject>
          <uid>supervisor</uid>
        </subject>
        <action name="read" permission="permit" />
        <action name="write" permission="permit" />
      </acl>
    </rule>
  </xacml>
</policy>

```

Permit "normal_user" read access to "name"

Permit "supervisor" read and write access to "salary"

Figure 17: An example of an security policy in XACML format

3730

3731 Figure 17 shows an example of a security policy used in Policy Management Functional Element.
 3732 The security policy is in XACML format.

3733 2.12.3 Key Features

3734 Implementations of the Policy Management Functional Element are expected to provide the
 3735 following key features:

- 3736 1. The Functional Element MUST provide the capability to define and manage Policy
 3737 Categories.
- 3738 2. The Functional Element MUST provide the capability to define and manage Policies.
- 3739 3. The Functional Element MUST provide version control capability to defined Policies.
- 3740 4. The Functional Element MUST provide the ability to manage Policies within a Policy
 3741 Category; including insertion, update, retrieval and removal of attached Policies.
- 3742 5. The Functional Element MUST provide the ability to retrieve Policies that are attached to a
 3743 Policy Category.

3744

3745 In addition, the following key feature could be provided to enhance the Functional Element
 3746 further:

- 3747 1. The Functional Element MAY provide the ability to translate Policy into multi-lingual.

3748

3749 **2.12.4 Interdependency**

Direct Dependency	
Policy Enforcement Functional Element	The Policy Enforcement Functional Element provides the mechanism to enforce the policy associated to a service. The enforcement is based on a pre-identified access structure. The access structure could be provided by the Role & Access Management Functional Element.
User Management Functional Element	The User Management Functional Element is used to manage the user's attributes. The Group Management Functional Element in turn provides useful aggregation of the users. Together, they are able to achieve effective and efficient management of user information.
Role & Access Management Functional Element	The Role and Access Management Functional Element may be used to manage the user's access rights by virtue of it's association with a group, phase or even the complete lifecycle of the project.

3750

3751 **2.12.5 Related Technologies and Standards**

3752 XACML.

3753

2.12.6 Model

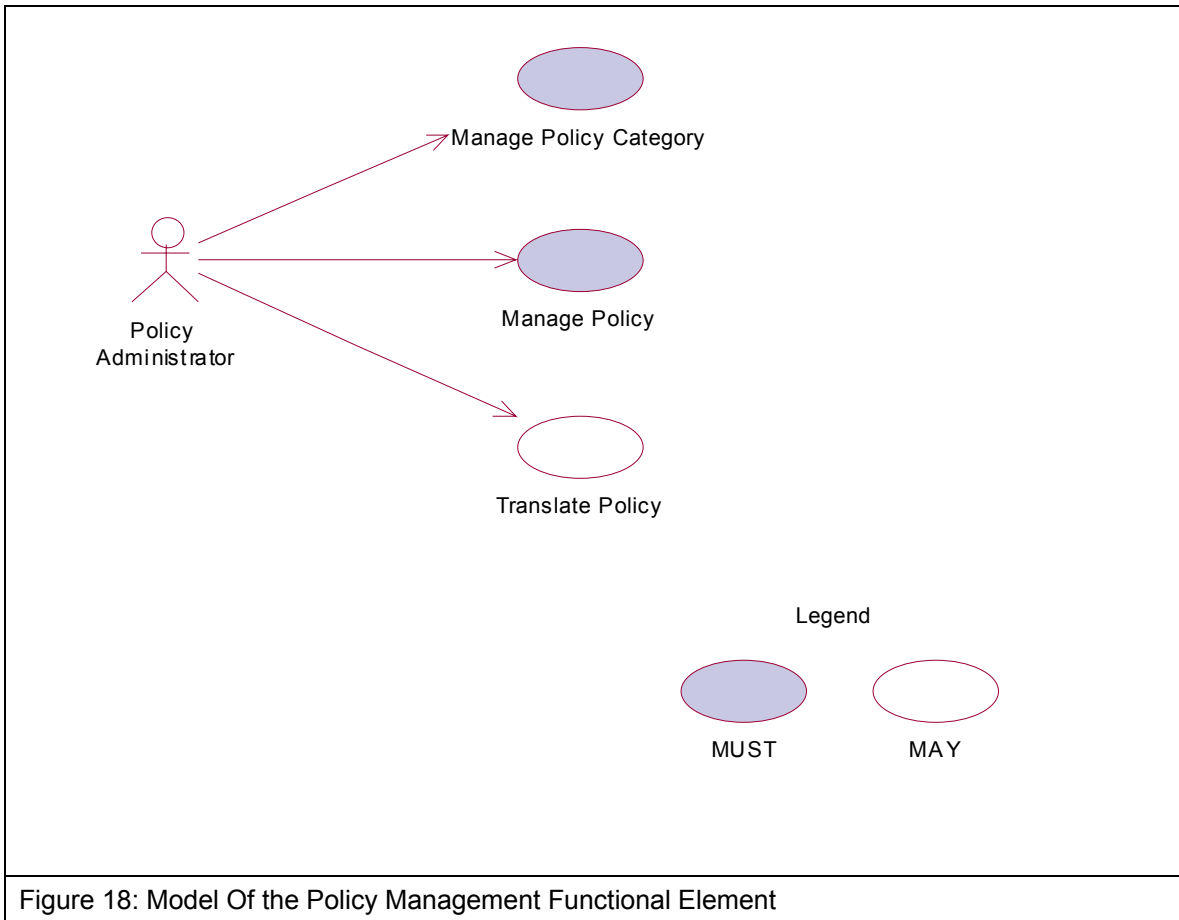


Figure 18: Model Of the Policy Management Functional Element

3754

3755 2.12.7 Usage Scenarios

3756 2.12.7.1 Manage Policy Category

3757 2.12.7.1.1 Description

3758 This use case allows the policy administrator to manage policy category.

3759 2.12.7.1.2 Flow of Events

3760 2.12.7.1.2.1 Basic Flow

3761 The use case begins when the policy administrator wants to create/retrieve/update/delete a policy
3762 category.

3763 1: The policy administrator sends a request to manipulate a policy category.

3764 2: Based on the operation it specifies, one of the following sub-flows is executed:

3765 If the operation is 'Create Policy Category', the sub-flow 2.1 is executed.

3766 If the operation is 'Retrieve Policy Category', the sub-flow 2.2 is executed.

3767 If the operation is '**Update Policy Category**', the sub-flow 2.3 is executed.

3768 If the operation is '**Delete Policy Category**', the sub-flow 2.4 is executed.

3769 2.1: Create Policy Category.

3770 2.1.1: The Functional Element gets the category name and definition.

3771 2.1.2: The Functional Element checks whether the category exists.

3772 2.1.3: The Functional Element creates the category.

3773 2.2: Retrieve Policy Category.

3774 2.2.1: The Functional Element gets the category name.

3775 2.2.2: The Functional Element checks whether the category exists.

3776 2.2.3: The Functional Element retrieves the category's information.

3777 2.3: Update Policy Category.

3778 2.3.1: The Functional Element gets the category name and definition.

3779 2.3.2: The Functional Element checks whether the category exists.

3780 2.3.3: The Functional Element updates the category's information.

3781 2.4: Delete Policy Category.

3782 2.4.1: The Functional Element gets the category name.

3783 2.4.2: The Functional Element checks whether the category exists.

3784 2.4.3: The Functional Element removes the category.

3785 3: The Functional Element returns the results of the operation to the policy administrator and the
3786 use case ends.

3787 **2.12.7.1.2.2 Alternative Flows**

3788 1: Category Already Exists.

3789 1.1: If in the basic flow 2.1.2, the category is already defined, Functional Element returns an
3790 error message and the use case ends.

3791 2: Category Not Found.

3792 2.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the category does not exist, Functional Element
3793 returns an error message and the use case ends.

3794 **2.12.7.1.3 Special Requirements**

3795 None.

3796 **2.12.7.1.4 Pre-Conditions**

3797 None.

3798 **2.12.7.1.5 Post-Conditions**

3799 None.

3800

3801 **2.12.7.2 Manage Policy**

3802 **2.12.7.2.1 Description**

3803 This use case allows the policy administrator to manage policy.

3804 **2.12.7.2.2 Flow of Events**

3805 **2.12.7.2.2.1 Basic Flow**

3806 The use case begins when the policy administrator wants to create/retrieve/update/delete a
3807 policy.

3808 1: The policy administrator sends a request to manipulate a policy.

3809 2: Based on the operation it specifies, one of the following sub-flows is executed:

3810 If the operation is '**Create Policy**', the sub-flow 2.1 is executed.

3811 If the operation is '**Retrieve Policy**', the sub-flow 2.2 is executed.

3812 If the operation is '**Update Policy**', the sub-flow 2.3 is executed.

3813 If the operation is '**Delete Policy**', the sub-flow 2.4 is executed.

3814 2.1: Create Policy.

3815 2.1.1: The Functional Element gets the policy name, content and the Policy Category
3816 where the policy is to be created.

3817 2.1.2: The Functional Element checks whether the policy exists.

3818 2.1.3: The Functional Element creates the policy.

3819 2.2: Retrieve Policy.

3820 2.2.1: The Functional Element gets the policy name and the Policy Category.

3821 2.2.2: The Functional Element checks whether the policy exists.

3822 2.2.3: The Functional Element retrieves the policy's information.

3823 2.3: Update Policy.

3824 2.3.1: The Functional Element gets the policy name, information and the Policy Category.

3825 2.3.2: The Functional Element checks whether the policy exists.

3826 2.3.3: The Functional Element updates the policy.

3827 2.4: Delete Policy.

3828 2.4.1: The Functional Element gets the policy name and the Policy Category.

3829 2.4.2: The Functional Element checks whether the policy exists.

- 3830 2.4.3: The Functional Element removes the policy from the Policy Category.
- 3831 3: The Functional Element returns the results of the operation to the policy administrator and the
3832 use case ends.
- 3833 **2.12.7.2.2 Alternative Flows**
- 3834 1: Policy Already Exists.
- 3835 1.1: If in the basic flow 2.1.2, the policy is already created, Functional Element returns an
3836 error message and the use case ends.
- 3837 2: Policy Not Found.
- 3838 2.1: If in the basic flow 2.2.2, 2.3.2 and 2.4.2, the policy does not exist, Functional Element
3839 returns an error message and the use case ends.
- 3840 **2.12.7.2.3 Special Requirements**
- 3841 None.
- 3842 **2.12.7.2.4 Pre-Conditions**
- 3843 None.
- 3844 **2.12.7.2.5 Post-Conditions**
- 3845 None.
3846
- 3847 **2.12.7.3 Translate Policy**
- 3848 **2.12.7.3.1 Description**
- 3849 This use case allows the policy administrator to translate policy into desired languages.
- 3850 **2.12.7.3.2 Flow of Events**
- 3851 **2.12.7.3.2.1 Basic Flow**
- 3852 The use case begins when the policy administrator wants to translate a policy.
- 3853 1: The policy administrator sends a request to translate a policy.
- 3854 2: The Functional Element gets the policy name and the language desired.
- 3855 3: The Functional Element checks whether the policy exists.
- 3856 4: The Functional Element retrieves the policy for translation.
- 3857 5: The Functional Element returns the results of the operation to the policy administrator and the
3858 use case ends.
- 3859 **2.12.7.3.2.2 Alternative Flows**
- 3860 1: Policy Not Found.

3861 1.1: If in the basic flow 3, the policy does not exist, Functional Element returns an error
3862 message and the use case ends.

3863 **2.12.7.3.3 Special Requirements**

3864 None.

3865 **2.12.7.3.4 Pre-Conditions**

3866 None.

3867 **2.12.7.3.5 Post-Conditions**

3868 None.

3869 **2.13 Policy Enforcement Functional Element (new)**

3870 **2.13.1 Motivation**

3871 The Policy Enforcement Functional Element helps enterprise to enforce policy for both the
3872 external partners and the customer applications that are authorized to access the enterprise
3873 applications. This Functional Element helps to ensure that the enterprise's interests and its
3874 confidential information are protected.

3875

3876 This Functional Element fulfills the following requirements from the Functional Elements
3877 Requirements:

3878 Primary Requirements

- 3879 • SECURITY-140 to SECURITY-144

3880 Secondary Requirements

- 3881 • None

3882 **2.13.2 Terms Used**

Terms	Description
XACML	eXtensible Access Control Markup Language. It is an XML-based language for access control that has been standardized in OASIS

3883

3884 **2.13.3 Key Features**

3885 Implementations of the Policy Enforcement Functional Element are expected to provide the
3886 following key features:

- 3887 1. The Functional Element MUST provide the ability to identify Policy Categories and/or
3888 Policies that are to be enforced.
- 3889 2. The Functional Element MUST provide the ability to access enforced Policies for
3890 accepting/rejecting the policy.
- 3891 3. The Functional Element MUST provide the ability to associate a policy to a service.
- 3892 4. The Functional Element MUST provide the capability to associate a policy to its service's
3893 access privileges through a pre-identified Access structure.
- 3894 5. The Functional Element MUST provide a mechanism to enforce policy upon acceptance of
3895 the policy.
- 3896 6. The Functional Element MUST provide the ability to enforce policies either based on
3897 individual or groups of services.
- 3898 7. The Functional Element MUST provide the capability to reject access.

3899 **2.13.4 Interdependency**

Direct Dependency	
Policy Management Functional Element	The Policy Management Functional Element provides the mechanism for security policy management, establishment, selection and viewing for enterprises to dynamically configure the relevant policy required to protect their interests.
Role & Access Management Functional Element	The Role & Access Management Functional Element may be used to manage the user's access rights by virtue of its association with a group, phase or even the complete lifecycle of the project.

3900

3901 **2.13.5 Related Technologies and Standards**

3902 XACML.

3903

3904 **2.13.6 Model**

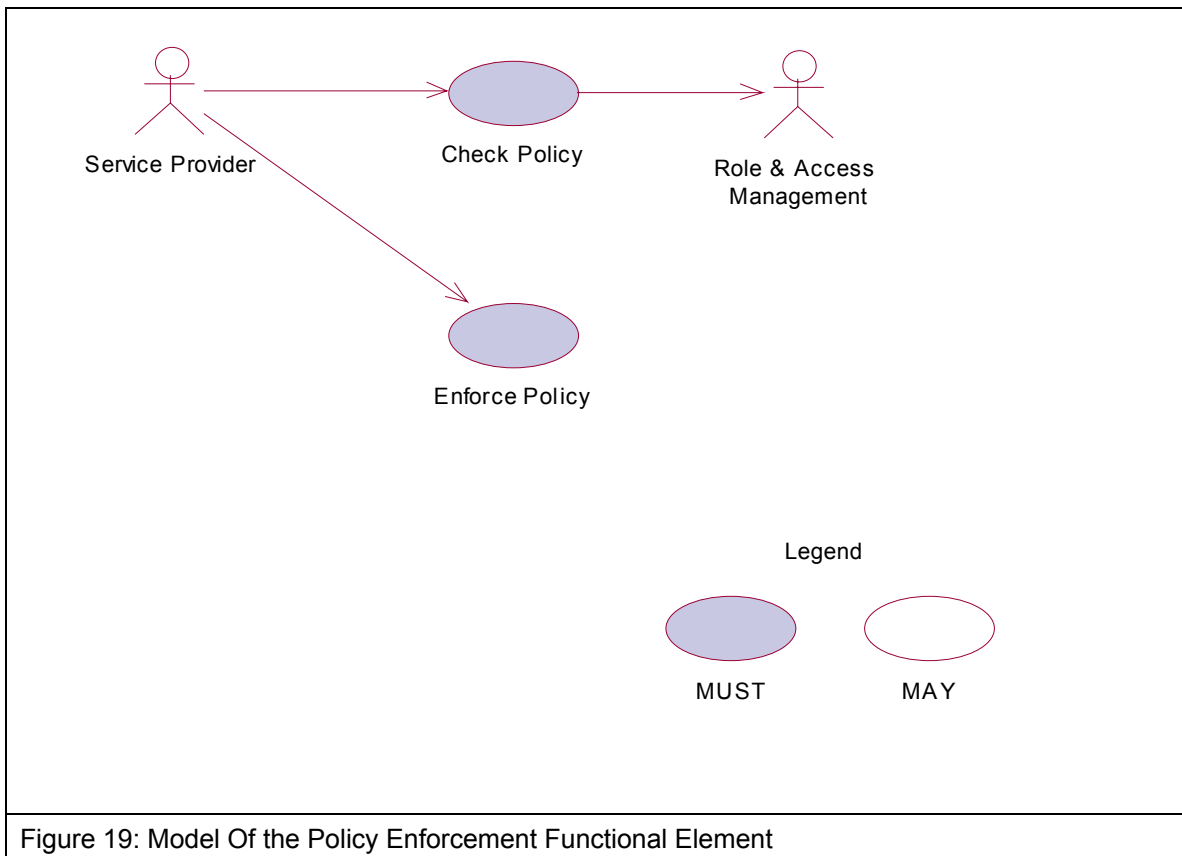


Figure 19: Model Of the Policy Enforcement Functional Element

3905

3906 **2.13.7 Usage Scenarios**

3907 **2.13.7.1 Check Policy**

3908 **2.13.7.1.1 Description**

3909 This use case allows the service provider to check policy.

3910 **2.13.7.1.2 Flow of Events**

3911 **2.13.7.1.2.1 Basic Flow**

3912 The use case begins when the service provider wants to check a policy.

3913 1: The service provider sends a request to check a policy.

3914 2: The Functional Element gets the policy and the requested service names.

3915 3: The Functional Element checks whether the policy and the requested service exist.

3916 4: The Functional Element evaluates the policy.

3917 5: The Functional Element resolves any policy conflict.

3918 6: The Functional Element returns the outcome to the service provider and the use case ends.

3919 **2.13.7.1.2.2 Alternative Flows**

3920 1: Policy Not Found.

3921 1.1: If in the basic flow 3, the policy does not exist, Functional Element returns an error
3922 message and the use case ends.

3923 2: Requested Service Not Found.

3924 2.1: If in the basic flow 3, the requested service does not exist, Functional Element returns an
3925 error message and the use case ends.

3926 3: Cannot Evaluate Policy.

3927 3.1: If in the basic flow 4, the policy cannot be evaluated, Functional Element returns an error
3928 message and the use case ends.

3929 4: Cannot Resolve Policy Conflict.

3930 4.1: If in the basic flow 5, the policy conflict cannot be resolved, Functional Element returns
3931 an error message and the use case ends.

3932 **2.13.7.1.3 Special Requirements**

3933 None.

3934 **2.13.7.1.4 Pre-Conditions**

3935 None.

3936 **2.13.7.1.5 Post-Conditions**

3937 None.
3938

3939 **2.13.7.2 Enforce Policy**

3940 **2.13.7.2.1 Description**

3941 This use case allows the service provider to enforce policy based on the pre-identified access
3942 structure.

3943 **2.13.7.2.2 Flow of Events**

3944 **2.13.7.2.2.1 Basic Flow**

3945 The use case begins when the service provider wants to enforce policy on a specific service.

3946 1: The service provider sends a request to enforce a policy.

3947 2: The Functional Element gets the policy name and the service activated.

3948 3: The Functional Element checks whether the policy and the service exist.

3949 4: The Functional Element gets the decision outcome.

3950 5: The Functional Element enforces the policy to the service and the use case ends.

3951 **2.13.7.2.2.2 Alternative Flows**

3952 1: Policy Not Found.

3953 1.1: If in the basic flow 3, the policy does not exist, Functional Element returns an error
3954 message and the use case ends.

3955 2: Service Not Found.

3956 2.1: If in the basic flow 3, the service does not exist, Functional Element returns an error
3957 message and the use case ends.

3958 3: Cannot Make Decision.

3959 3.1: If in the basic flow 4, decision cannot be made based on the information provided,
3960 Functional Element returns an error message and the use case ends.

3961 **2.13.7.2.3 Special Requirements**

3962 None.

3963 **2.13.7.2.4 Pre-Conditions**

3964 None.

3965 **2.13.7.2.5 Post-Conditions**

3966 None.
3967

3968 **2.14 Presentation Transformer Functional Element (Deprecated)**

3969

3970 This Functional Element has been deprecated in this version. Please refer to its replacement,
3971 2.26 Transformer Functional Element (new) for further details.

3972 **2.15 QoS Functional Element (new)**

3973 **2.15.1 Motivation**

3974 With the widespread of Web Services, Quality of Service (QoS) becomes a significant factor in
3975 distinguishing the success of service providers. On the other hand poor QoS translates into
3976 frustrated customers, which can lead to lost business opportunities. QoS determines the service
3977 usability and utility, both of which influence the popularity of the service.

3978

3979 This Functional Element fulfills the following requirements from the Functional Elements
3980 Requirements:

3981 Primary Requirements

- 3982 • MANAGEMENT-320,
- 3983 • MANAGEMENT-321,
- 3984 • MANAGEMENT-323,
- 3985 • MANAGEMENT-324,
- 3986 • [MANAGEMENT-325 and
- 3987 • MANAGEMENT-312.

3988 Secondary Requirements

- 3989 • MANAGEMENT-311 and
- 3990 • MANAGEMENT-310.

3991

3992 **2.15.2 Terms Used**

Terms	Description
Availability	Availability refers to the quality aspect of whether the Web Service is present or ready for immediate use.
Performance	Performance refers to the quality aspect of Web service. It is measured in terms of throughput and latency. Higher throughput and lower latency values represent good performance of a Web Service.
Reliability	Reliability refers to the quality aspect of a Web Service that represents the degree of being capable of maintaining the service and service quality.
Accessibility	Accessibility refers to the quality aspect of a service that represents the degree it is capable of serving a Web service request. It denotes the success rate or chance of a successful service instantiation at a point in time.
Security	Security is the quality aspect of the Web service of providing confidentiality and non-repudiation by authenticating the parties involved, encrypting messages, and providing access control

3993

3994 Figure 20 depicts the basic concepts of 2 steps approach of QoS Functional Element. Step 1
3995 begins when the user (service requester) requests to measure QOS of a known web service. The

3996 Function Element then returns a Reference ID once it receives that request. It also takes
 3997 necessary measurements and logs them. Step 2 begins when the user requests for the result of
 3998 measurement. The user provides the Functional Element a Reference ID. With this Reference
 3999 ID, the Functional Element calculates and returns the result to the user. The measurements used
 4000 in this Functional Element are designed with the requirements from WSQM Specs (working draft)
 4001 Version 2.0, dated September 2005 taken into considerations.
 4002

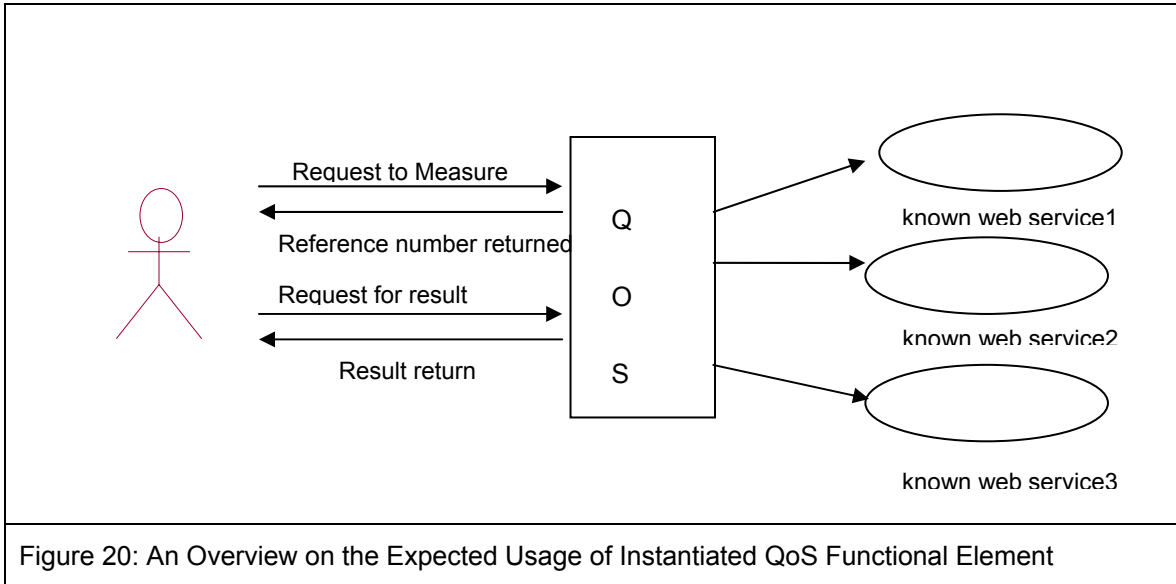


Figure 20: An Overview on the Expected Usage of Instantiated QoS Functional Element

4003

4004 2.15.3 Key Features

4005 Implementations of the QoS Functional Element are expected to provide the following key
 4006 features:

- 4007 1. The Functional Element MUST provide the capability to measure Availability.
- 4008 2. The Functional Element MUST provide the capability to measure Performance.
- 4009 3. The Functional Element MUST provide the capability to measure Reliability.
- 4010 4. The Functional Element MUST provide the capability to measure Accessibility.

4011

4012 In addition, the following key features could be provided to enhance the Functional Element
 4013 further:

- 4014 1. The Functional Element MAY provide confidentiality and non-repudiation by authenticating
 4015 the parties involved, encrypting messages and providing access control as in the Security
 4016 aspect.

4017

4018 2.15.4 Interdependencies

Direct Dependency

Log Utility Functional Element	The Log Utility Functional Element is used to record the data.
--------------------------------	----------------------------------------------------------------

4019

4020

4021
4022

Interaction Dependency	
Secure SOAP Management Functional Element	The Secure SOAP Management Functional Element is used to provide authentication to the user, encrypting messages and providing access control

4023

4024 **2.15.5 Related Technologies and Standards**

Specifications	Description
WSDL 1.1	The ability to parse the WSDL document and generate a client is heavily dependent on it being a conforming WSDL document.

4025

4026 **2.15.6 Model**

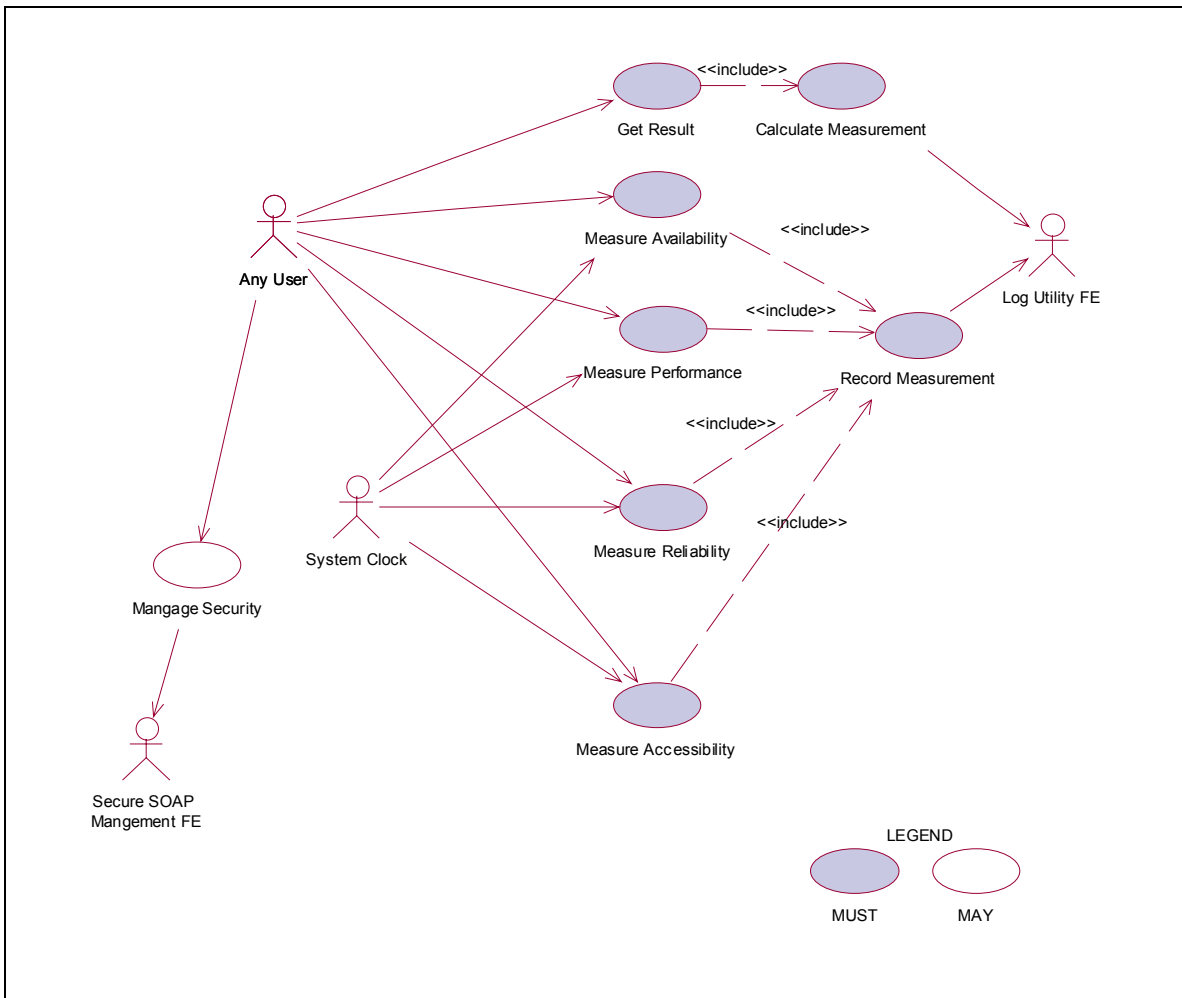


Figure 21: Model Of the QoS Functional Element

4027

4028 **2.15.7 Usage Scenarios**

4029 **2.15.7.1 Measure Availability**

4030 **2.15.7.1.1 Description**

4031 This use case allows the user to measure the availability of a known Web Service. User sets a
4032 period of measurement and the frequency of invocation. The result of this measure is in
4033 percentage. It is derived by using the successful invocations divided by total number of
4034 invocations for the given period of measurement.

4035
$$\text{Total uptime} - \text{downtime} / \text{Total uptime} \times 100 \%$$

4036
$$= ((\text{number of successful invocation} \times \text{frequency of invocation}) / \text{period of measurement}) \times 100\%$$

4037
$$= (\text{number of successful invocations} / \text{total invocations}) \times 100\%$$

4038

4039 **2.15.7.1.2 Flow of Events**

4040 **2.15.7.1.2.1 Basic Flow**

4041 This use case starts when the user wants to measure the availability of a Web Service.

4042 1. User sets a period of measurement.

4043 2. User determines the acceptable invocation interval.

4044 3. User submits the WSDL of a known web service.

4045 4. Functional Element parses the URL of the WSDL document and extracts the necessary
4046 information.

4047 5. Functional Element generates client base on the extracted information.

4048 6. Functional Element invokes the known web service using the generated client

4049 7. Functional Element generates a Reference ID.

4050 8. Functional Element returns Reference ID to the user.

4051 9. Functional Element logs the Reference ID to the Record Measurement Use Case.

4052 10. Functional Element logs the Measurement Type to the Record Measurement Use Case.

4053 11. Functional Element logs each invocation at every interval to the Record Measurement Use
4054 Case.

4055 12. Functional Element logs successful invocation at every interval to the Record Measurement
4056 Use Case.

4057 13. Functional Element continues to invoke the known web service at every interval until the
4058 period of measurement is reached and the use case ends.

4059 **2.15.7.1.2.2 Alternative Flows**

4060 1. If the structure of the WSDL does not comply with the standard, the Functional Element
4061 returns an error message and the use case ends.

- 4062 2. If the Functional Element fails to generate the client, the Functional Element returns an error
4063 message and the use case ends.
- 4064 3. If the Functional Element fails to find the known web service, the Functional Element returns
4065 an error message and the use case ends.
- 4066 4. If the Functional Element fails to invoke the known web service, the Functional Element
4067 returns an error message and the use case ends.
- 4068 5. If the Functional Element fails to return a reference ID, the Functional Element returns an
4069 error message and the use case ends.
- 4070 6. If the Functional Element gets a wrong a reference ID, the Functional Element returns an
4071 error message and the use case ends.

4072 **2.15.7.1.3 Special Requirements**

4073 None.

4074 **2.15.7.1.4 Pre-Conditions**

4075 None

4076 **2.15.7.1.5 Post-Conditions**

4077 None.

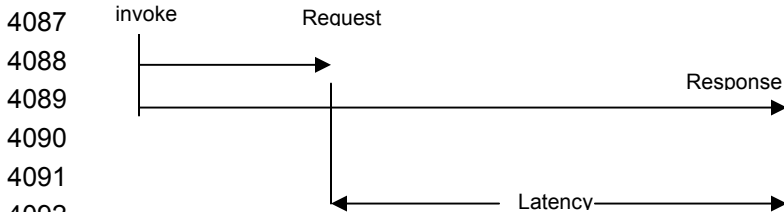
4078

4079 **2.15.7.2 Measure Performance**

4080 **2.15.7.2.1 Description**

4081 This use case allows the user to measure the performance of a Web Service. In Performance
4082 both Latency and Throughput are measured. For throughput, user sets a period of measurement.
4083 Throughput is derived as the total number of invocations for the given period of measurement.
4084 For Latency, user logs the request time and response time of invocation. Latency is derived by
4085 the response time minus the request time of the invocation, as indicated below:

4086



4094 **2.15.7.2.2 Flow of Events**

4095 **2.15.7.2.2.1 Basic Flow**

4096 This use case starts when a user wants to measure the Performance of a Web Service.

- 4097 1. Based on the operation it specified, one of the following sub-flows is expected
- 4098 • If the operation is 'Measure Throughput', then sub-flow 1.1 is executed.

- 4099 • If the operation is 'Measure Latency', then sub-flow 1.2 is executed.
- 4100 1.1. Measure Throughput
- 4101 This use case starts when a user wants to measure the Throughput of a Web
- 4102 Service.
- 4103 1.1.1. User sets a period of measurement.
- 4104 1.1.2. User submits the WSDL of a known web service.
- 4105 1.1.3. Functional Element parses the URL of the WSDL document and extracts the
- 4106 necessary information.
- 4107 1.1.4. Functional Element generates a Reference ID.
- 4108 1.1.5. Functional Element returns a Reference ID to user.
- 4109 1.1.6. Functional Element logs the Reference ID to the Record Measurement Use
- 4110 Case.
- 4111 1.1.7. Functional Element logs the measurement type to the Record Measurement
- 4112 Use Case.
- 4113 1.1.8. Functional Element waits and logs any invocation to this WSDL until the
- 4114 period of measurement is reached and the use case ends.
- 4115 1.2. Measure Latency
- 4116 1.2.1. User submits the WSDL of a known web service.
- 4117 1.2.2. Functional Element parses URL of the WSDL document and extracts the
- 4118 necessary information.
- 4119 1.2.3. Functional Element invokes the known web service.
- 4120 1.2.4. Functional Element generates a Reference ID.
- 4121 1.2.5. Functional Element returns a Reference ID to user.
- 4122 1.2.6. Functional Element logs the Reference ID to the Record Measurement Use
- 4123 Case.
- 4124 1.2.7. Functional Element logs the measurement type to the Record Measurement
- 4125 Use Case.
- 4126 1.2.8. Functional Element logs the request time to the Record Measurement Use
- 4127 Case.
- 4128 1.2.9 Functional Element logs the response time to the Record Measurement Use
- 4129 Case and the use case ends.

4130 **2.15.7.2.2.2 Alternative Flows**

- 4131 1. If the structure of the WSDL does not comply with the standard, the Functional Element
- 4132 returns an error message and the use case ends.
- 4133 2. If the Functional Element fails to generate the client, the Functional Element returns an error
- 4134 message and the use case ends.

- 4135 3. If the Functional Element fails to find the known web service, the Functional Element returns
4136 an error message and the use case ends.
- 4137 4. If the Functional Element fails to invoke the known web service, the Functional Element
4138 returns an error message and the use case ends.
- 4139 5. If the Functional Element fails to return a reference ID, the Functional Element returns an
4140 error message and the use case ends.
- 4141 6. If the Functional Element gets a wrong a reference ID, the Functional Element returns an
4142 error message and the use case ends.

4143 **2.15.7.2.3 Special Requirements**

4144 None.

4145 **2.15.7.2.4 Pre-Conditions**

4146 None.

4147 **2.15.7.2.5 Post-Conditions**

4148 None.

4149

4150 **2.15.7.3 Measure Reliability**

4151 **2.15.7.3.1 Description**

4152 This use case allows the user to measure the reliability of a known Web Service. User sets a
4153 period of measurement. The number of failures over a period of time is the measure of Reliability.
4154 It is derived as the unsuccessful invocations for the given period of measurement.

4155 **2.15.7.3.2 Flow of Events**

4156 **2.15.7.3.2.1 Basic Flow**

- 4157 1. User sets a period of measurement.
- 4158 2. User submits the WSDL of a known web service.
- 4159 3. Functional Element parses the URL of the WSDL document and extracts the necessary
4160 information.
- 4161 4. Functional Element generates a Reference ID.
- 4162 5. Functional Element returns a Reference ID to user.
- 4163 6. Functional Element logs the Reference ID to the Record Measurement Use Case.
- 4164 7. Functional Element logs measurement type to the Record Measurement Use Case.
- 4165 8. Functional Element waits for any invocation to the known WSDL.
- 4166 9. Functional Element logs unsuccessful invocations to this WSDL until the period of
4167 measurement is reached and the use case ends.

4168 **2.15.7.3.2 Alternative Flows**

- 4169 1. If the structure of the WSDL does not comply with the standard, the Functional Element
4170 returns an error message and the use case ends.
- 4171 2. If the Functional Element fails to generate the client, the Functional Element returns an error
4172 message and the use case ends.
- 4173 3. If the Functional Element fails to find the known web service, the Functional Element returns
4174 an error message and the use case ends.
- 4175 4. If the Functional Element fails to invoke the known web service, the Functional Element
4176 returns an error message and the use case ends.
- 4177 5. If the Functional Element fails to return a reference ID, the Functional Element returns an
4178 error message and the use case ends.
- 4179 6. If the Functional Element gets a wrong a reference ID, the Functional Element returns an
4180 error message and the use case ends.

4181 **2.15.7.3.3 Special Requirements**

4182 None.

4183 **2.15.7.3.4 Pre-Conditions**

4184 None.

4185 **2.15.7.3.5 Post-Conditions**

4186 None.

4187 **2.15.7.4 Measure Accessibility**

4188 **2.15.7.4.1 Description**

4189 This use case allows the user to measure the accessibility of a known Web Service. It is a
4190 measure denoting the success rate or chance of a successful service instantiation at a point of
4191 time. User sets the number of times of invocations. User invokes the known web service at the
4192 number of times set by the user at one go. The result of this measure is in percentage. It is
4193 derived by using the successful invocations divided by total invocations for the given period of
4194 measurement:

4195 $success\ rate = successful\ invocations / total\ invocations \times 100\%$ (invocations are fired simultaneously)

4196

4197 **2.15.7.4.2 Flow of Events**

4198 **2.15.7.4.2.1 Basic Flow**

- 4199 1. User sets number of invocations.
- 4200 2. User submits the WSDL of a known web service.
- 4201 3. Functional Element parses the URL of the WSDL document and extracts the necessary
4202 information.
- 4203 4. Functional Element generates client base on the extracted information.

- 4204 5. Functional Element invokes the known web service simultaneously at the number of times set
4205 by the user using the generated client.
- 4206 6. Functional Element generates a Reference ID.
- 4207 7. Functional Element returns a Reference ID to user.
- 4208 8. Functional Element logs the Reference ID to the Record Measurement Use Case.
- 4209 9. Functional Element logs measurement type to the Record Measurement Use Case.
- 4210 10. Functional Element logs each invocation to the Record Measurement Use Case.
- 4211 11. Functional Element logs successful invocation and the use case ends.

4212 **2.15.7.4.2.2 Alternative Flows**

- 4213 1. If the structure of the WSDL does not comply with the standard, the Functional Element
4214 returns an error message and the use case ends.
- 4215 2. If the Functional Element fails to generate the client, the Functional Element returns an error
4216 message and the use case ends.
- 4217 3. If the Functional Element fails to find the known web service, the Functional Element returns
4218 an error message and the use case ends.
- 4219 4. If the Functional Element fails to invoke the known web service, the Functional Element
4220 returns an error message and the use case ends.
- 4221 5. If the Functional Element fails to return a reference ID, the Functional Element returns an
4222 error message and the use case ends.
- 4223 6. If the Functional Element gets a wrong a reference ID, the Functional Element returns an
4224 error message and the use case ends.

4225 **2.15.7.4.3 Special Requirements**

4226 None.

4227 **2.15.7.4.4 Pre-Conditions**

4228 None.

4229 **2.15.7.4.5 Post-Conditions**

4230 None.

4231

4232

4233 **2.15.7.5 Record Measurement**

4234 **2.15.7.5.1 Description**

4235 This use case records the Measurement taken. It records type of Measurement, Reference ID,
4236 and the invocation data (invocation status (Successful or Unsuccessful), request time and
4237 response time)

4238 **2.15.7.5.2 Flow of Events**

4239 **2.15.7.5.2.1 Basic Flow**

4240 This use case starts when the user record the Measurement.

- 4241 1. The Functional Element logs Reference ID into a log file using Log Utility FE.
- 4242 2. The Functional Element logs Measurement type into a log file using Log Utility FE.
- 4243 3. The Functional Element logs the invocation data into a log file using Log Utility FE.

4244 **2.15.7.5.2.2 Alternate Flow**

- 4245 1. Log file not available, the Functional Element returns an error and the user case ends.
- 4246 2. If the Functional Element fails to get a reference ID, the Functional Element returns an error
4247 message and the use case ends.

4248 **2.15.7.5.3 Special Requirements**

4249 None.

4250 **2.15.7.5.4 Pre-Conditions**

4251 None.

4252 **2.15.7.5.5 Post-Conditions**

4253 None.

4254

4255 **2.15.7.6 Calculate Measurement**

4256 **2.15.7.6.1 Description**

4257 This use case calculates the Measurement.

4258 **2.15.7.6.2 Flow of Events**

4259 **2.15.7.6.2.1 Basic Flow**

4260 This use case starts when user wants to calculate Measurement.

- 4261 1. The Functional Element gets the Reference ID.
- 4262 2. The Functional Element opens up the log file.
- 4263 3. The Functional Element reads the data in the log file base on Reference ID given.
- 4264 4. The Functional Element calculates the measurement using the data read from the log file.
- 4265 5. The Functional Element sends the calculated result to the user.

4266 **2.15.7.6.2.2 Alternative Flows**

- 4267 1. Log file not available, the Functional Element returns an error and the user case ends.

4268 2. If the Functional Element fails to get a reference ID, the Functional Element returns an error
4269 message and the use case ends.

4270 **2.15.7.6.3 Special Requirements**

4271 None.

4272 **2.15.7.6.4 Pre-Conditions**

4273 None.

4274 **2.15.7.6.5 Post-Conditions**

4275 None.

4276

4277 **2.15.7.7 Get Result**

4278 **2.15.7.7.1 Description**

4279 This use case calculates the Measurement logged.

4280 **2.15.7.7.2 Flow of Events**

4281 **2.15.7.7.2.1 Basic Flow**

4282 This use case starts when user wanted to get result base on the Reference ID.

4283 1. The Functional Element gets the Reference ID from user

4284 2. The Functional Element passes the Reference ID to Calculate Measurement Use Case.

4285 3. The Functional Element gets calculated result.

4286 4. The Functional Element returns the result to the user.

4287 **2.15.7.7.2.2 Alternative Flows**

4288 1. Log file not available, the Functional Element returns an error and the user case ends.

4289 2. If the Functional Element fails to get a reference ID, the Functional Element returns an error
4290 message and the use case ends.

4291 **2.15.7.7.3 Special Requirements**

4292 None.

4293 **2.15.7.7.4 Pre-Conditions**

4294 None.

4295 **2.15.7.7.5 Post-Conditions**

4296 None.

4297

4298 **2.15.7.8 Manage Security**

4299 **2.15.7.8.1 Description**

4300 This use case allows user to check that the known web service is securely managed.

4301 **2.15.7.8.2 Flow of Events**

4302 **2.15.7.8.2.1 Basic Flow**

- 4303 1. The service provider sends a request to check security of the known web service.
- 4304 2. User submits the WSDL of a known web service.
- 4305 3. Functional Element parses the URL of the WSDL document and extracts the necessary
4306 information.
- 4307 4. Functional Element generates client base on the extracted information.
- 4308 5. Functional Element invokes the known web service with a username.
- 4309 6. User sends a message to the known web service.
- 4310 7. The Functional Element checks whether username is authenticated.
- 4311 8. The Functional Element checks whether message is encrypted.
- 4312 9. The Functional Element checks whether the whole process is access controlled.
- 4313 10. The Functional Element returns the outcome to the user and the use case ends.

4314 **2.15.7.8.2.2 Alternative Flows**

- 4315 1. If the structure of the WSDL does not comply with the standard, the Functional Element
4316 returns an error message and the use case ends.
- 4317 2. If the Functional Element fails to generate the client, the Functional Element returns an error
4318 message and the use case ends.
- 4319 3. If the Functional Element fails to find the known web service, the Functional Element returns
4320 an error message and the use case ends.
- 4321 4. If the Functional Element fails to invoke the known web service, the Functional Element
4322 returns an error message and the use case ends.
- 4323 5. If the web service fails to return result, the Functional Element returns an error message and
4324 the use case ends.

4325 **2.15.7.8.3 Special Requirements**

4326 None.

4327 **2.15.7.8.4 Pre-Conditions**

4328 None.

4329 **2.15.7.8.5 Post-Conditions**

4330 None.

4331 **2.16 Role and Access Management Functional Element**

4332 **2.16.1 Motivation**

4333 The Role and Access Management Functional Element is expected to be an integral part of the
4334 User Access Management (UAM) functionalities that is expected to be needed by a Web Service-
4335 enabled implementation. This Functional Element is expected to fulfill the needs arising out of
4336 managing access to resources within an application, based on role-based access control
4337 mechanism. As such it will cover aspects that include:

- 4338 Management of roles and access privileges, and
- 4339 Assignment of roles to entities that will be accessing the resources that is being managed.

4340

4341 This Functional Element fulfills the following requirements from the Functional Elements
4342 Requirements, Working Draft 01a:

4343 Primary Requirements

- 4344 • MANAGEMENT-030 to MANAGEMENT-034, and
- 4345 • MANAGEMENT-200 to MANAGEMENT-205.

4346 Secondary Requirements

- 4347 • SECURITY-040 to SECURITY-041.

4348

4349 **2.16.2 Terms Used**

Terms	Description
Access Control	Access Control refers to the process of ensuring that only an authorized user can access the resources within a computer system.
Lifecycle	A lifecycle refers to the sequence of phases in the lifetime of a resource.
Phase	A phase refers to the different stages that a resource may be in when viewed from a lifecycle perspective
Resource	A resource in an application is defined to encompass data/information in a system. Examples of this information include users information, transaction information and security information.
Role	A role is typically assigned to a user to define or indicate the job or responsibility of the said user in a particular context.
Role Based Access Control	Role Based Access Control is a model of access management mechanism. In this model, the access control is enabled in the following manner: Determine who (user) is requesting access. Determine the role(s) of the user Determine the type of access that is allowed based on the role(s) of the user It is the task of the access control mechanism to ensure that only processes, which are explicitly authorized, perform the operation by these objects.

User	A user is loosely defined to include both human and virtual users. Virtual users could include service users and application (or machine) users that are utilising other services in a SOA environment.
User Access Management (UAM)	<p>User Access Management or UAM refer to the concept of managing users in a holistic manner, considering all aspect which includes:</p> <p>Defining a set of basic user information that should be stored in any enterprise application.</p> <p>Providing a means to extend this basic set of user information when needed..</p> <p>Simplifying management by grouping related users together through certain criteria.</p> <p>Having the flexibility of adopting both coarse/fine grain access controls.</p>

4350

4351 2.16.3 Key Features

4352 Implementations of the Secure SOAP Functional Element are expected to provide the following
4353 key features:

- 4354 1. The Functional Element MUST provide the capability to manage the creation and deletion of
4355 instances of the following concepts based on a pre-defined structure:
 - 4356 1.1. Role,
 - 4357 1.2. Access, and
 - 4358 1.3. Resource
- 4359 2. The Functional Element MUST provide the capability to manage all the information (attribute
4360 values) stored in such concepts. This includes the capability to retrieve and update attribute's
4361 values belonging to a concept like Role, Access or Resource.
- 4362 3. The Functional Element MUST provide the capability to associate a Role to its access
4363 privileges through the Access structure.
- 4364 4. The Functional Element MUST provide the capability to determine a Role's accessibility to
4365 Resources based on the access privileges that have been assigned.
- 4366 5. The Functional Element MUST provide the ability to manage the association of users to
4367 Roles via assignments of Roles to users. This will include:
 - 4368 1.4. Assignment/Un-assignment of Roles to individual Users, and
 - 4369 1.5. Assignment/Un-assignment of Roles to Groups.

4370 This will provide an indirect linkage between the accessibility of specific Users to Resources
4371 through the concept of Role and Access.
- 4372 6. The Functional Element MUST provide a mechanism for managing the concepts of Role,
4373 Access and Resource across different application domains.

4374 *Example: Namespace control mechanism*

4375

4376 In addition, the following key features could be provided to enhance the Functional Element
4377 further:

- 4378 1. The Functional Element MAY provide a mechanism to enable different Access instances to
4379 be related to one another.
- 4380 2. The Functional Element MAY also provide a mechanism to enable hierarchical
4381 relationships between Access instances.

4382 *Example: Parent and Child Relationship*

- 4383 3. The Functional Element MAY provide the ability for Roles to be temporal sensitive.
 4384 *Example: A Role is assigned to a particular Phase in a Lifecycle.*
 4385

4386 **2.16.4 Interdependencies.**

Direct Dependencies	
Phase and Lifecycle Management Functional Element	The key abstraction, phases and lifecycle, in the Phase and Lifecycle Management Functional Element is used as a target for the assignment of roles and access privileges.
User Management Functional Element	The key abstraction, user, in the User Management Functional Element is used as a target for the assignment of roles and access privileges.
Group Management Functional Element	The key abstraction, group, in the Group Management Functional Element is used as a target for the assignment of roles and access privileges.

4387 **2.16.5 Related Technologies and Standards**

- 4388 None
 4389

4390 **2.16.6 Model**

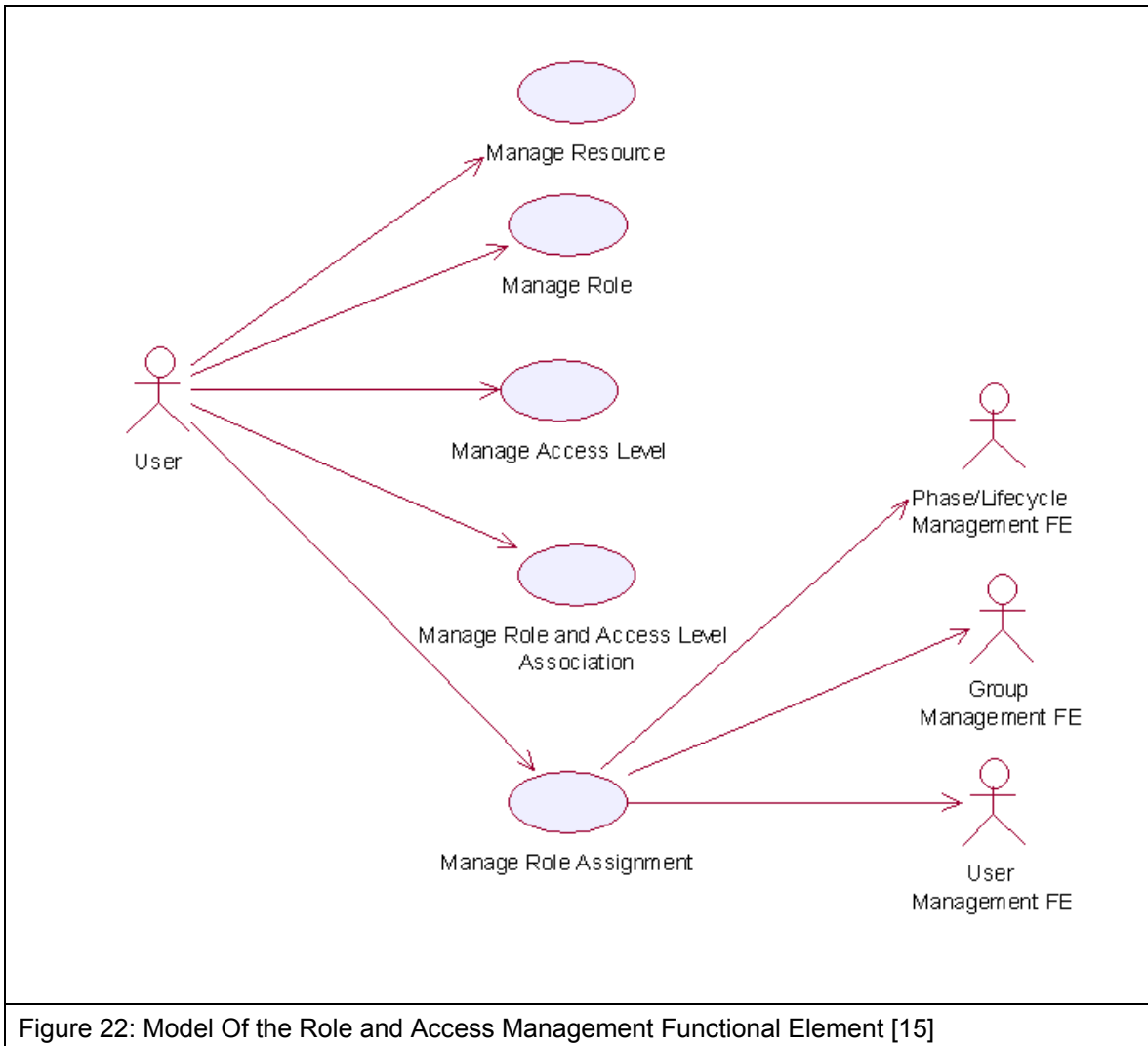


Figure 22: Model Of the Role and Access Management Functional Element [15]

4391

4392 **2.16.7 Usage Scenario**

4393 **2.16.7.1 Manage Role**

4394 **2.16.7.1.1 Description**

4395 This use case allows the service user to manipulate the role information such as adding,
4396 changing and deleting role information in the Functional Element.

4397 **2.16.7.1.2 Flow of Events**

4398 **2.16.7.1.2.1 Basic Flow**

4399 This use case starts when any user wants to create, change or delete a role.

4400 1: Service user specifies the function it would like to perform (either create a role, update a role or
4401 delete a role).

4402 2: Once the service user provides the requested information, one of the sub-flows is executed.

4403 If the service user provides '**Create a Role**', then sub-flow 2.1 is executed.

4404 If the service user provides '**Retrieve a Role**', then sub-flow 2.2 is executed.

4405 If the service user provides '**Update a Role**', then sub-flow 2.3 is executed.

4406 If the service user provides '**Delete a Role**', then sub-flow 2.4 is executed.

4407 2.1: Create a Role.

4408 2.1.1: The service user specifies role information such as the role name and description.

4409 2.1.2: The Functional Element connects to the data storage.

4410 2.1.3: The Functional Element checks whether the role exists in the Functional Element
4411 or not, saves the role information in the data storage and the use case ends.

4412 2.2: Retrieve a Role.

4413 2.2.1: The service user specifies the role name for retrieval.

4414 2.2.2: The Functional Element connects to the data storage.

4415 2.2.3: The Functional Element retrieves the role information in the data storage and the
4416 use case ends.

4417 2.3: Update a Role.

4418 2.3.1: The service user specifies the role name to update.

4419 2.3.2: The service user specifies the target field name and value of the role.

4420 2.3.3: The Functional Element connects to the data storage.

4421 2.3.4: The Functional Element updates the role information in the data storage and the
4422 use case ends.

4423 2.4: Delete a Role.

4424 2.4.1: The service user specifies the role name to delete.

4425 2.4.2: The Functional Element connects to the data storage.

4426 2.4.3: The Functional Element removes the record of the role in the data storage and the
4427 use case ends.

4428 **2.16.7.1.2.2 Alternative Flows**

4429 1: Data Storage Not Available.

4430 1.1: If in basic flow 2.1.2, 2.2.2, 2.3.3 and 2.4.2, the data storage of the role information is not
4431 available, an error message is returned and the use case ends.

4432 2: Role Already Exists.

4433 2.1: If in basic flow 2.1.3, the Functional Element checks that the role already exists in the
4434 data storage, an error message is returned and the use case ends.

4435 3: Role Does Not Exist.

4436 3.1: If in basic flow 2.2.3, 2.3.4 and 2.4.3, the Functional Element checks that the role does
4437 not exist in the data storage, an error message is returned and the use case ends.

4438 4: Role Cannot Be Deleted.

4439 4.1: If in basic flow 2.4.3, the other information associated with the role, such as any access
4440 level assigned, still exists, the role information may not be removed. An error message is
4441 returned and the use case ends.

4442 **2.16.7.1.3 Special Requirements**

4443 None

4444 **2.16.7.1.4 Pre-Conditions**

4445 None.

4446 **2.16.7.1.5 Post-Conditions**

4447 If the use case was successful, the role is saved/updated/removed in the Functional Element.
4448 Otherwise, the Functional Element state is unchanged.

4449 **2.16.7.2 Manage Resource**

4450 **2.16.7.2.1 Description**

4451 This use case allows the service user to manipulate the resource information such as adding,
4452 changing and deleting resource information in the Functional Element.

4453 **2.16.7.2.2 Flow of Events**

4454 **2.16.7.2.2.1 Basic Flow**

4455 This use case starts when any user wants to create, change or delete a resource.

4456 1: The user specifies the function it would like to perform.

4457 2: The user provides the requested information, one of the sub-flows is executed.

4458 If the user provides '**Create a Resource**', then sub-flow 2.1 is executed.

4459 If the user provides '**Retrieve a Resource**', then sub-flow 2.2 is executed.

4460 If the user provides '**Update a Resource**', then sub-flow 2.3 is executed.

4461 If the user provides '**Delete a Resource**', then sub-flow 2.4 is executed.

4462 2.1: Create a Resource.

4463 2.1.1: The user specifies resource information such as the resource name and
4464 description.

4465 2.1.2: The Functional Element connects to the data storage.

4466 2.1.3: The Functional Element checks whether the resource exists in the Functional
4467 Element, saves the resource information in the data storage and the use case ends.

4468 2.2: Retrieve a Resource.

4469 2.2.1: The service user specifies the resource name for retrieval.

4470 2.2.2: The Functional Element connects to the data storage.

4471 2.2.3: The Functional Element retrieves the resource information in the data storage and
4472 the use case ends.

4473 2.3: Update a Resource.

4474 2.3.1: The service user specifies the resource name to update.

4475 2.3.2: The Functional Element connects to the data storage.

4476 2.3.3: The Functional Element updates the resource information in the data storage and
4477 the use case ends.

4478 2.4: Delete a Resource.

4479 2.4.1: The service user specifies the resource name to delete.

4480 2.4.2: The Functional Element connects to the data storage.

4481 2.4.3: The Functional Element removes the record of the resource in the data storage
4482 and the use case ends.

4483 **2.16.7.2.2 Alternative Flows**

4484 1: Data Storage Not Available.

4485 1.1: If in basic flow 2.1.2, 2.2.2, 2.3.2 and 2.4.2, the data storage of the resource information
4486 is not available, an error message is returned and the use case ends.

4487 2: Resource Already Exists.

4488 2.1: If in basic flow 2.1.3, the Functional Element checks that the resource already exists in
4489 the data storage, an error message is returned and the use case ends.

4490 3: Resource Does Not Exist.

4491 3.1: If in basic flow 2.2.3, 2.3.3 and 2.4.3, the Functional Element checks that the resource
4492 does not exist in the data storage, an error message is returned and the use case ends.

4493 **2.16.7.2.3 Special Requirements**

4494 None

4495 **2.16.7.2.4 Pre-Conditions**

4496 None.

4497 **2.16.7.2.5 Post-Conditions**

4498 None

4499 **2.16.7.3 Manage Access Level**

4500 **2.16.7.3.1 Description**

4501 This use case allows service user to manage the creation/retrieval/modification/deletion of access
4502 level.

4503 **2.16.7.3.2 Flow of Events**

4504 **2.16.7.3.2.1 Basic Flow**

4505 This use case starts when service user wants to manage the access levels.

4506 1: The service user specifies the function it would like to perform (add, update or delete an
4507 access level).

4508 2: Once the service user provides the requested information, one of the sub-flows is executed.

4509 If the service user provides '**Add an Access Level**', then sub-flow 2.1 is executed.

4510 If the service user provides '**Retrieve an Access Level**', then sub-flow 2.2 is activated.

4511 If the service user provides '**Update an Access Level**', then sub-flow 2.3 is activated.

4512 If the service user provides '**Delete an Access Level**', then sub-flow 2.4 is executed.

4513 2.1: Add an Access Level.

4514 2.1.1: The service user specifies the access level information, which includes: name,
4515 description, name of parent access level and group of resources that the access level is
4516 associated with.

4517 2.1.2: The Functional Element connects to the data storage.

4518 2.1.3: The Functional Element check whether the access level and its parent access level
4519 exist in the Functional Element, saves the access level information in the data storage
4520 and the use case ends.

4521 2.2: Retrieve an Access Level.

4522 2.2.1: The service user specifies the access level name to retrieve.

4523 2.2.2: The Functional Element connects to the data storage.

4524 2.2.3: The Functional Element gets access level information from the data storage and
4525 returns to the service user and the use case ends.

4526 2.3: Update an Access Level.

4527 2.3.1: The service user specifies the access level name.

4528 2.3.2: The service user specifies the field(s) and new value(s) to update.

4529 2.3.3: The Functional Element connects to the data storage.

4530 2.3.4: The Functional Element updates the access level information in the data storage
4531 with the value specified in 2.3.2 and the use case ends.

4532 2.4: Delete an Access Level.

4533 2.4.1: The service user specifies the access level name to delete.
4534 2.4.2: The Functional Element connects to the data storage.
4535 2.4.3: The Functional Element removes the record of the access level in the data storage
4536 and the use case ends.

4537 **2.16.7.3.2.2 Alternative Flows**

4538 1: Data Storage Not Available.

4539 1.1: If in basic flow 2.1.2, 2.2.2, 2.3.3 and 2.4.2, the data storage of the access level
4540 information is not available, an error message is returned and the use case ends.

4541 2: Access Level Already Exists.

4542 2.1: If in basic flow 2.1.3, the Functional Element checks that the access level already exists
4543 in the data storage, an error message is returned and the use case ends.

4544 3: Access Level Cannot Be Deleted.

4545 3.1: If in basic flow 2.4.3, the other information associated with the Access Level, such as
4546 roles to which the access level is assigned and the parent access level still exists, the access
4547 level information may not be removed. An error message is returned and the use case ends.

4548 4: Parent Access Level Not Exist.

4549 4.1: If in basic flow 2.1.3, the parent access level does not exist, an error message is returned
4550 and the use case ends.

4551 **2.16.7.3.3 Special Requirements**

4552 None

4553 **2.16.7.3.4 Pre-Conditions**

4554 None.

4555 **2.16.7.3.5 Post-Conditions**

4556 None

4557 **2.16.7.4 Manage Role and Access Level Association**

4558 **2.16.7.4.1 Description**

4559 This use case allows service user to assign, update and remove the access level assigned to
4560 role.

4561 **2.16.7.4.2 Flow of Events**

4562 **2.16.7.4.2.1 Basic Flow**

4563 This use case starts when service user wants to manage the relationship between access level
4564 and role.

4565 1: The service user specifies a role and the function he/she would like to perform on the role
4566 (either assign an access level to role, update role access level, or delete role access level).

4567 2: Once the service user provides the requested information, one of the sub-flows is executed.
4568 If the user provides '**Assign an Access Level to Role**', then sub-flow 2.1 is executed.
4569 If the user provides '**Update Access Level for Role**', then sub-flow 2.2 is executed.
4570 If the user provides '**Delete Access Level for Role**', then sub-flow 2.3 is executed.
4571 If the user provides '**Retrieve Access Level for Role**', then sub-flow 2.4 is executed.
4572 If the service user provides '**Retrieve Role for Access Level**', then sub-flow 2.5 is executed.

4573 2.1: Assign an Access Level to Role.

4574 2.1.1: The service user specifies access level that will be assigned to the role.
4575 2.1.2: The Functional Element connects to the data storage.
4576 2.1.3: The Functional Element checks whether the access level has been assigned to the
4577 role. Functional Element saves the access level reference in the role record in the data
4578 storage and the use case ends.

4579 2.2: Update Access Level for Role.

4580 2.2.1: The service user specifies the access level to update and the new access level
4581 information.
4582 2.2.2: The Functional Element connects to the data storage.
4583 2.2.3: The Functional Element updates the access level reference in the role record in the
4584 data storage and the use case ends.

4585 2.3: Delete Access Level to Role.

4586 2.3.1: The service user specifies the access level to delete.
4587 2.3.2: The Functional Element connects to the data storage.
4588 2.3.3: The Functional Element removes the access level reference from the record of the
4589 role in the data storage and the use case ends.

4590 2.4: Retrieve Access Level for Role.

4591 2.4.1: The service user specifies the role to retrieve the access levels associated with it.
4592 2.4.2: The Functional Element connects to the data storage.
4593 2.4.3: The Functional Element retrieves the access level assigned to the role in the data
4594 storage and the use case ends.

4595 2.5: Retrieve Role for Access Level.

4596 2.5.1: The service user specifies the access level to retrieve roles associated to it.
4597 2.5.2: The Functional Element connects to the data storage.
4598 2.5.3: The Functional Element retrieves roles associated to the access level in the data
4599 storage and the use case ends.

4600 **2.16.7.4.2.2 Alternative Flows**

4601 1: Data Storage Not Available.

4602 1.1: If in basic flow 2.1.2, 2.2.2 and 2.3.2, the data storage of the access level information is
4603 not available, an error message is returned and the use case ends.

4604 2: Access Level Assignment Already Exists.

4605 2.1: If in basic flow 2.1.3, the Functional Element checks that the access level already exists
4606 in the role record in the data storage, an error message is returned and the use case ends.

4607 3: Access Level Assignment Not Exist.

4608 3.1: If in basic flow 2.3.3, the access level assignment does not exist, an error message is
4609 returned and the use case ends.

4610 4: Access Level Not Exist.

4611 4.1: If in basic flow 2.1.3, 2.2.3, 2.3.3, 2.4.3 and 2.5.3, the access level does not exist, an
4612 error message is returned and the use case ends.

4613 5: Role Not Exist.

4614 5.1: If in basic flow 2.1.3, 2.2.3, 2.3.3, 2.4.3 and 2.5.3, the role does not exist, an error
4615 message is returned and the use case ends.

4616 **2.16.7.4.3 Special Requirements**

4617 None.

4618 **2.16.7.4.4 Pre-Conditions**

4619 None.

4620 **2.16.7.4.5 Post-Conditions**

4621 None.

4622 **2.16.7.5 Manage Role Assignment**

4623 **2.16.7.5.1 Description**

4624 The use case allows service user to assign a role to a user, a group, a phase in a lifecycle, to
4625 change or to delete such assignment.

4626 **2.16.7.5.2 Flow of Events**

4627 **2.16.7.5.2.1 Basic Flow**

4628 This use case starts when the service user wants to manage the assignment of a role. This role
4629 can be assigned to a user, group, phase and lifecycle.

4630 1: Service user specifies a role and an operation to perform on the role.

4631 2: Once the service user provides the requested information, one of the sub-flows is executed.

4632 If the user provides '**Assign Role**', then sub-flow 2.1 is executed.

4633 If the user provides '**Retrieve Role**', then sub-flow 2.2 is executed.

4634 If the user provides '**Un-assign Role**', then user sub-flow 2.3 is executed.

- 4635 2.1: Assign Role.
- 4636 2.1.1: The service user specifies a user/group/phase/lifecycle to which the role will be
4637 assigned.
- 4638 2.1.2: Depending of target of the assignment, the Functional Element will check for the
4639 presence of one of the following Functional Elements.
- 4640 User Management Functional Element
- 4641 Group Management Functional Element
- 4642 Phase and Lifecycle Management Functional Element
- 4643 2.1.3: The Functional Element checks whether the role has been assigned to the
4644 intended target
- 4645 2.1.4: The Functional Element saves the relationship between the role and the target and
4646 the use case ends.
- 4647 2.2: Retrieve Role.
- 4648 2.2.1: The service user specifies a user/group/phase/lifecycle to retrieve all roles
4649 assigned
- 4650 2.2.2: Depending of target of the assignment, the Functional Element will check for the
4651 presence of one of the following Functional Elements.
- 4652 User Management Functional Element
- 4653 Group Management Functional Element
- 4654 Phase and Lifecycle Management Functional Element
- 4655 2.2.3: The Functional Element gets the roles that are assigned to the target.
- 4656 2.2.4: The Functional Element returns the results to the service user and the use case
4657 ends.
- 4658 2.3: Un-assign Role.
- 4659 2.3.1: The service user specifies a user/group/phase/lifecycle and the role that is to be
4660 un-assigned.
- 4661 2.3.2: Depending of target of this un-assignment, the Functional Element will check for
4662 the presence of one of the following Functional Elements.
- 4663 User Management Functional Element
- 4664 Group Management Functional Element
- 4665 Phase and Lifecycle Management Functional Element
- 4666 2.3.3: The Functional Element checks if the roles have been assigned to the target in the
4667 first place.
- 4668 2.3.4: The Functional Element removes the role assigned and the use case ends.
- 4669 **2.16.7.5.2.2 Alternative Flows**
- 4670 1: Dependent Functional Element not available.

- 4671 1.1: If in basic flow 2.1.2, 2.2.2 and 2.3.2, the dependent Functional Elements are not
4672 available, an error message is returned and the use case ends.
- 4673 2: Invalid User/Group/Phase/Lifecycle Account.
- 4674 2.1: If in basic flow 2.1.2, 2.2.2 and 2.3.2, the dependent Functional Elements are available
4675 but an invalid account is provided, an error message is returned and the use case ends.
- 4676 3: Data Storage Not Available.
- 4677 3.1: If in basic flow 2.1.2, 2.2.2 and 2.3.2, the Functional Element is unable to access the data
4678 storage, an error message is provided and the use case ends.

4679

4680 **2.16.7.5.3 Special Requirements**

4681 None.

4682 **2.16.7.5.4 Pre-Conditions**

4683 None.

4684 **2.16.7.5.5 Post-Conditions**

4685 None.

4686 2.17 Search Functional Element

4687 2.17.1 Motivation

4688 In a Web Service-enabled implementation, information is distributed across different sites and this
4689 makes searching and collating information difficult. Against this backdrop, this Functional
4690 Element is expected to fulfill the needs identified within an application by covering the following
4691 aspects.

4692 Providing the capability for configuration of different types of data sources for information search,

4693 Providing the facility to provide a concrete definition of data source classification for information
4694 search,

4695 Providing the ability to define different search scopes for various data source classification,

4696 Performing information search on those pre-configured different types of data sources and

4697 Providing the provision to consolidate the return result arising from the search operation.

4698

4699 This Functional Element fulfills the following requirements from the Functional Elements
4700 Requirements, Working Draft 01a:

4701 Primary Requirements

- 4702 • MANAGEMENT-009,
- 4703 • PROCESS-030 to PROCESS-031, and
- 4704 • PROCESS-034.

4705 Secondary Requirements

- 4706 • None

4707

4708 2.17.2 Terms Used

Terms	Description
Data source	Data source refers to any kind of information storage and retrieval databases like RDBMS, LDAP, ODBMS, XMLDB, XML Files, TEXT Files, etc.
Search Category	A Search Category refers to some logical grouping of the data sources on the basis of purpose of various data source purpose like NEWS, EMAIL, USERS, GROUPS, TRANSACTIONS, etc.
Data Source Type	Data Source Type refers to the various kinds of data storage format or structure like XML, HTML, TEXT, Databases, Tables, Rows, Columns in RDBMS, Collections, Nodes, Files & Tags in XMLDB, that are used to store and retrieve information from different data sources
RDBMS	Relational Database Management Systems
XMLDB	eXtensible Markup Language (XML) Database
LDAP	Lightweight Directory Access Protocol
XML	eXtensible Markup Language

HTML	HyperText Markup Language
------	---------------------------

4709 **2.17.3 Key Features**

4710 Implementations of the Search Functional Element are expected to provide the following key
4711 features:

- 4712 1. The Functional Element MUST provide a mechanism to define and manage Search
4713 Categories.
- 4714 2. The Functional Element MUST provide the capability to configure and store information
4715 about targeted data sources for a particular Search Category.
4716 *Example: Some of the stored information would include Location, Type, Name, Data Fields*
4717 *(of interest to the search) and access control (typically username and password) of the*
4718 *targeted data source.*
- 4719 3. As part of Key Feature (2), the Functional Element MUST also provide the ability to
4720 configure the scope of search and returned results.
- 4721 4. The Functional Element MUST also provide a mechanism to link the Search Categories to
4722 configured target data sources.
- 4723 5. The Functional Element MUST provide the ability to search multiple data sources for a
4724 defined Search Category.
4725 *Example: Some of the common data sources would include RDBMS, XML DB, LDAP*
4726 *servers and flat files like XML files, text files and HTML files*
- 4727 6. The Functional Element MUST provide the ability to perform searches based on a given set
4728 of keyword(s).

4729

4730 In addition, the following key features could be provided to enhance the Functional Element
4731 further:

- 4732 1. The Functional Element MAY also provide the ability to perform conditional and parametric
4733 searches.
- 4734 2. The Functional Element MAY also provide the ability to restrict the scope of a search.
4735 *Example: By providing a particular Search Category or types of data sources for the*
4736 *search.*

4737

4738 **2.17.4 Interdependencies**

4739 None

4740

4741 **2.17.5 Related Technologies and Standards**

4742 None

4743

2.17.6 Model

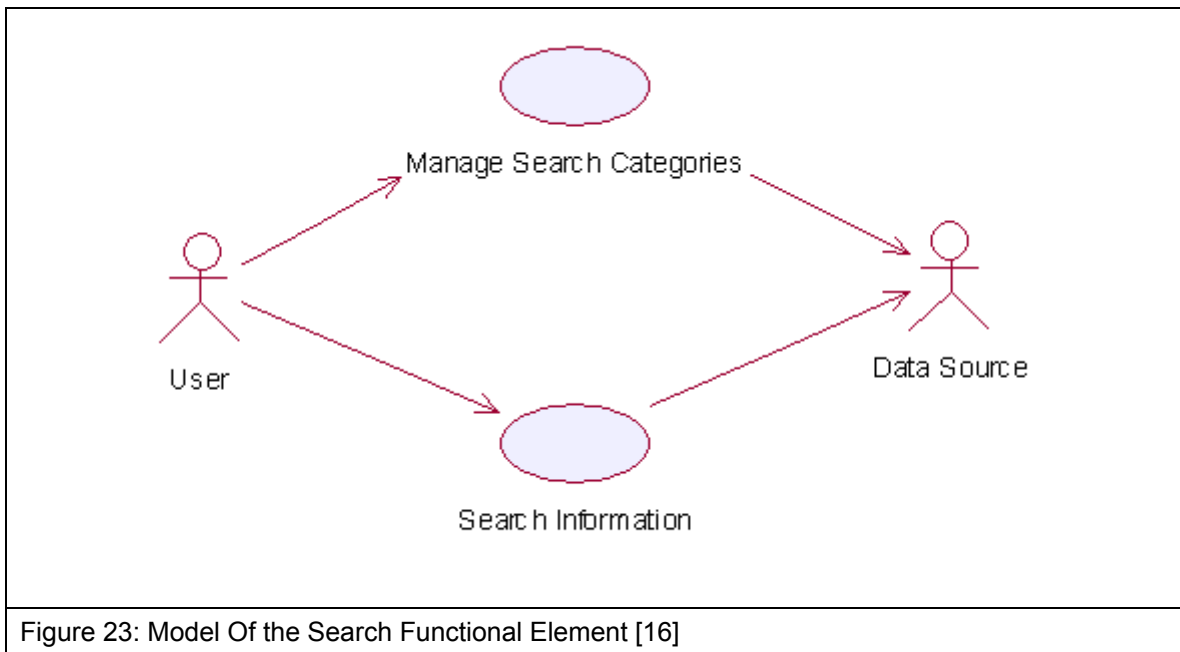


Figure 23: Model Of the Search Functional Element [16]

4744

2.17.7 Usage Scenario

4745

2.17.7.1 Manage Search Categories

4746

2.17.7.1.1 Description

4747

This use case allows the users to manage the different search categories.

4748

2.17.7.1.2 Flow of Events

4749

2.17.7.1.2.1 Basic Flow

4750

This use case starts when the user wishes to manage the different data sources for search to be performed on it.

4751

4752

1: The users initiates a request to configure data source(s) and type(s) by providing the data source information and type to be added, removed or retrieved.

4753

4754

2: The Functional Element checks whether the data source configuration file exists.

4755

3: The Functional Element checks the request. Based on the type of request, one of the sub-flows is executed.

4756

4757

If the request is to **'Create Data Source And Type'**, then sub-flow 3.1 is executed.

4758

If the request is to **'View Data Sources And Types'**, then sub-flow 3.2 is executed.

4759

If the request is to **'Delete Data Source And Type'**, then sub-flow 3.3 is executed.

4760

3.1: Create Data Source and Type.

4761

3.1.1: The Functional Element checks whether the same data source and type has been created.

4762

4763 3.1.2: The Functional Element appends the new data source and type in the data source
4764 configuration file specified.

4765 3.2: View Data Source and Type.

4766 3.2.1: The Functional Element retrieves all the data source and type information from the
4767 data source configuration file.

4768 3.2.2: The Functional Element returns the data source(s) and type(s).

4769 3.3: Delete Data Source and Type.

4770 3.3.1: The Functional Element checks whether the data source and type exist in the data
4771 source configuration based on data source id from the data source configuration file.

4772 3.3.2: The Functional Element removes the old data source and type from the data
4773 source configuration file.

4774 4: The Functional Element returns a success or failure flag indicating the status of the operation
4775 being performed and use case ends.

4776 **2.17.7.1.2.2 Alternative Flows**

4777 1: Data Source Configuration File Not Found.

4778 1.1: If in basic flow 2, the data source configuration file does not exist, the Functional Element
4779 creates an empty data source configuration file.

4780 2: Duplicate Data Source and Type.

4781 2.1: If in basic flow 3.1.1, the same data source and type have been configured, the
4782 Functional Element returns an error message and the use case end.

4783 3: Data Source and Type Do Not Exist.

4784 3.1: If in basic flow 3.2.1 and 3.3.1, a particular data source and type cannot be found in the
4785 specified data source configuration file, the Functional Element returns an error message and
4786 the use case end.

4787 **2.17.7.1.3 Special Requirements**

4788 None.

4789 **2.17.7.1.4 Pre-Conditions**

4790 None.

4791 **2.17.7.1.5 Post-Conditions**

4792 None.

4793 **2.17.7.2 Search Information**

4794 **2.17.7.2.1 Description**

4795 This use case allows any users to perform search on various disparate data sources and types
4796 configured to be searched and returns the matching results.

4797 **2.17.7.2.2 Flow of Events**

4798 **2.17.7.2.2.1 Basic Flow**

4799 This use case starts when users wishes to perform information search on a data source.

4800 1: Users initiates a request to perform information search on a given data source by providing
4801 information to be searched, location of the data source(s) and the data source type(s).

4802 2: The Functional Element checks for the existence of the specified data source(s).

4803 3: The Functional Element validates the data source type(s) against the set of supported data
4804 type(s) configured within the Functional Element that are available for information search.

4805 4: The Functional Element performs information search based on the search parameters given by
4806 the users or the other Functional Elements.

4807 5: The Functional Element returns the result of the information search performed to the users or
4808 other Functional Elements and use case ends.

4809 **2.17.7.2.2.2 Alternative Flows**

4810 1: Data Source(s) Are Not Available.

4811 1.1: In basic flow 2, if the identified data source is not available, the Functional Element
4812 returns an error message and the use case ends.

4813 2: Invalid Configuration Instructions

4814 2.1: In basic flow 2, if the input inform by the user is incomplete, the Functional Element
4815 returns an error message and the use case ends.

4816 3: Invalid Data Source Type.

4817 3.1: In basic flow 3, if the data source type is invalid, the Functional Element returns an error
4818 message and the use case ends.

4819 4: No Matching Result.

4820 4.1: In basic flow 4, if the search results in no matching results, the Functional Element
4821 returns an error message and the use case ends..

4822 **2.17.7.2.3 Special Requirements**

4823 None

4824 **2.17.7.2.4 Pre-Conditions**

4825 None.

4826 **2.17.7.2.5 Post-Conditions**

4827 None.

4828

4829 **2.18 Secure SOAP Management Functional Element**

4830 **2.18.1 Motivation**

4831 In a Web Services implementation, it is envisaged that confidential information is being exchanged
4832 all the time. Against this backdrop, it is imperative that an application in such an environment is
4833 equipped with the capability to guard sensitive information from prying eyes. Secure SOAP
4834 Management fulfills this need by covering the following areas.

4835 The facility of digitally signing SOAP message,

4836 The facility of encrypting SOAP message, and

4837 The capability to generate the original SOAP message after signing or encrypting the message.

4838

4839 This Functional Element fulfills the following requirements from the Functional Elements
4840 Requirements, Working Draft 01a:

4841 Primary Requirements

- 4842 • SECURITY-003 (SECURITY-003-3 only),
- 4843 • SECURITY-020 (all), and
- 4844 • SECURITY-022, and
- 4845 • SECURITY-026.

4846 Secondary Requirements

- 4847 • None

4848

4849 **2.18.2 Terms Used**

Terms	Description
Digital Signature	An electronic signature that can be used to authenticate the identity of the sender of a message, or of the signer of a document. It can also be used to ensure that the original content of the message or document that has been conveyed is unchanged
Encryption	A method of scrambling or encoding data to prevent unauthorized users from reading or tampering with the data. Only individuals with access to a password or key can decrypt and use the data.
PKCS#11	The cryptographic token interface standards. Defines a technology independent programming interface for cryptographic devices such as smart cards.
Public Key Cryptography Specification (PKCS) #12	The personal information exchange syntax standard. Defines a portable format for storage and transportation of user private keys, certificates etc.

4850

4851 **2.18.3 Key Features**

4852 Implementations of the Secure SOAP Functional Element are expected to provide the following
 4853 key features:

- 4854 1. The Functional Element MUST provide the capability to digitally sign SOAP messages
 4855 completely or partially using XML-Signature Syntax and Processing, W3C Recommendation
 4856 12 February 2002.
- 4857 2. The Functional Element MUST provide the capability to validate a signed SOAP message.
- 4858 3. The Functional Element MUST provide the capability to encrypt SOAP messages
 4859 completely or partially using XML-Encryption Syntax and Processing, W3C
 4860 Recommendation 10 December 2002.
- 4861 4. The Functional Element MUST provide the capability to decrypt encrypted SOAP messages.
- 4862 5. The Functional Element MUST support PKCS12 compatible digital certificates.
- 4863 6. The Functional Element MUST be able to verify the validity and authenticity of digital
 4864 certificates used.

4865

4866 In addition, the following key features could be provided to enhance the Functional Element
 4867 further:

- 4868 1. The Functional Element MAY also support PKCS11 compatible tokens.
- 4869 2. The Functional Element MAY also provide log support as part of the audit trails for its
 4870 transaction records.

4871

4872 **2.18.4 Interdependencies**

Direct Dependency	
Log Utility Functional Element	The Log Utility Functional Element is being used for logging and creation of audit trails.

4873 **2.18.5 Related Technologies and Standards**

Standards / Specifications	Specific References
Public Key Infrastructure (PKI)	PKI is a system of digital certificates, Certificate Authorities, and other registration authorities that verify and authenticate the validity of each party involved in an Internet transaction In this Functional Element, the private key and public key are generated for the Functional Element to sign and encrypt SOAP messages. The Functional Element uses the session key to encrypt the SOAP message. The digital certificate is attached to the SOAP message after the Functional Element has signed the SOAP message.
XML-Signature Syntax and Processing, W3C Recommendation 12 th Feb 2002 [17]	This specification addresses authentication, non-repudiation and data-integrity issues. In addition, it also specifies the XML syntax and processing rules for creating and representing digital signatures. In this Functional Element, both the digital signature on the SOAP message and validation of the signed SOAP message is done based on this specification.

XML-Encryption Syntax and Processing, W3C Recommendation 10 th Dec 2002 [18]	This specification addresses data privacy by defining a process for encrypting data and representing the result in XML document. In this Functional Element, the encryption and decryption of SOAP messages are done based on this specification.
-----------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

4874

4875

4876 **2.18.6 Model**

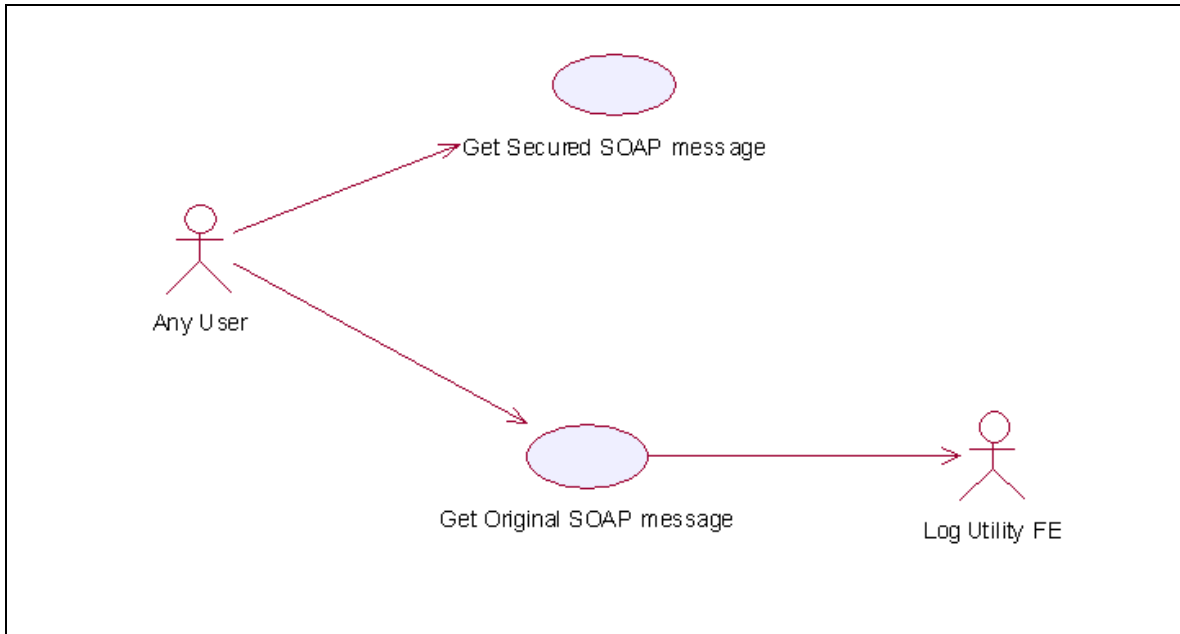


Figure 24: Model Of the Secure SOAP Management Functional Element [19]

4877 **2.18.7 Usage Scenarios**

4878 **2.18.7.1 Get Secured SOAP message**

4879 **2.18.7.1.1 Description**

4880 This Functional Element describes the process to generate secured SOAP message.

4881 **2.18.7.1.2 Flow of Events**

4882 **2.18.7.1.2.1 Basic Flow**

4883 This use case starts when the user wants to secure the SOAP message.

4884 If user wants to 'Sign SOAP message', then basic flow 1 is executed.

4885 If user wants to 'Encrypt and Sign the SOAP message', then basic flow 2 is executed.

4886 1: Sign SOAP Message.

4887 1.1: User sends the SOAP message, digital certificate and specifies the element name that
4888 needs to be signed.

4889 1.2: Functional Element gets the key information from the digital certificate.

4890 *Note: The private key will be used to sign the SOAP message and the public key will be*
4891 *added to the SOAP message after the signing.*

4892 1.3: Functional Element signs the element.

4893 *Note: The digital signature format is expected to be based on XML-Digital Signature Syntax*
4894 *mentioned in section 3.10.5.*

4895 1.4: Functional Element parses the secure SOAP message and regenerates the SOAP
4896 message.

4897 1.5: Functional Element returns the secured SOAP message to user and the use case ends.

4898 2: Encrypt And Sign SOAP Message.

4899 2.1: User sends the SOAP message, digital certificate and specify the element name that
4900 needs to be encrypted.

4901 2.2: User sends the receiver's public key information to Functional Element.

4902 *Note: Receiver's public key will be used to encrypt the session key, which was then used to*
4903 *encrypt the content of the element in the SOAP message.*

4904 2.3: Functional Element gets key information from the user's digital certificate.

4905 *Note: Private key is used to sign the SOAP message and public key is used to add into the*
4906 *SOAP message after the signing.*

4907 2.4: Functional Element generates the session key.

4908 *Note: Session key is used to encrypt the content of the element.*

4909 2.5: Functional Element encrypts the content of element with the session key.

4910 2.6: Functional Element encrypts session key with the receiver's public key.

4911 2.7: Functional Element signs the SOAP message after encryption.

4912 2.8: Functional Element regenerates the SOAP message.

4913 *Note: Functional Element adds the encrypted content of the element, encrypted session key*
4914 *information, the receiver's public key information and the signature to the SOAP message.*

4915 2.9: Functional Element returns the SOAP message and the use case ends.

4916 **2.18.7.1.2.2 Alternative Flows**

4917 1: Cannot Get Key.

4918 1.1: In basic flow 1.2 and 2.3, Functional Element cannot get the key information from the
4919 digital certificate. The Functional Element returns an error message and the use case ends.

4920 2: Cannot Sign

4921 2.1: In basic flow 1.3, Functional Element cannot sign the SOAP message. The Functional
4922 Element returns an error message and the use case ends.

4923 3: Cannot Encrypt

4924 3.1: In basic flow 2.5, Functional Element cannot encrypt the SOAP message. The Functional
4925 Element returns an error message and the use case ends.

4926 **2.18.7.1.3 Special Requirements**

4927 None.

4928 **2.18.7.1.4 Pre-Conditions**

4929 None.

4930 **2.18.7.1.5 Post-Conditions**

4931 None.

4932 **2.18.7.2 Get Original SOAP Message**

4933 **2.18.7.2.1 Description**

4934 This use case allows users to get original SOAP message.

4935 **2.18.7.2.2 Flow of Events**

4936 **2.18.7.2.2.1 Basic Flow**

4937 This use case starts when the user wants to get the original SOAP message.

4938 If the user wants to '**Verify the SOAP message**', then basic flow 1 is executed.

4939 If the user wants to '**Decrypt and Verify the SOAP message**', then basic flow 2 is executed.

4940 1: Verify SOAP Message.

4941 1.1: User sends the SOAP message and sender's digital certificate.

4942 1.2: Functional Element verifies the SOAP message.

4943 *Note: The sender's certificate information will be used to verify the signature.*

4944 1.3: Functional Element gets the original SOAP message, returns to user and the use case
4945 ends.

4946 2: Decrypt And Verify The SOAP Message.

4947 2.1: User sends the SOAP message, user's digital certificate and sender's certificate.

4948 2.2: Functional Element verifies the SOAP message.

4949 *Note: The sender's certificate information will be used to verify the signature.*

4950 2.3: Functional Element gets the user's key information from the user's digital certificate.

4951 *Note: The user's private key will be used to decrypt the session key.*

- 4952 2.4: Functional Element decrypts the session key.
- 4953 2.5: Functional Element decrypts the content of the element with the session key.
- 4954 2.6: Functional Element regenerates the SOAP message.
- 4955 *Note: Functional Element removes the session key information and the digital signature*
4956 *information from the SOAP message and gets the original one.*
- 4957 2.7: Functional Element returns the original SOAP message to user and the use case ends.

4958 **2.18.7.2.2 Alternative Flows**

- 4959 1: Verification Fails.
- 4960 1.1: In basic flow 1.3 and 2.3, if verification fails, the Functional Element returns an error
4961 message and the use case ends.
- 4962 2: Decryption of Content Fails.
- 4963 2.1: In basic flow 2.5, the Functional Element cannot decrypt the content of the element. The
4964 Functional Element returns an error message and the use case ends.

4965 **2.18.7.2.3 Special Requirements**

4966 None

4967 **2.18.7.2.4 Pre-Conditions**

4968 None.

4969 **2.18.7.2.5 Post-Conditions**

4970 None.

4971 **2.19 Sensory Functional Element**

4972 **2.19.1 Motivation**

4973 In a Web Service implementation where the presentation capabilities of clients differ, there is a
4974 need to determine the exact ability of the end devices so that the appropriate contents may be
4975 forwarded. The Sensory Functional Element can help to play this role by covering the following
4976 aspects within an application:

4977 Determining the presentation capabilities by inspecting incoming headers, and

4978 Determining the presentation capabilities by extracting MIME information from the relevant
4979 headers.

4980

4981 This Functional Element fulfills the following requirements from the Functional Elements
4982 Requirements, Working Draft 01a:

4983 Primary Requirements

- 4984 • DELIVERY-001,
- 4985 • DELIVERY-005 to DELIVERY-006, and
- 4986 • DELIVERY-009.

4987 Secondary Requirements

- 4988 • MANAGEMENT-011, and
- 4989 • MANAGEMENT-096.

4990

4991 **2.19.2 Terms Used**

Terms	Description
HTTP	Hyper Text Transport Protocol [HTTP] refers to the protocol for moving hypertext files across the Internet. Requires a HTTP client program on one end, and an HTTP server program on the other end. HTTP is the most important protocol used in the World Wide Web (WWW).
MIME	Multipurpose Internet Mail Extensions (MIME) refers to a standard that allows the embedding of arbitrary documents and other binary data of known types (images, sound, video, and so on) into e-mail handled by ordinary Internet electronic mail interchange protocols
Location Based Services (LBS)	Location-based services (LBS) refer to the services that provides users of mobile devices personalized services tailored to their current location.

4992

4993 **2.19.3 Key Features**

4994 Implementations of the Sensory Functional Element are expected to provide the following key
4995 features:

- 4996 1. The Functional Element MUST intercept HTTP requests from client and determines existing
4997 supportability of the request's MIME type.

4998 2. The Functional Element MUST provide the mechanism to manage MIME types, including
 4999 the ability to add, delete and retrieve supported MIME types.

5000

5001 In addition, the following key features could be provided to enhance the Functional Element
 5002 further:

5003 1. The Functional Element MAY provide a mechanism to enable Location Based Services
 5004 (LBS).

5005 **2.19.4 Interdependencies**

Interaction Dependency	
Presentation Transformer Functional Element	The Presentation Transformer Functional Element may be used to generate the appropriate output for the targeted devices.

5006 **2.19.5 Related Technologies and Standards**

5007 None.

5008

5009 **2.19.6 Model**

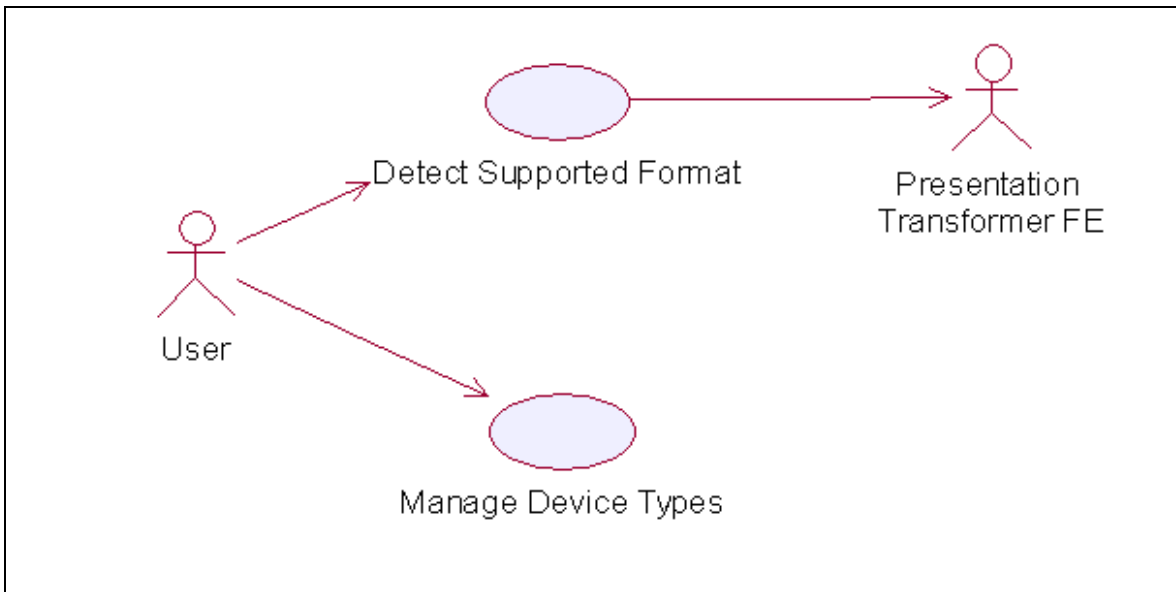


Figure 25: Model Of the Sensory Functional Element [20]

5010 **2.19.7 Usage Scenarios**

5011 **2.19.7.1 Detect Supported Format**

5012 **2.19.7.1.1 Description**

5013 This use case allows the service user (user/other service) to make request and based on that
 5014 request it detects service user's device capabilities.

5015 **2.19.7.1.2 Flow of Events**

5016 **2.19.7.1.2.1 Basic Flow**

5017 This use case starts when the service user wishes to use any service provided by the service
5018 provider.

5019 1: The Functional Element receives the request from the service user.

5020 2: The Functional Element extracts MIME name and MIME type from the service user's HTTP
5021 request (even from SOAP request).

5022 3: The Functional Element uses MIME name and MIME TYPE to check with the pre-registered
5023 MIME type.

5024 4: The Functional Element sends device capabilities to service user and ends the use case.

5025 **2.19.7.1.2.2 Alternative Flows**

5026 1: Unsupported Device.

5027 1.1 If in the basic flow 2, the Functional Element is unable to detect the service user' device
5028 capability, the Functional Element returns a error message and the use case ends.

5029 **2.19.7.1.3 Special Requirements**

5030 None

5031 **2.19.7.1.3.1 Supportability**

5032 The edge devices must be able to support the HTTP request.

5033 **2.19.7.1.4 Pre-Conditions**

5034 None.

5035 **2.19.7.1.5 Post-Conditions**

5036 None.

5037 **2.19.7.2 Manage Device Types**

5038 **2.19.7.2.1 Description**

5039 This use case allows the service user to maintain the device (MIME Type information). This
5040 includes adding, changing and deleting device information from the Functional Element.

5041 **2.19.7.2.2 Flow of Events**

5042 **2.19.7.2.2.1 Basic Flow**

5043 This use case starts when the service user wishes to add or delete either device or service
5044 information from the Functional Element.

5045 1: The Functional Element requests that the service user specify the function to perform (either
5046 add, update or delete device or service).

- 5047 2: Once the service user provides the requested information, one of the sub-flows is executed.
- 5048 If the service user provides 'Register Device Types', then sub-flow 2.1 is executed.
- 5049 If the service user provides 'Delete Device Types', then sub-flow 2.2 is executed.
- 5050 2.1: Register Device Type.
- 5051 2.1.1: The Functional Element requests that the service user provide the device
5052 information. This includes: MIME Name, MIME Description, Supported MIME type.
- 5053 2.1.2: Once the service user provides the requested information, the Functional Element
5054 generates and assigns a unique MIME Id number to the device.
- 5055 2.2: Delete Device Type.
- 5056 2.2.1: The Functional Element requests that the service user provide the Device ID.
- 5057 2.2.2: The Functional Element retrieves the existing device information based on the
5058 Device ID.
- 5059 2.2.3: The service user provides the delete device information and the Functional
5060 Element deletes the device record from the Functional Element.
- 5061 3: The use case ends when the service user provides the requested information or decided to
5062 end use case.
- 5063 **2.19.7.2.2 Alternative Flows**
- 5064 1: Invalid Device Information.
- 5065 1.1: If in the sub-flow 2.1.2, the requested information provided by the user is invalid, the
5066 Functional Element returns an error message and the use case ends
- 5067 2: Device Not Found.
- 5068 2.1 If in the basic flows 2.2.2, the device information with the specified device is not found or
5069 does not exist, the Functional Element returns an error message and the use case ends.
- 5070 **2.19.7.2.3 Special Requirements**
- 5071 **2.19.7.2.3.1 Supportability**
- 5072 Manage Device Types supports the most widespread MIME types used today.
- 5073 **2.19.7.2.4 Pre-Conditions**
- 5074 None.
- 5075 **2.19.7.2.5 Post-Conditions**
- 5076 If the use case was successful, the device information is added, updated or deleted from the
5077 Functional Element. Otherwise, the Functional Element's state is unchanged.

5078 **2.20 Service Level Management Functional Element (new)**

5079 **2.20.1 Motivation**

5080 The Service Level Management Functional Element enables the management of Service Level
5081 Agreements (SLAs), each of which represents a joint agreement between the service customer
5082 and provider based on a set of service offerings. The service offerings typically expressed as
5083 SLA templates, but still can be customized to cater to various services and customers. The
5084 Service Level Management Functional Element also manages the lifecycle of a SLA which could
5085 be broadly classified into: SLA creation; SLA deployment and provisioning; SLA enforcement and
5086 SLA termination.

5087

5088 This Functional Element fulfills the following requirements from the Functional Elements
5089 Requirements:

5090 Primary Requirement

- 5091 • MANAGEMENT-300.

5092

5093 **2.20.2 Terms Used**

Terms	Description
SLA	Service Level Agreement is a joint agreement between service provider and service customer to define a set of service offerings.

5094

5095 **2.20.3 Key Features**

5096 Implementations of the Service Level Management Functional Element are expected to provide
5097 the following key features:

- 5098 1. The Functional Element MUST provide the ability to create Service Offering and associated
5099 service levels.
- 5100 2. The Functional Element MUST provide the ability to manage defined Service Offerings,
5101 including the ability to retrieve, modify and delete.
- 5102 3. The Functional Element MUST provide the ability to create of a SLA via customer
5103 subscription based on defined Service Offerings.
- 5104 4. The Functional Element MUST provide the ability to generate billing & service level reports
5105 based on defined SLAs.
- 5106 5. The Functional Element MUST provide the ability to notify subscribers of SLA termination.
- 5107 6. The Functional Element MUST provide the ability to delete SLAs upon termination.

5108

5109 In addition, the following key features could be provided to enhance the Functional Element
5110 further:

- 5111 1. The Functional Element MAY provide the ability to customize SLAs. This includes the
5112 capability to:
 - 5113 1.1. Alter service offerings parameters.
 - 5114 1.2. Add and delete different service offerings into a SLA.

5115

5116 **2.20.4 Interdependencies**

Interaction Dependencies	
QoS Management	The Service Level Management Functional Element may make use of the metrics and metering results to model SLAs.
Notification	The Service Level Management Functional Element may make use of the Notification Functional Element to notify subscribers of certain SLAs the happening on the SLAs.

5117

5118 **2.20.5 Related Technologies and Standards**

Standards / Specifications	Specific References
Web Service Level Agreement Project	– Under IBM Emerging Technology Toolkit. Latest update was in 2003. No news on its standardization.

5119

5120 **2.20.6 Model**

5121

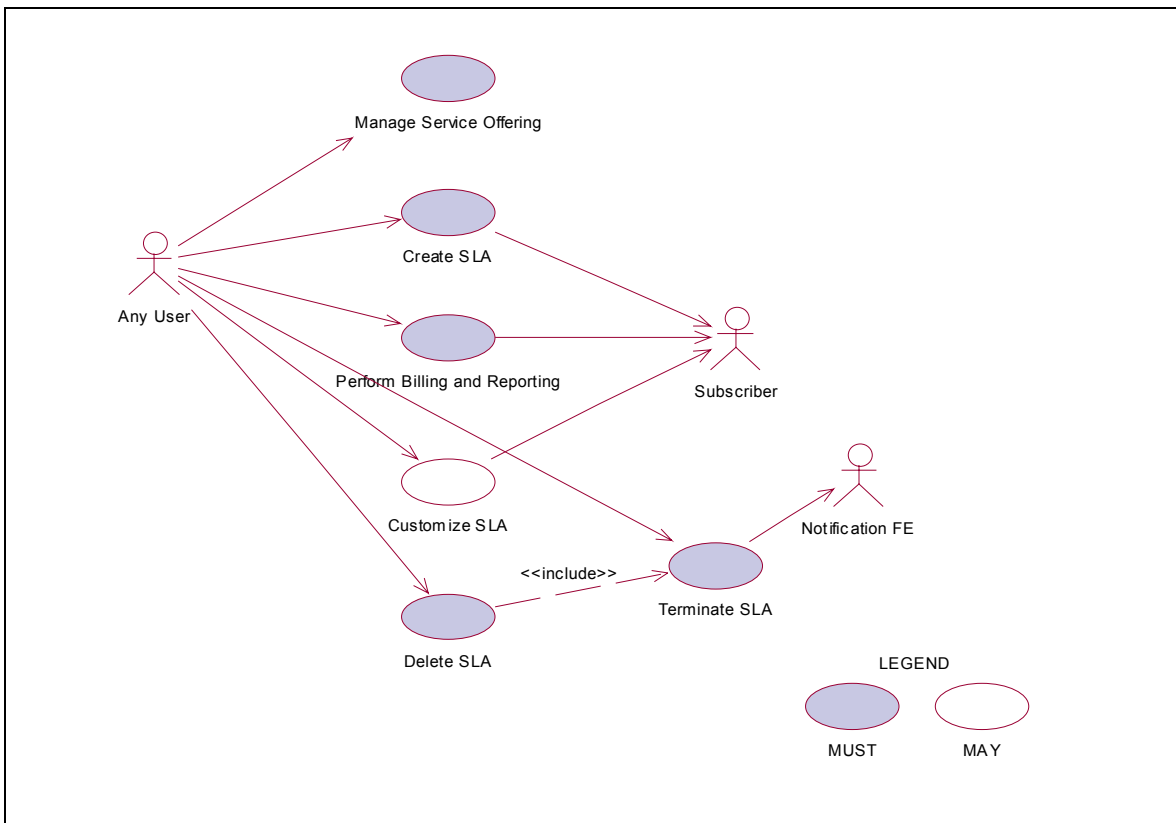


Figure 26: Model of the Service Level Management Functional Element.

5122

5123 **2.20.7 Usage Scenarios**

5124 **2.20.7.1 Manage Service Offering**

5125 **2.20.7.1.1 Description**

5126 This use case allows any user to manage service offering, which enables any user to create,
5127 retrieve, update and delete a service offering.

5128 **2.20.7.1.2 Flow of Events**

5129 **2.20.7.1.2.1 Basic Flow**

5130 This use case starts when any user wants to manage service offerings.

5131 1: The user sends Manage Service Offering request to the system together with the specified
5132 operation.

5133 2: On receipt of the request from the user, the functional element will execute one of the sub-
5134 flows. If the service user provides "**Create Service Offering**", the Create Service Offering sub-
5135 flow (**2.1**) is executed. If the service user provides "**Update Service Offering**", the Update
5136 Service Offering sub-flow (**2.2**) is activated. If the service user provides "**Retrieve Service**
5137 **Offering**", the Retrieve Service Offering sub-flow (**2.3**) is activated. If the service user provides
5138 "**Delete Service Offering**", the Delete Service Offering sub-flow (**2.4**) is executed.

5139

5140 2.1: Create Service Offering.

5141 2.1.1: The service user specifies details of a service offering.

5142 2.1.2: The system checks the existing service offering.

5143 *2.1.3: The system generates service offering information and adds to the system*
5144 *and the use case ends.*

5145 2.2: Update Service Offering.

5146 2.2.1: The service user specifies the service offering to update.

5147 2.2.2: The system retrieves the existing service offering information.

5148 2.2.3: The service user provides the update service offering information.

5149 *2.2.4: The system updates the service offering with the updated information and*
5150 *ends use case.*

5151 2.3: Retrieve Service Offering.

5152 2.3.1: The service user specifies the service offering to retrieve.

5153 2.3.2: The system retrieves the existing service offering information and ends the use
5154 case.

5155 2.4: Delete Service Offering.

5156 2.4.1: The service user specifies the service offering to delete.

5157 2.4.2: The system retrieves the existing service offering information.

5158 *2.4.3: The system deletes the service offering from the system and the use case*
5159 *ends.*

5160 **2.20.7.1.2.2 Alternative Flows**

5161 1: Invalid Service Offering.

5162 1.1: If in the Basic Flow 2.1.1, system detects any invalid description, system returns
5163 general error message and ends the use case.
5164 2: Service Offering Already Exists.
5165 2.1: If in the Basic Flow 2.1.2, the system checks the existing service offering and finds the
5166 service offering already exists. The system returns an error and ends the use case.
5167 3: Service Offering Not Exist.
5168 3.1: If in the Basic Flow 2.2.2, 2.3.2, 2.4.2, the system checks the existing service
5169 offering and finds the service offering doesn't exist. The system returns an error
5170 and ends the use case.

5171 **2.20.7.1.3 Special Requirements**

5172 **2.20.7.1.4 Pre-Conditions**

5173 None.

5174 **2.20.7.1.5 Post-Conditions**

5175 None.

5176

5177 **2.20.7.2 Create SLA**

5178 **2.20.7.2.1 Description**

5179 This use case allows any user to create Service Level Agreement.

5180 **2.20.7.2.2 Flow of Events**

5181 **2.20.7.2.2.1 Basic Flow**

5182 This use case starts when any user wants to create SLA.

5183 1: The user sends a request to create SLA to the Functional Element which includes the
5184 arrangement of the defined service offerings.

5185 2: The Functional Element will dispatch the SLA information to the subscribers.

5186 3: The subscribers accept the SLA arrangement and the use case ends.

5187 **2.20.7.2.3 Alternative Flows**

5188 1: Service Offering Not Available.

5189 1.1: If in the Basic Flow 1, Functional Element detects the service offering provided by the
5190 user is not available, the Functional Element returns general error message and ends the use
5191 case.

5192 2: Subscriber Not Available.

5193 2.1: If in the Basic Flow 2, the Functional Element checks that the subscriber is not available,
5194 the Functional Element returns an error and ends the use case.

5195 3: Subscriber Don't Agree.

5196 3.1: If in the Basic Flow 3, the subscriber does not agree with the arrangement defined in
5197 SLA, the Functional Element returns an error and ends the use case.

5198 **2.20.7.2.4 Special Requirements**

5199 None.

5200 **2.20.7.2.5 Pre-Conditions**

5201 None.

5202 **2.20.7.2.6 Post-Conditions**

5203 If the use case is successful, a SLA is added into the Functional Element.
5204

5205 **2.20.7.3 Perform Billing and Reporting**

5206 This use case allows any user to do billing and reporting of the information related to SLA.

5207 **2.20.7.3.1 Flow of Events**

5208 **2.20.7.3.1.1 Basic Flow**

5209 This use case starts when any user wants to do SLA related billing and report.

5210 1: The user sends a request to conduct billing and reporting by providing information, which
5211 enables to identify the SLA and its service offering and associated subscribers.

5212 2: On receipt of request of performing billing and reporting from the user, the Functional Element
5213 retrieves the billing and report information according to the definition of SLA and internally
5214 recorded information.

5215 3: The Functional Element passes the generated information to the subscribers.

5216 4: The Functional Element passes the response to the user and the use case ends.

5217 **2.20.7.3.1.2 Alternative Flows**

5218 1: Information Not Enough.

5219 1.1: If in the Basic Flow 1, Functional Element detects the information provided by the user is
5220 not enough to form identify the SLA and its associated service offerings and subscribers,
5221 Functional Element returns general error message and ends the use case.

5222 2: No Data Available.

5223 2.1: If in the Basic Flow 2, the Functional Element retrieves the recorded information and
5224 finds it is unavailable or incomplete, the Functional Element returns an error and ends the use
5225 case.

5226 3: Subscriber Not Available.

5227 3.1: If in the Basic Flow 3, the subscriber is not available, the Functional Element returns an
5228 error and ends the use case.

5229 **2.20.7.3.2 Special Requirements**

5230 None.

5231 **2.20.7.3.3 Pre-Conditions**

5232 None.

5233 **2.20.7.3.4 Post-Conditions**

5234 None.

5235

5236 **2.20.7.4 Customize SLA**

5237 **2.20.7.4.1 Description**

5238 This use case allows users to customize a SLA.

5239 **2.20.7.4.1.1 Basic Flow**

5240 This use case starts when any user wants to customize a SLA.

5241 1: The user sends request to customize a SLA by providing the information what will be
5242 customized in a SLA. There are two ways to customize a SLA, to modify the parameters of
5243 service offerings in a SLA and to add or delete service offerings in a SLA.

5244 2: On receipt of a customizing SLA request from the user, the Functional Element checks the
5245 validity of the customized SLA.

5246 3: The Functional Element passes the customized SLA to the subscribers.

5247 4: The subscribers accept the customized SLA.

5248 5: The Functional Element passes the response from the service to the user and the use case
5249 ends.

5250 **2.20.7.4.1.2 Alternative Flows**

5251 1: SLA Not Available.

5252 1.1: If in the Basic Flow 1, the SLA that the user wants to customize does not exist,
5253 Functional Element returns general error message and ends the use case.

5254 2: Information Not Valid.

5255 2.1: If in the Basic Flow 2, Functional Element detects the information provided by the user is
5256 not valid to form a SLA, Functional Element returns general error message and ends the use
5257 case.

5258 3: Subscriber Not Available.

5259 3.1: If in the Basic Flow 3, the subscriber is not available, Functional Element returns general
5260 error message and ends the use case.

5261 4: Subscriber Does Not Accept.

5262 4.1: If in the Basic Flow 4, the subscriber does not accept the customized SLA, Functional
5263 Element returns general error message and ends the use case.

5264 **2.20.7.4.2 Special Requirements**

5265 None.

5266 **2.20.7.4.3 Pre-Conditions**

5267 None.

5268 **2.20.7.4.4 Post-Conditions**

5269 If the use case is successful, a customized SLA is added into the functional element.
5270

5271 **2.20.7.5 Terminate SLA**

5272 This use case enables the user to terminate a SLA.

5273 **2.20.7.5.1 Flow of Events**

5274 **2.20.7.5.1.1 Basic Flow**

5275 This use case starts when the user wants to terminate a SLA.

5276 1: The user sends a request to terminate a SLA to the Functional Element by providing related
5277 information.

5278 2: On receipt of a terminating SLA request from the user, the Functional Element terminates the
5279 operations related to the SLA.

5280 3: The Functional Element notifies the subscribers about the termination of the SLA through
5281 Notification Functional Element.

5282 4: The Functional Element passes the response from the service to the user and the use case
5283 ends.

5284 **2.20.7.5.1.2 Alternative Flows**

5285 1: SLA Not Exist.

5286 1.1: If in the Basic Flow 2, Functional Element detects the SLA that the user wants to
5287 terminate does not exist, Functional Element returns general error message and ends the use
5288 case.

5289 2: Notification FE Not Available.

5290 2.1: If in Basic Flow 3, Functional Element detects the Notification Functional Element is not
5291 available, Functional Element returns general error message and ends the use case.

5292 **2.20.7.5.2 Special Requirements**

5293 None.

5294 **2.20.7.5.3 Pre-Conditions**

5295 None.

- 5296 **2.20.7.5.4 Post-Conditions**
- 5297 If the use case is successful, the Functional Element stops all the operations related to the SLA.
- 5298
- 5299 **2.20.7.6 Delete SLA**
- 5300 This use case enables the user to remove a SLA from the Functional Element.
- 5301 **2.20.7.6.1 Flow of Events**
- 5302 **2.20.7.6.1.1 Basic Flow**
- 5303 This use case starts when the user wants to delete a SLA from the Functional Element.
- 5304 1: The user sends a request to delete a SLA providing related information.
- 5305 2: On receipt of request of deleting SLA from the user, the Functional Element validates the
- 5306 provided information and invokes the use case Terminate SLA.
- 5307 3: The Functional Element deletes the SLA.
- 5308 4: The Functional Element passes the response from the service to the user and the use case
- 5309 ends.
- 5310 **2.20.7.6.1.2 Alternative Flows**
- 5311 1: SLA Does Not Exist.
- 5312 1.1: If in the Basic Flow 2, Functional Element detects the SLA that the user wants to delete
- 5313 does not exist, Functional Element returns general error message and ends the use case.
- 5314 2: Terminate SLA Error.
- 5315 2.1: If in the Basic Flow 2, use case Terminate SLA returns error, Functional Element returns
- 5316 general error message and ends the use case.
- 5317 **2.20.7.6.2 Special Requirements**
- 5318 None.
- 5319 **2.20.7.6.3 Pre-Conditions**
- 5320 None.
- 5321 **2.20.7.6.4 Post-Conditions**
- 5322 If the use case is successful, a SLA is deleted from the Functional Element.

5323 **2.21 Service Level Enforcement Functional Element (new)**

5324 **2.21.1 Motivation**

5325 The Service Level Enforcement Functional Element enables monitoring the compliance of SLA
5326 and enforcing SLA through load management.

5327

5328 This Functional Element fulfills the following requirements from the Functional Elements
5329 Requirements:

- 5330 • Primary Requirements
- 5331 • MANAGEMENT-301 and
 - 5332 • MANAGEMENT-302.

5333

5334 **2.21.2 Terms Used**

Terms	Description
SLA	Service Level Agreement is a joint agreement between service provider and service customer to define a set of service offerings.

5335

5336 **2.21.3 Key Features**

5337 Implementations of the Service Level Enforcement Functional Element are expected to provide
5338 the following key features:

- 5339 1. The Functional Element MUST provide the ability to monitor SLA compliance based on
5340 measured data.
- 5341 2. The Functional Element MUST provide the ability to detect any violation of SLA.
- 5342 3. The Functional Element MUST provide the ability to enforce a SLA via through load
5343 management.

5344

5345 In addition, the following key features could be provided to enhance the Functional Element
5346 further:

- 5347 1. The Functional Element MAY provide the ability to manage load. This include the capability
5348 to:
- 5349 1.1. Control admission of service.
 - 5350 1.2. Prioritize requests.

5351

5352 **2.21.4 Interdependencies**

Interaction Dependencies	
QoS Management	The Service Level Enforcement Functional Element may make use the metrics and metering results to monitor compliance of SLA.

5353

5354

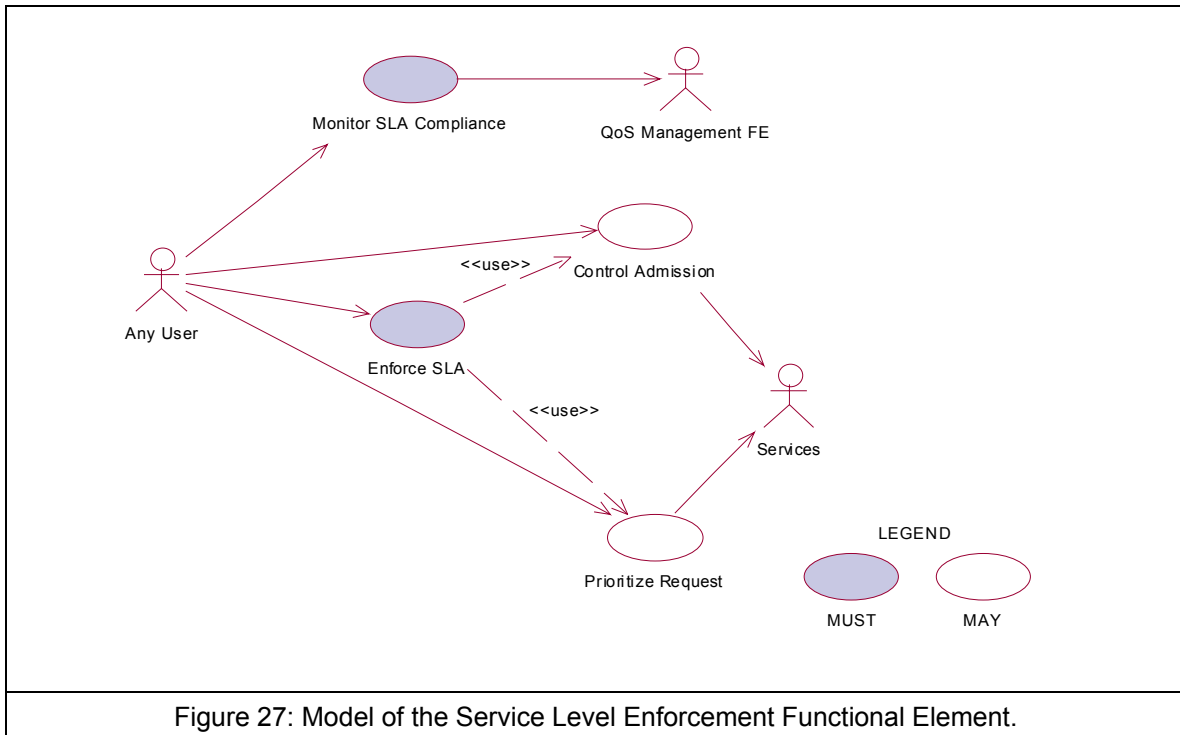
2.21.5 Related Technologies and Standards

Standards / Specifications	Specific References
Web Service Level Agreement Project	– Under IBM Emerging Technology Toolkit. Latest update was in 2003. No news on its standardization.

5355

2.21.6 Model

5356



5357

2.21.7 Usage Scenarios

2.21.7.1 Monitor SLA Compliance

2.21.7.1.1 Description

5361 This use case allows any user to monitor and check the SLA is compliant or not at the run time.

2.21.7.1.2 Flow of Events

2.21.7.1.2.1 Basic Flow

5364 This use case starts when any user wants to monitor the SLA compliance.

5365 1: The user sends Monitor SLA Compliance request to the Functional Element together with the
5366 specified SLA information.

5367 2: On receipt of the request from the user, the Functional Element will retrieve the SLA
5368 information.

5369

5370 3: The Functional Element extracts the measured data through QoS Management Functional
5371 Element.

5372 4: The Functional Element checks the compliance of SLA.

5373 5: The Functional Element returns response to the user and the use case ends.

5374 **2.21.7.1.2.2 Alternative Flows**

5375 1: SLA Not Exist.

5376 1.1: If in the Basic Flow 2, the Functional Element detects that the SLA to monitor does not
5377 exists, system returns general error message and ends the use case.

5378 2: Measured Data Not Available.

5379 2.1: If in the Basic Flow 3, the Functional Element retrieves measured data through QoS
5380 Management Functional Element and the latter is not ready, the Functional Element returns
5381 an error and ends the use case.

5382 3: SLA Not Compliant.

5383 3.1: If in the Basic Flow 4, the Functional Element checks the measured data against SLA
5384 and the violation exists, the Functional Element returns an error and ends the use case.

5385 **2.21.7.1.3 Special Requirements**

5386 **2.21.7.1.4 Pre-Conditions**

5387 None

5388 **2.21.7.1.5 Post-Conditions**

5389 None

5390

5391 **2.21.7.2 Control Admission**

5392 **2.21.7.2.1 Description**

5393 As a means of manage load to enforce SLA, the use case allows any user to control admission
5394 toward services.

5395 **2.21.7.2.2 Flow of Events**

5396 **2.21.7.2.2.1 Basic Flow**

5397 This use case starts when any user wants to control admission toward services.

5398 1: The user sends request to control admission to certain services to the Functional Element
5399 which includes the option of admission and the targeted services.

5400 2: The Functional Element will manage the control of admission to the services at run time.

5401 3: The Functional Element returns response to the user and the use case ends.

5402 **2.21.7.2.3 Alternative Flows**

5403 1: Service Not Available.

5404 1.1: If in the Basic Flow 1, Functional Element detects the targeted service provided by the
5405 user is not available, Functional Element returns general error message and ends the use
5406 case.

5407 2: Control Admission Failed.

5408 2.1: If in the Basic Flow 2, the Functional Element fails to control admission to the services at
5409 run time, Functional Element returns an error and ends the use case.

5410 **2.21.7.2.4 Special Requirements**

5411 None.

5412 **2.21.7.2.5 Pre-Conditions**

5413 The services are manageable to the user.

5414 **2.21.7.2.6 Post-Conditions**

5415 If the use case is successful, the load of the monitored services is changed thus the SLA is
5416 enforced through load management.

5417

5418 **2.21.7.3 Prioritize Request**

5419 As a means of load management to enable SLA enforcement, the use case allows any user to
5420 prioritize request to the targeted services according to the requirements of SLA.

5421 **2.21.7.3.1 Flow of Events**

5422 **2.21.7.3.1.1 Basic Flow**

5423 This use case starts when any user wants to prioritize various requests to targeted services.

5424 1: The user sends request to prioritize request to the Functional Element, which include
5425 information of the targeted services, the priority of the request and so on.

5426 2: On receipt of the request from the user, the Functional Element controls the processing of the
5427 request according to the priority given at the run time.

5428 3: The Functional Element passes the response to the user and the use case ends.

5429 **2.21.7.3.1.2 Alternative Flows**

5430 1: Services Not Exist.

5431 1.1: If in the Basic Flow 1, Functional Element detects the targeted service provided by the
5432 user does not exist, Functional Element returns general error message and ends the use
5433 case.

5434 2: Prioritize Request Fails.

5435 2.1: If in the Basic Flow 2, the Functional Element fails to control the requests of the services
5436 according to the priority given the user, the Functional Element returns an error and ends the
5437 use case.

5438 **2.21.7.3.2 Special Requirements**

5439 None.

5440 **2.21.7.3.3 Pre-Conditions**

5441 The services are manageable to the user.

5442 **2.21.7.3.4 Post-Conditions**

5443 If the use case is successful, the load of the monitored services is changed thus the SLA is
5444 enforced through load management.

5445

5446 **2.21.7.4 Enforce SLA**

5447 **2.21.7.4.1 Description**

5448 This use case allows users to enforce a SLA in a run time environment.

5449 **2.21.7.4.1.1 Basic Flow**

5450 This use case starts when any user wants to enforce a SLA in the run time environment.

5451 1: The user sends a request to enforce a SLA to the Functional Element by providing the SLA
5452 and its associated services and the option of the means of enforcement through load
5453 management.

5454 2: On receipt of the request from the user, the Functional Element checks the SLA and decides
5455 the means of enforcement, i.e. by taking advantage of load management.

5456 3: The Functional Element dispatches its request of load management and invokes use case
5457 Control Admission or use case Prioritize Request.

5458 4: The Functional Element returns the response to the user and the use case ends.

5459 **2.21.7.4.1.2 Alternative Flows**

5460 1: SLA Not Available.

5461 1.1: If in the Basic Flow 1, the SLA that the user wants to enforce does not exist, Functional
5462 Element returns general error message and ends the use case.

5463 2: Services Not Exist.

5464 2.1: If in the Basic Flow 1, Functional Element detects the services that the user wants to
5465 enforce SLA do not exist, Functional Element returns general error message and ends the
5466 use case.

5467 3: Control Admission Not Working.

5468 3.1: If in the Basic Flow 3, Functional Element fails to invoke use case control admission,
5469 Functional Element returns general error message and ends the use case.

- 5470 4: Prioritize Request Not Working.
- 5471 4.1: If in the Basic Flow 3, Functional Element fails to invoke use case Prioritize Request,
5472 Functional Element returns general error message and ends the use case.
- 5473 **2.21.7.4.2 Special Requirements**
- 5474 None.
- 5475 **2.21.7.4.3 Pre-Conditions**
- 5476 The services targeted are manageable.
- 5477 **2.21.7.4.4 Post-Conditions**
- 5478 None.
- 5479

5480 **2.22 Service Management Functional Element**

5481 **2.22.1 Motivation**

5482 The ability to monitor Web Services invocation is crucial towards the adoption of this technology
5483 from the security and performance standpoints. A security framework should incorporate an
5484 authentication and authorisation mechanism together with an audit trail. These twin
5485 considerations will serve to discourage resource misuse and in addition, will help to promote the
5486 “pay-as-you-use” concept. Service throughput on the server end is another important parameter
5487 that must be monitored. Administrators of services, which are sluggish, should be notified
5488 immediately via any electronic means.

5489

5490 This Functional Element fulfills the following requirements from the Functional Elements
5491 Requirements, Working Draft 01a:

5492 Primary Requirements

- 5493 • MANAGEMENT-090, and
- 5494 • MANAGEMENT-093 to MANAGEMENT-096.

5495 Secondary Requirements

- 5496 • None

5497 **2.22.2 Terms Used**

Terms	Description
Management Domain	Management Domain refers to the set of servers that needs to be monitored. This domain is typically under the control of one agency and administered by a known administrator.
Performance Parameters	Performance Parameters refers to the set of attributes that should be track for the purpose of evaluating the performance of the Web Services.
Monitoring	Monitoring refers to the logging and tracking of the Web Service's

5498

5499 **2.22.3 Key Features**

5500 Implementations of the Service Management Functional Element are expected to provide the
5501 following key features:

- 5502 1. The Functional Element MUST provide the capability to configure the Management Domain.

Example: All Servers that falls under a certain IP range (192.168.20.3 to 192.168.20.22)

5503

- 5504 2. The Functional Element MUST provide the capability to discover services that are under the
5505 Management Domain.

- 5506 3. The Functional Element MUST provide the capability to configure Performance Parameters
5507 that are of interest for Monitoring purposes.

Example: The following are some of the Performance Parameter that may be of interest:
The time at which a Web Service request came.
The time at which the corresponding response was sent.
The name of the Web Service that was invoked.

5508 4. The Functional Element MUST provide a means to log Performance Parameters.

5509

5510 In addition, the following key feature could be provided to enhance the Functional Element
 5511 further:

5512 1. The Functional Element MAY provide the capability to configure additional attributes that is
 5513 tagged along with a particular Web Service.

Example: The access permission for invoking the service.

5514 2. The Functional Element MAY provide verification services to block unauthorized Web
 5515 Service's usage.

Example: The header information that accompanies the request may be extracted for relevant client's credential. This could then be compared to the access permission for the service.

5516 **2.22.4 Interdependencies**

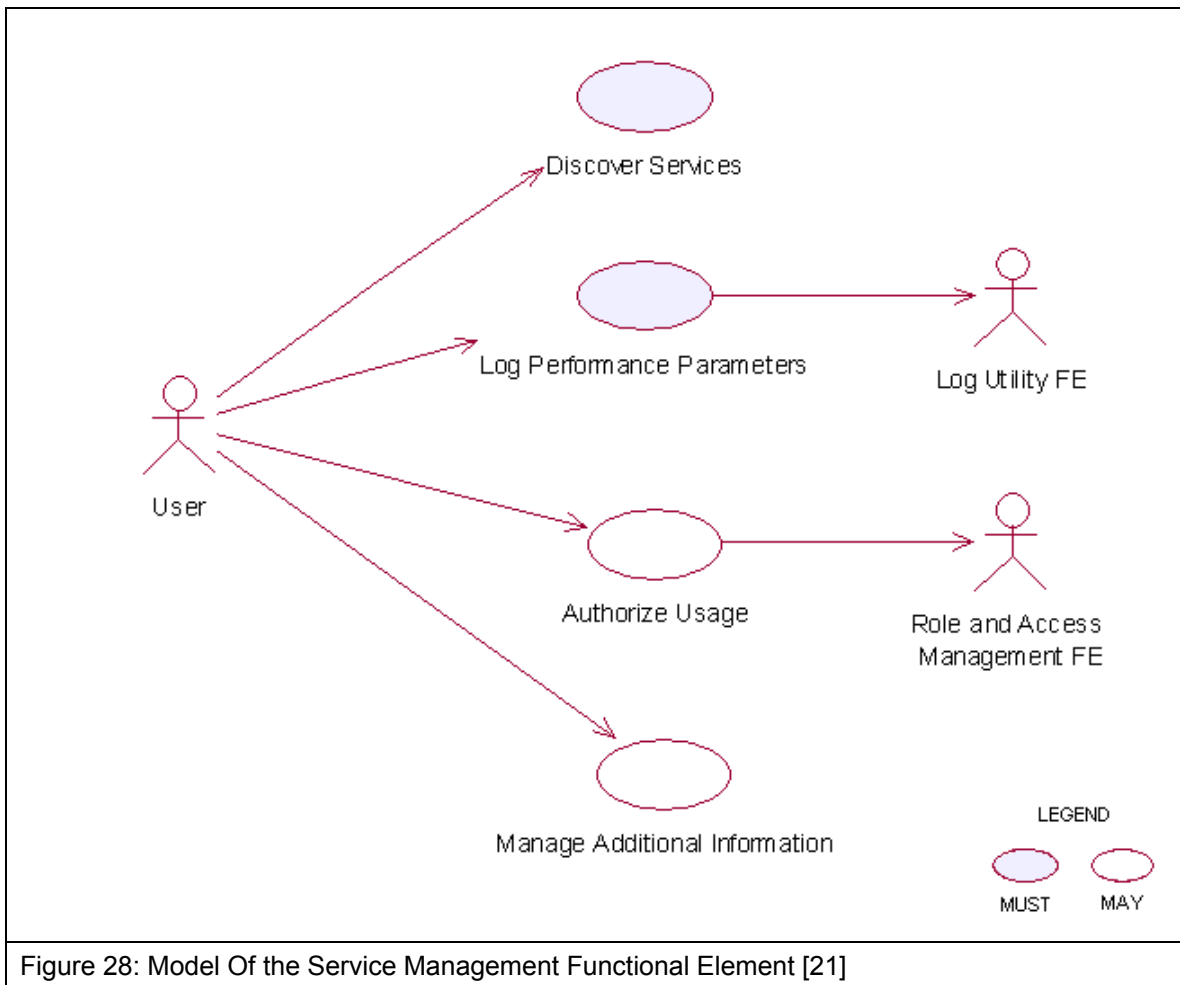
Direct Dependency	
Log Utility Functional Element	The Log Utility Functional Element helps to log the Performance Parameter into the appropriate data sources

5517

Interaction Dependencies	
Role and Access Management Functional Element	In the event when authentication is required before invocation of a particular service is allowed, the Service Management Functional Element may extract authentication information from the header of the incoming request and use the Role and Access Management Functional Element to extract the relevant role information before deciding if a user has the privilege to access a particular Web Service.

5518 **2.22.5 Related Technologies and Standards**

5519 None

2.22.6 Model5521 **2.22.7 Usage Scenarios**5522 **2.22.7.1 Discover Services**5523 **2.22.7.1.1 Description**

5524 This use case describes the scenario surrounding the automatic discovery of services hosted in
 5525 the Management Domain.

5526 **2.22.7.1.2 Flow of Events**5527 **2.22.7.1.2.1 Basic Flow**

5528 The use case begins when the user wants to retrieve a list of services URLs from the
 5529 Management Domain.

5530 1: The user sends a request to retrieve the list of services URLs from the Management Domain.

5531 2: The Functional Element reads from a configuration file to so as to determine the exact
 5532 boundaries of the Management Domain.

5533 3: The Functional Element retrieves from each of the servers as stated in the configuration file a
5534 list of service URLs that it is hosting

5535 4: The Functional Element returns the list of service URLs back to the user and the use case
5536 ends.

5537 **2.22.7.1.2.2 Alternative Flows**

5538 1: Configuration File Does Not Exist

5539 1.1: In basic flow 2, the Functional Element fails to read boundaries from the configuration
5540 file. The Functional Element in turn return an error message and the use case end.

5541 2: Fail To Communicate With the Server

5542 2.1: In basic flow 3, the Functional Element fails to communicate with the servers hosting the
5543 services. The Functional Element in turn return an error message and the use case end.

5544 **2.22.7.1.3 Special Requirements**

5545 The protocol of communicating with a server hosting the services is not standardized. Each
5546 server may offer different mechanism for retrieving the list of services hosted and as such, the
5547 extensibility this approach is severely limited.

5548 **2.22.7.1.4 Pre-Conditions**

5549 None.

5550 **2.22.7.1.5 Post-Conditions**

5551 None

5552

5553 **2.22.7.2 Log Performance Parameters**

5554 **2.22.7.2.1 Description**

5555 This use case allows the user to log the performance parameters of all the Web Services that is
5556 being hosted by an application that contains the Service Management Functional Element.

5557 **2.22.7.2.2 Flow of Events**

5558 **2.22.7.2.2.1 Basic Flow**

5559 The use case begins when the user wants to log the performance parameters of all the Web
5560 Services that is being hosted by an application that contains the Service Management Functional
5561 Element.

5562 1: The user sends a request to log the performance parameters of all the Web Services hosted.

5563 2: The Functional Element reads from a configuration file the performance parameter to be
5564 logged.

5565 3: The Functional Element extracts the performance parameters for the incoming message and
5566 stores them into the data store

5567 4: The Functional Element next extracts the performance parameters for the outgoing message
5568 and stores them into the data store

5569 5: The Functional Element stores the necessary information into the data store.

5570 **2.22.7.2.2.2 Alternative Flows**

5571 1: No Performance Parameter Found.

5572 1.1: In basic flow 2, the Functional Element discovers that the performance parameter to be
5573 logged is not configured. The Functional Element returns an error message and the use case
5574 ends.

5575 2: Data Store Not Available.

5576 2.1: In basic flow 5, the Functional Element detects that the data store is not available. The
5577 Functional Element returns an error message and the use case ends.

5578 **2.22.7.2.3 Special Requirements**

5579 None.

5580 **2.22.7.2.4 Pre-Conditions**

5581 None.

5582 **2.22.7.2.5 Post-Conditions**

5583 None.

5584

5585 **2.22.7.3 Authorize Usage**

5586 **2.22.7.3.1 Description**

5587 This use case describes the authentication process for invoking a Web Service that is being
5588 hosted by an application that contains the Service Management Functional Element.

5589 **2.22.7.3.2 Flow of Events**

5590 **2.22.7.3.2.1 Basic Flow**

5591 The use case starts when a user accesses a service.

5592 1: The user sends a request to invoke a particular Web Service.

5593 2: The Functional Element extracts the following information from the incoming message

5594 2.1: The username attribute that resides in the header of the incoming message

5595 3: The Functional Element extracts the access privilege associated with the service from the data
5596 store

5597 4: The Functional Element uses the Role and Access Management Functional Element to retrieve
5598 the role of the user.

5599 5: The Functional Element looks up the data store to determine if the user is authorized to access
5600 the service

5601 6: The Functional Element allows the request to be process and the use case ends.

5602 **2.22.7.3.2 Alternative Flow**

5603 1: Username header not found.

5604 1.1: In basic flow 2, the username attribute is not found in the header.

5605 1.2: The Functional Element denies access to the requested Web Service and returns an
5606 error message.

5607 2: Web Service access privilege not set.

5608 2.1: In basic flow 3, the Functional Element could not find the access privilege for the Web
5609 Service.

5610 2.2: The Functional Element denies access to the requested Web Service and returns an
5611 error message.

5612 3: Role and Access Management Functional Element not available

5613 3.1: In basic flow 4, the Functional Element could not find the Role and Access Management
5614 Functional Element.

5615 3.2: The Functional Element denies access to the requested Web Service and returns an
5616 error message.

5617 4: User not authorize

5618 4.1: In basic flow 5, the Functional Element looks up the data source and determines that the
5619 user does not have the required privilege to access the service.

5620 4.2: The Functional Element denies access to the requested Web Service and returns an
5621 error message.

5622 **2.22.7.3.3 Special Requirements**

5623 None.

5624 **2.22.7.3.4 Pre-Conditions**

5625 None.

5626 **2.22.7.3.5 Post-Conditions**

5627 None.

5628

5629 **2.22.7.4 Manage Additional Information**

5630 **2.22.7.4.1 Description**

5631 This use case helps to maintain the following attributes of a Web Service that is useful in
5632 determining if a particular user has the privilege to invoke it.

5633 Service Name. This is the name of the service to monitor

5634 Access level. This refers to the access level of the Web Services hosted

5635 Role Names. If a user's role matches any of the roles contained here, then he/she has the
5636 privilege to access the Web Service.

5637 **2.22.7.4.2 Flow of Events**

5638 **2.22.7.4.2.1 Basic Flow**

5639 This use case starts when user wants to manage services.

5640 1: The user specifies the additional information that he wants to create/update/delete/retrieve.

5641 2: Once the user provides the requested information, one of the sub-flows is executed.

5642 If the user provides '**Create Service Parameter**', then sub-flow 2.1 is executed.

5643 If the user provides '**Update Service Parameter**', then sub-flow 2.2 is executed.

5644 If the user provides '**Delete Service Parameter**', then sub-flow 2.3 is executed.

5645 If the user provides '**Retrieve Service Parameter**', then sub-flow 2.4 is executed.

5646 2.1: Create Service Parameter.

5647 2.1.1: The user specifies the service to create with the appropriate additional information.

5648 2.1.2: The Functional Element connects to the data store.

5649 2.1.3: The Functional Element saves the new service in the data store and the use case
5650 ends.

5651 2.2: Update Service Parameter.

5652 2.2.1: The user specifies the service to update with the appropriate additional information.

5653 2.2.2: The Functional Element connects to the data store.

5654 2.2.3: The Functional Element updates the service in the data store and the use case
5655 ends.

5656 2.3: Delete Service Parameter.

5657 2.3.1: The user specifies the service to delete.

5658 2.3.2: The Functional Element connects to the data store.

5659 2.3.3: The Functional Element deletes the service in the data store and the use case
5660 ends.

5661 2.4: Retrieve Service Parameter.

5662 2.4.1: The user specifies the service to retrieve.

5663 2.4.2: The Functional Element connects to the data store.

5664 2.4.3: The Functional Element retrieves the service from the data store and the use case
5665 ends.

5666 **2.22.7.4.2.2 Alternative Flows**

5667 1: Data Store Not Available.

5668 1.1: If in basic flow 2.1.2, 2.2.2, 2.3.2 and 2.4.2, the data store is not available, an error message
5669 is returned and the use case ends.

5670 **2.22.7.4.3 Special Requirements**

5671 None.

5672 **2.22.7.4.4 Pre-Conditions**

5673 None.

5674 **2.22.7.4.5 Post-Conditions**

5675 None.

5676 2.23 Service Registry Functional Element

5677 2.23.1 Motivation

5678 In a Web Service-enabled implementation, there exist the needs to maintain a central repository
5679 of all the services that are available. This facilitates service lookups as well as management of
5680 Web Services within the application that contains the Functional Element. In order to achieve
5681 these expectations, the Functional Element will cover the following aspects.

5682 Simplify management of information in a XML registry server like UDDI and ebXML, and

5683 Simplify information publish and query from a XML registry server like UDDI and ebXML.

5684

5685 This Functional Element fulfills the following requirements from the Functional Elements
5686 Requirements, Working Draft 01a:

5687 Primary Requirements

- 5688 • PROCESS-031 to PROCESS-032,
- 5689 • PROCESS-035, and
- 5690 • MANAGEMENT-097 to MANAGEMENT-100

5691 Secondary Requirements

- 5692 • PROCESS-014.

5693

5694 2.23.2 Terms Used

Terms	Description
Classification / Taxonomy	Classification / Taxonomy refers to a taxonomy that may be used to classify or categorize any registry object instances like Organizations, Web Services, Service Bindings, etc.
Concept / tModel	Concept / tModel is used to represent taxonomy elements and their structural relationship with each other in order to describe an internal taxonomy.
Organization	Organization provides information on organizations such as a Submitting Organization. Each Organization may have a reference to a parent Organization. In addition it may have a contact attribute defining the primary contact within the organization. An Organization also has an address attribute.
Registry Server	Registry Server refers to a registry that offers a mechanism for users or software applications to advertise and discover Web Services. An XML registry is an infrastructure that enables the building, deployment, and discovery of Web Services.
Service Binding	Service Binding represent technical information on a specific way to access a specific interface offered by a service.
UUID	Universally Unique Identifier

5695 **2.23.3 Key Features**

5696 Implementations of the Service Registry Functional Element are expected to provide the following
5697 key features:

- 5698 1. The Functional Element MUST provide the capability to facilitate the management of the
5699 following information in a UDDI or an ebXML compliant registry server.
- 5700 1.1. Organisation
5701 1.2. Classification / Taxonomy
5702 1.3. Web Service
5703 1.4. tModel
5704 1.5. Service Binding
5705 The management of this information includes registering, updating, deleting and searching.
- 5706 2. As part of Key Feature (1), the Functional Element MUST provide the ability to perform the
5707 operations specified across multiple registry servers.
- 5708 3. The Functional Element MUST provide a mechanism to enable single step publishing of
5709 services into registry servers
5710

5711 **2.23.4 Interdependencies**

5712 None
5713

5714 **2.23.5 Related Technologies and Standards**

Specifications	Description
UDDI Data Structure and API Specification v2.0	UDDI Data Structure Specification v2.0 describes in detail the data structure models of organizations, web services, service categories, service bindings, and tModels. [22] UDDI API Specification v2.0 describes in detail the publishing, deleting, and querying API(s) to manipulate the information stored in XML registry server like UDDI. [23]
ebXML Registry Information Model (RIM) Specification v2.0 [24]	ebXML Registry Information Model Specification v2.0 describes in detail the data structure models of organizations, web services, service categories, service bindings, and tModels.
ebXML Registry Services (RS) Specification v2.0 [25]	ebXML Registry Services Specification v2.0 describes in detail the publishing, deleting, and querying API(s) to manipulate the information stored in XML registry server like UDDI.

5715

5716

2.23.6 Model

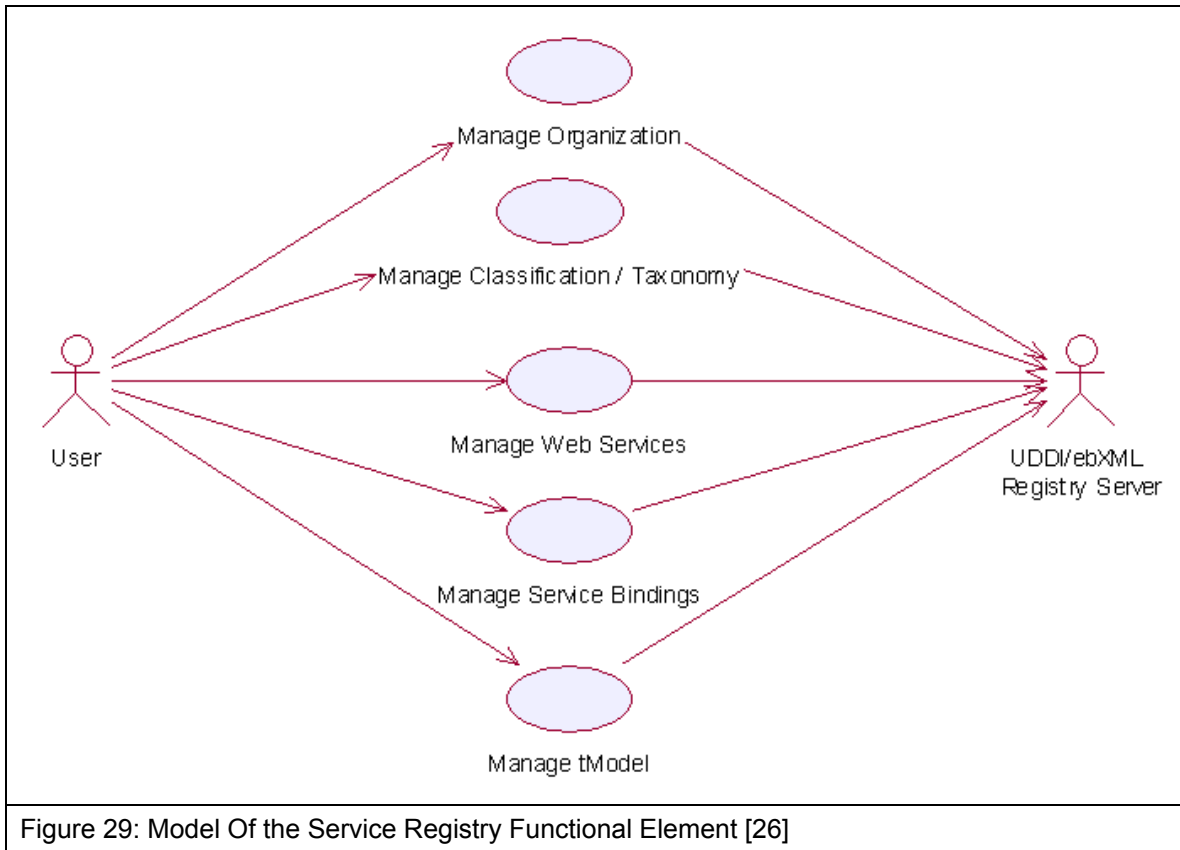


Figure 29: Model Of the Service Registry Functional Element [26]

5717 2.23.7 Usage Scenario

5718 2.23.7.1 Manage Classification / Taxonomy

5719 2.23.7.1.1 Description

5720 This use case allows any users to create, remove and view classification/taxonomy in the
5721 registry.

5722 2.23.7.1.2 Flow of Events

5723 2.23.7.1.2.1 Basic Flow

5724 This use case starts when the users of registry server wishes to create, remove or view the
5725 classification/taxonomy in the registry server.

5726

5727 1: User initiates a request type to the Functional Element stating whether to create, remove or
5728 view classification/taxonomy.

5729 2: The Functional Element checks whether the registry server exists.

5730 3: The Functional Element checks the request. Based on the type of request, one of the sub-
5731 flows is executed.

5732 If the request is to '**Create Classification/Taxonomy**', then sub-flow 3.1 is executed.

5733 If the request is to '**View Classification/Taxonomy**', then sub-flow 3.2 is executed.

5734 If the request is to '**Remove Classification/Taxonomy**', then sub-flow 3.3 is executed.

5735 3.1: Create Classification/Taxonomy.

5736 3.1.1: Other Functional Element provides username, password and registry server URL
5737 to the Functional Element for authentication.

5738 3.1.2: The Functional Element checks for the user validity in the identified registry server.

5739 3.1.3: Other Functional Element provides classification/taxonomy information to be
5740 created in the registry server.

5741 3.1.4: The Functional Element checks for the duplicate classification/taxonomy name.

5742 3.1.5: The Functional Element creates the classification/taxonomy information in the
5743 private (default) or the public UDDI registry server according to the URL provided by
5744 other Functional Element, if it does not exist.

5745 3.2: View Classification/Taxonomy.

5746 3.2.1: The Functional Element retrieves all the classification/taxonomy from the identified
5747 registry server, which may be private (default) or public.

5748 3.2.2: The Functional Element returns the classification/taxonomy information from the
5749 identified registry server to other Functional Element.

5750 3.3: Remove Classification/Taxonomy.

5751 3.3.1: Other Functional Element provides username, password and registry server URL
5752 to the Functional Element for authentication.

5753 3.3.2: The Functional Element checks for the user validity in the identified registry server.

5754 3.3.3: Other Functional Element provides classification/taxonomy key (i.e. UUID) to be
5755 removed from the identified registry server.

5756 3.3.4: The Functional Element removes the classification/taxonomy information from the
5757 private (default) or the public UDDI registry server according to the URL provided by the
5758 user.

5759 4: The Functional Element returns the status of the operation and the use case ends.

5760 **2.23.7.1.2.2 Alternative Flows**

5761 1: Registry Server Down.

5762 1.1: In the basic flow 2, if the identified registry server is down, the Functional Element
5763 returns an error message and the use case ends.

5764 2: Invalid Username And Password.

5765 2.1: In the basic flow 3.1.2 and 3.3.2, if the username or password is invalid, the Functional
5766 Element returns an error message and the use case ends.

5767 3: Classification/Taxonomy Key Not Found.

5768 3.1: In the basic flow 3.3.3, if the classification/taxonomy key cannot be found in the
5769 specified registry server, the Functional Element returns an error message and the use
5770 case ends.

5771 4: Duplicate Classification/Taxonomy.
5772 4.1: In the basic flow 3.1.4, If the same classification/taxonomy name has been defined in
5773 the registry server, the Functional Element returns an error message and the use case
5774 ends.

5775 **2.23.7.1.3 Special Requirements**
5776 None

5777 **2.23.7.1.4 Pre-Conditions**
5778 In order to manage the classification/taxonomy in the registry server, users must be registered
5779 with the registry server. Username and password will be given when a user registers with a
5780 registry server.

5781 **2.23.7.1.5 Post-Conditions**
5782 None.

5783 **2.23.7.2 Manage Web Services**

5784 **2.23.7.2.1 Description**
5785 This use case allows any users to register, remove and view Web Services in the private (default)
5786 as well as the public UDDI Registry Server.

5787 **2.23.7.2.2 Flow of Events**

5788 **2.23.7.2.2.1 Basic Flow**
5789 This use case starts when the users of registry server wishes to create, remove and view Web
5790 Services.

5791 1: User initiates a request type to the Functional Element stating whether to create, remove or
5792 view Web Services in the identified private or public registry server.

5793 2: The Functional Element checks whether the registry server exists.

5794 3: The Functional Element checks the request. Based on the type of request, one of the sub-
5795 flows is executed.

5796 If the request is to '**Create Web Service**', then sub-flow 3.1 is executed.

5797 If the request is to '**View Web Services**', then sub-flow 3.2 is executed.

5798 If the request is to '**Remove Web Service**', then sub-flow 3.3 is executed.

5799 3.1: Create Web Service.

5800 3.1.1: User provides username, password and registry server URL to the Functional
5801 Element for authentication.

5802 3.1.2: The Functional Element checks for the user validity in the identified registry server.

5803 3.1.3: Other Functional Element provides Web Service information to be created in the
5804 registry server.

5805 3.1.4: The Functional Element creates the Web Service information in the private
5806 (default) or the public UDDI registry server according to the URL provided by other
5807 Functional Element.

5808 3.2: View Web Services.

5809 3.2.1: The Functional Element retrieves all the Web Services from the identified registry
5810 server for specific stated conditions like service name search, business name search,
5811 etc.

5812 3.2.2: The Functional Element displays the Web Services information search results from
5813 the identified registry server to other Functional Element.

5814 3.3: Remove Web Service

5815 3.3.1 User provides username, password and registry server URL to the Functional
5816 Element for authentication.

5817 3.3.2: The Functional Element checks for the user validity in the identified registry server.

5818 3.3.3: Other Functional Element provides Web Service key (i.e. UUID) to be removed
5819 from the identified registry server.

5820 3.3.4: The Functional Element removes the Web Service information from the private
5821 (default) or the public UDDI registry server according to the URL provided by other
5822 Functional Element.

5823 4: The Functional Element returns the results of the operation and the use case ends.

5824 **2.23.7.2.2.2 Alternative Flows**

5825 1: Registry Server Down.

5826 1.1: In the basic flow 2, if the identified registry server is down, the Functional Element
5827 returns an error message and the use case ends.

5828 2: Invalid Username And Password.

5829 2.1: In the basic flow 3.1.2 and 3.3.2, if the username or password is invalid, the Functional
5830 Element returns an error message and the use case ends.

5831 3: Web Service Key Not Found.

5832 3.1: In the basic flow 3.3.3, if the Web Service key cannot be found in the specified registry
5833 server, the Functional Element returns an error message and the use case ends.

5834 **2.23.7.2.3 Special Requirements**

5835 **2.23.7.2.4 Pre-Conditions**

5836 In order to manage Web Services in the registry server, the users must be registered with the
5837 registry server. Username and password will be given when a user registers with a registry
5838 server.

5839 **2.23.7.2.5 Post-Conditions**

5840 None.

5841 **2.23.7.3 Manage Organization**

5842 **2.23.7.3.1 Description**

5843 This use case allows any users to create, remove and view organization in the registry.

5844 **2.23.7.3.2 Flow of Events**

5845 **2.23.7.3.2.1 Basic Flow**

5846 This use case starts when the users of registry server wishes to create, remove or view
5847 Organization.

5848 1: User initiates a request type to the Functional Element stating whether to create, remove or
5849 view Organization.

5850 2: The Functional Element checks whether the registry server exists.

5851 3: The Functional Element checks the request. Based on the type of request, one of the sub-
5852 flows is executed.

5853 If the request is to '**Create Organization**', then sub-flow 3.1 is executed.

5854 If the request is to '**View Organizations**', then sub-flow 3.2 is executed.

5855 If the request is to '**Remove Organization**', then sub-flow 3.3 is executed.

5856 3.1: Create Organization.

5857 3.1.1: Other Functional Element provides username, password and registry server URL
5858 to the Functional Element for authentication.

5859 3.1.2: The Functional Element checks for the user validity in the identified registry server.

5860 3.1.3: Other Functional Element provides organization information to be created in the
5861 registry server.

5862 3.1.4: The Functional Element checks for the duplicate organization name.

5863 3.1.5: The Functional Element creates the organization information in the private (default)
5864 or the public UDDI registry server according to the URL provided by other Functional
5865 Element, if it does not exist.

5866 3.2: View Organizations.

5867 3.2.1: The Functional Element retrieves all the organizations from the identified registry
5868 server for specific stated conditions like organization name, key, etc.

5869 3.2.2: The Functional Element returns the organization information from the identified
5870 registry server to other Functional Element.

5871 3.3: Remove Organization.

5872 3.3.1: Other Functional Element provides username, password and registry server URL
5873 to the Functional Element for authentication.

5874 3.3.2: The Functional Element checks for the user validity in the identified registry server.

5875 3.3.3: Other Functional Element provides Organization key (i.e. UUID) to be removed
5876 from the identified registry server.

5877 3.3.4: The Functional Element removes the Organization information from the private
5878 (default) or the public UDDI registry server according to the URL provided by the user.

5879 4: The Functional Element returns the status of the operation and the use case ends.

5880 **2.23.7.3.2.2 Alternative Flows**

5881 1: Registry Server Down.

5882 1.1: In the basic flow 2, if the identified registry server is down, the Functional Element
5883 returns an error message and the use case ends.

5884 2: Invalid Username And Password.

5885 2.1: In the basic flow 3.1.2 and 3.3.2, if the username or password is invalid, the Functional
5886 Element returns an error message and the use case ends.

5887 3: Organization Key Not Found.

5888 3.1: In the basic flow 3.3.3, if the Organization key cannot be found in the specified registry
5889 server, the Functional Element returns an error message and the use case ends.

5890 4: Duplicate Organization.

5891 4.1: In the basic flow 3.1.4, If the same Organization name has been defined in the registry
5892 server the Functional Element returns an error message and the use case ends.

5893 **2.23.7.3.3 Special Requirements**

5894 None

5895 **2.23.7.3.4 Pre-Conditions**

5896 In order to manage Organization in the registry server, users must be registered with the registry
5897 server. Username and password will be given when a user registers with a registry server.

5898 **2.23.7.3.5 Post-Conditions**

5899 None.

5900 **2.23.7.4 Manage Service Binding**

5901 **2.23.7.4.1 Description**

5902 This use case allows any users to register, remove and view Service Binding in the private
5903 (default) as well as the public UDDI Registry Server.

5904 **2.23.7.4.2 Flow of Events**

5905 **2.23.7.4.2.1 Basic Flow**

5906 This use case starts when the users of registry server wishes to create, remove and view Service
5907 Binding.

5908 1: User initiates a request type to the Functional Element stating whether to create, remove or
5909 view Service Binding in the identified private or public registry server.

5910 2: The Functional Element checks whether the registry server exists.

5911 3: The Functional Element checks the request. Based on the type of request, one of the sub-
5912 flows is executed.

- 5913 If the request is to '**Create Service Binding**', then sub-flow 3.1 is executed.
- 5914 If the request is to '**View Service Bindings**', then sub-flow 3.2 is executed.
- 5915 If the request is to '**Remove Service Binding**', then sub-flow 3.3 is executed.
- 5916 3.1: Create Service Binding.
- 5917 3.1.1: User provides username, password and registry server URL to the Functional
5918 Element for authentication.
- 5919 3.1.2: The Functional Element checks for the user validity in the identified registry server.
- 5920 3.1.3: Other Functional Element provides Service Binding information to be created in the
5921 registry server.
- 5922 3.1.4: The Functional Element creates the Service Binding information in the private
5923 (default) or the public UDDI registry server according to the URL provided by other
5924 Functional Element.
- 5925 3.2: View Service Bindings.
- 5926 3.2.1: The Functional Element retrieves all the Service Bindings from the identified
5927 registry server for specific stated conditions like service binding key search, etc.
- 5928 3.2.2: The Functional Element displays the Service Bindings information search results
5929 from the identified registry server to other Functional Element.
- 5930 3.3: Remove Service Binding
- 5931 3.3.1 User provides username, password and registry server URL to the Functional
5932 Element for authentication.
- 5933 3.3.2: The Functional Element checks for the user validity in the identified registry server.
- 5934 3.3.3: Other Functional Element provides Service Binding key (i.e. UUID) to be removed
5935 from the identified registry server.
- 5936 3.3.4: The Functional Element removes the Service Binding information from the private
5937 (default) or the public UDDI registry server according to the URL provided by other
5938 Functional Element.
- 5939 4: The Functional Element returns the results of the operation and the use case ends.

5940 **2.23.7.4.2.2 Alternative Flows**

- 5941 1: Registry Server Down.
- 5942 1.1: In the basic flow 2, if the identified registry server is down, the Functional Element returns
5943 an error message and the use case ends.
- 5944 2: Invalid Username And Password.
- 5945 2.1: In the basic flow 3.1.2 and 3.3.2, if the username or password is invalid, the Functional
5946 Element returns an error message and the use case ends.
- 5947 3: Service Binding Key Not Found.
- 5948 3.1: In the basic flow 3.3.3, if the Service Binding key cannot be found in the specified registry
5949 server, the Functional Element returns an error message and the use case ends.

5950 **2.23.7.4.3 Special Requirements**

5951 **2.23.7.4.4 Pre-Conditions**

5952 In order to manage Service Binding in the registry server, the users must be registered with the
5953 registry server. Username and password will be given when a user registers with a registry
5954 server.

5955 **2.23.7.4.5 Post-Conditions**

5956 None.

5957 **2.23.7.5 Manage tModel**

5958 **2.23.7.5.1 Description**

5959 This use case allows any users to register, remove and view tModel in the private (default) as
5960 well as the public UDDI Registry Server.

5961 **2.23.7.5.2 Flow of Events**

5962 **2.23.7.5.2.1 Basic Flow**

5963 This use case starts when the users of registry server wishes to create, remove and view tModel.

5964 1: User initiates a request type to the Functional Element stating whether to create, remove or
5965 view tModel in the identified private or public registry server.

5966 2: The Functional Element checks whether the registry server exists.

5967 3: The Functional Element checks the request. Based on the type of request, one of the sub-
5968 flows is executed.

5969 If the request is to '**Create tModel**', then sub-flow 3.1 is executed.

5970 If the request is to '**View tModels**', then sub-flow 3.2 is executed.

5971 If the request is to '**Remove tModel**', then sub-flow 3.3 is executed.

5972 3.1: Create tModel.

5973 3.1.1: User provides username, password and registry server URL to the Functional
5974 Element for authentication.

5975 3.1.2: The Functional Element checks for the user validity in the identified registry server.

5976 3.1.3: Other Functional Element provides tModel information to be created in the registry
5977 server.

5978 3.1.4: The Functional Element creates the tModel information in the private (default) or
5979 the public UDDI registry server according to the URL provided by other Functional
5980 Element.

5981 3.2: View tModels.

5982 3.2.1: The Functional Element retrieves all the tModels from the identified registry server
5983 for specific stated conditions like tModel name search, tModel key search, etc.

- 5984 3.2.2: The Functional Element displays the tModel information search results from the
5985 identified registry server to other Functional Element.
- 5986 3.3: Remove tModel.
- 5987 3.3.1 User provides username, password and registry server URL to the Functional
5988 Element for authentication.
- 5989 3.3.2: The Functional Element checks for the user validity in the identified registry server.
- 5990 3.3.3: Other Functional Element provides tModel key (i.e. UUID) to be removed from the
5991 identified registry server.
- 5992 3.3.4: The Functional Element removes the tModel information from the private (default)
5993 or the public UDDI registry server according to the URL provided by other Functional
5994 Element.
- 5995 4: The Functional Element returns the results of the operation and the use case ends.
- 5996 **2.23.7.5.2.2 Alternative Flows**
- 5997 1: Registry Server Down.
- 5998 1.1: In the basic flow 2, if the identified registry server is down, the Functional Element returns
5999 an error message and the use case ends.
- 6000 2: Invalid Username And Password.
- 6001 2.1: In the basic flow 3.1.2 and 3.3.2, if the username or password is invalid, the Functional
6002 Element returns an error message and the use case ends.
- 6003 3: tModel Key Not Found.
- 6004 3.1: In the basic flow 3.3.3, if the tModel key cannot be found in the specified registry server,
6005 the Functional Element returns an error message and the use case ends.
- 6006 **2.23.7.5.3 Special Requirements**
- 6007 **2.23.7.5.4 Pre-Conditions**
- 6008 In order to manage tModel in the registry server, the users must be registered with the registry
6009 server. Username and password will be given when a user registers with a registry server.
- 6010 **2.23.7.5.5 Post-Conditions**
- 6011 None.

6012 **2.24 Service Router Functional Element (new)**

6013 **2.24.1 Motivation**

6014

6015 Enable capability for easy and simple mechanisms for invoking web services by:

6016

- 6017 • Providing a façade to service requesters for services location transparency, services
- 6018 reliability.
- 6019 • Performing pre- and post- processing before and after web services invocation.

6020

6021 This Functional Element fulfills the following requirements from the Functional Elements
6022 Requirements:

6023

Primary Requirements

6024

1.3 PROCESS-250 to PROCESS-260.

6025

Secondary Requirements

6026

1.4 None

6027

6028 **2.24.2 Terms Used**

Terms	Description
Façade	Façade is exterior face or interface of a system, which hides the implementation details of the system.
Functional handler	Functional handler is a software component that performs certain business processing on the parameters passed.

6029

6030 Figure 30 depicts the basic concepts of how the participating entities collaborate together in the
6031 Service Router Functional Element. All the invocations from service client come to the Service
6032 router which servers as façade. The Service Router routes the invocation the actual web
6033 services. Functional handlers could be incorporated in the Functional Element or other Functional
6034 Elements. The functional handlers can be invoked before or after the actual web services are
6035 invoked.

6036

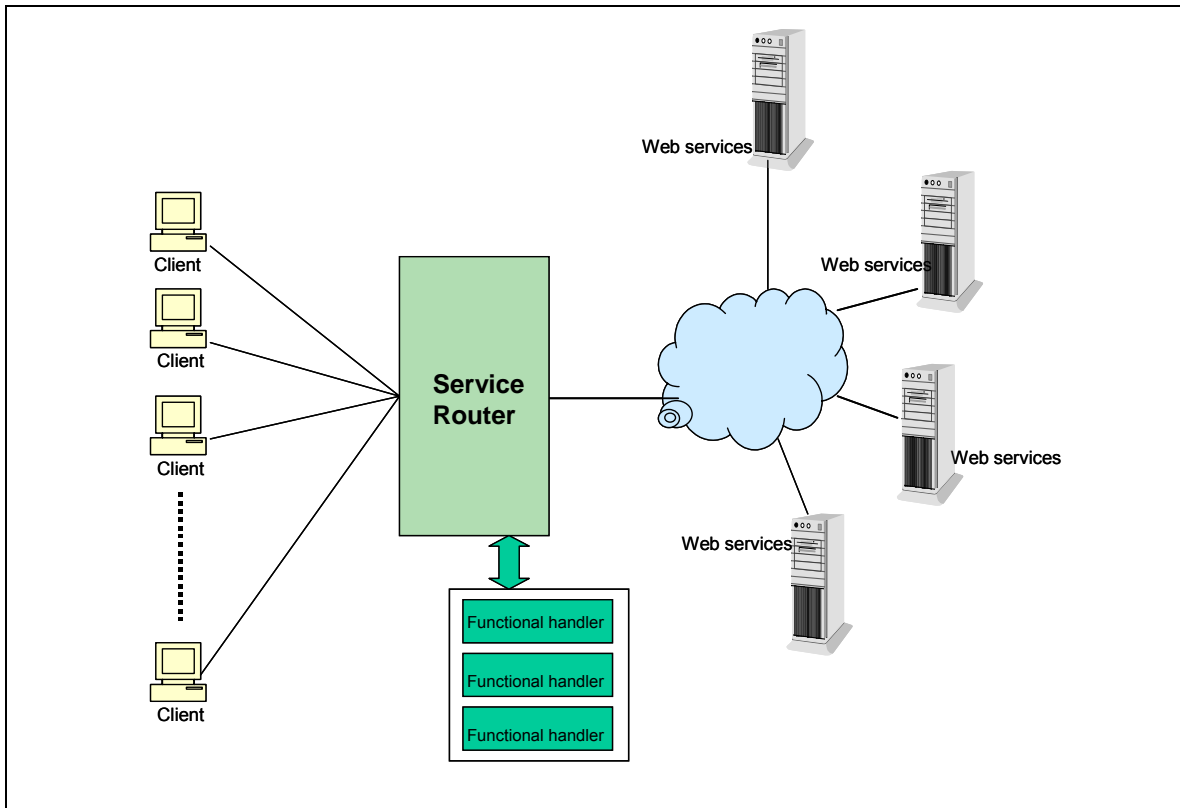


Figure 30: An Overview of the Service Router Functional Element

6037

6038 2.24.3 Key Features

6039 Implementations of the Service Router Functional Element are expected to provide the following
6040 key features:

- 6041 1. The Functional Element MUST provide mechanism as façade for web services invocations.
6042 This mechanism has the following capabilities:
 - 6043 1.1. Provide a single access point for web service invocation.
 - 6044 1.2. Provide the location transparency of actual web services.
- 6045 2. The Functional Element MUST provide capability to route web services invocation on
6046 behalf of service requesters to the specified actual web services.
- 6047 3. The Functional Element MUST provide capability to manage web services invocation in the
6048 aspects of invocation time-out, transaction management.
- 6049 4. The Functional Element MUST provide capability to manage the registration of web
6050 services that are going to be invoked.
- 6051 5. The Functional Element MUST provide capability to deploy registered web services
6052 automatically into the façade.
- 6053 6. The Functional Element MUST provide mechanism to incorporate functional handlers.
- 6054 7. The Functional Element MUST provide capability to perform processing by invoking
6055 functional handlers defined for a web services invocation before the web services is really
6056 invoked.
- 6057 8. The Functional Element MUST provide capability to perform processing by invoking
6058 functional handlers for a web services invocation after the web services is invoked.

- 6059 9. The Functional Element MUST provide capability to manage functional handlers.
6060 10. The Functional Element MUST provide capability to manage the parameter mappings
6061 between two adjacent functional handlers and parameter mapping between functional
6062 handler and web services.

6063

6064 In addition, the following key features could be provided to enhance the Functional Element
6065 further:

- 6066 1. The Functional Element MAY provide capability to invoke the alternative web services if the
6067 actual web services that is targeted to invoke is not available.
- 6068 2. The Functional Element MAY provide the capability to define a sequence of functional
6069 handlers for a web services for a web services invocation.
- 6070 3. The Functional Element MAY provide capability to enable the invocation of functional
6071 handlers in pre-defined sequence for a web for a web services invocation.

6072

6073 **2.24.4 Interdependencies**

6074 None.

6075

6076 **2.24.5 Related Technologies and Standards**

6077 None.

6078

2.24.6 Model

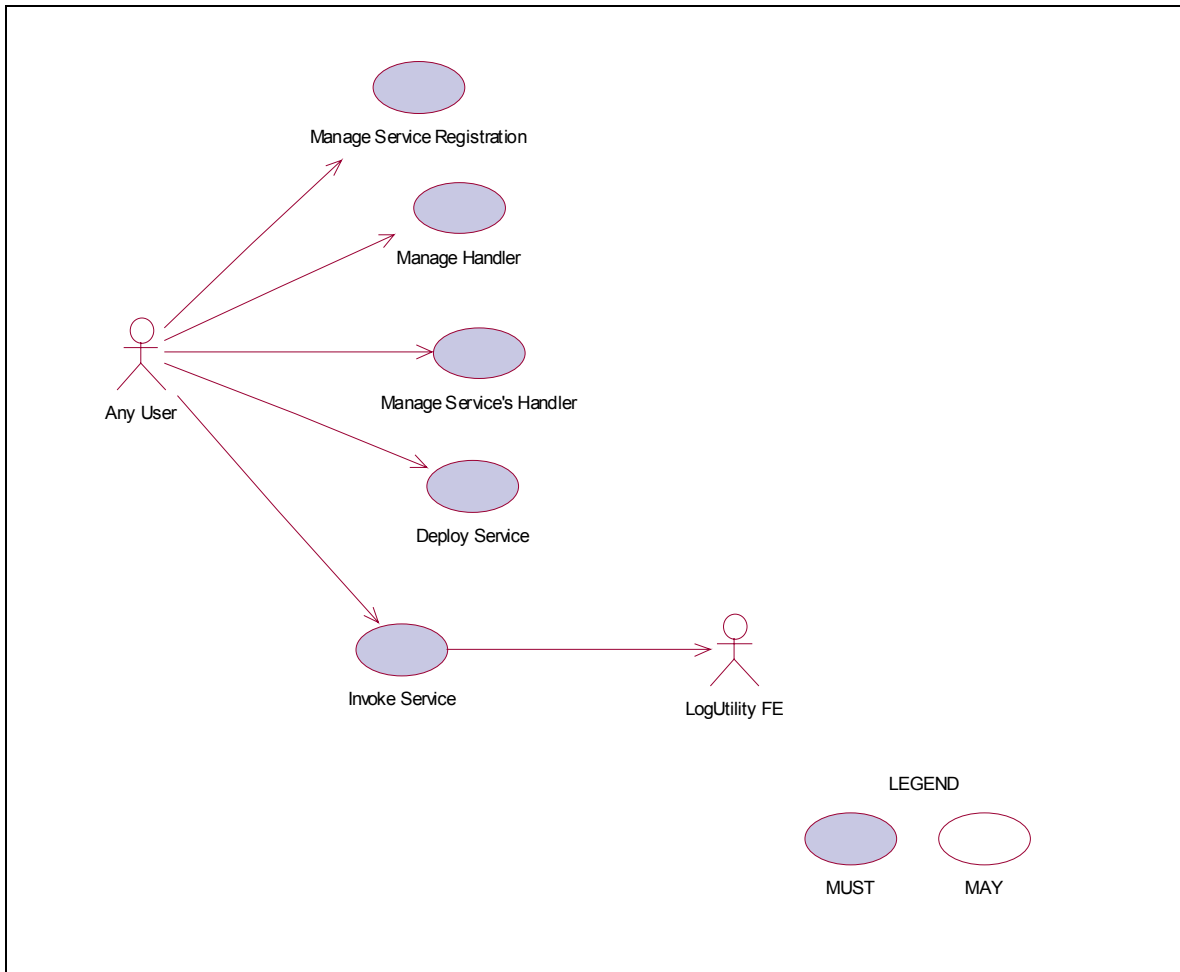


Figure 31: Model Of the Service Router Functional Element [27]

6079

6080 2.24.7 Usage Scenarios

6081 2.24.7.1 Manage Service Registration

6082 2.24.7.1.1 Description

6083 This use case allows the user to register, remove and view web services from or to the service
6084 router.

- 6085 • Register Web Service

6086 Web services details are registered to the service router.

- 6087 • Delete Web Service

6088 Web services are removed from the service router.

- 6089 • View Web Service

6090 View the registration information of a web service.

6091 **2.24.7.1.2 Flow of Events**

6092 **2.24.7.1.2.1 Basic Flow**

6093 This use case starts when the user of service router wishes to register, remove and view web
6094 services registration.

6095 1: The user initiates a request type to the Functional Element stating whether to register, remove
6096 or view web services registration in the service router.

6097 2: The Functional Element checks the request. Based on the type of request, one of the sub-
6098 flows is executed. If the request is to register a new web service in the service router, system
6099 executes 'Register Web Service'. If the request is to view web services from the service router,
6100 system executes 'View Web Services'. If the request is to remove a web service from the service
6101 router, system executes 'Remove Web Service'.

6102 2.1: Register Web Service.

6103 2.1.1: The user provides the WSDL of a web service.

6104 2.1.2: The user provides other web service information to be kept in the service
6105 router.

6106 2.1.3: The Functional Element retrieves web service information from the WSDL and
6107 keeps them into the registry.

6108 2.2: View Web Services.

6109 2.2.1: The Functional Element retrieves the service from the registry with the specific
6110 service name.

6111 2.2.2: The Functional Element returns the web services information results to the
6112 user.

6113 2.3: Remove Web Service

6114 2.3.1: The user provides web service name to be removed from the identified
6115 registry server.

6116 2.3.2: The Functional Element removes the web service information from the
6117 registry.

6118 3: The Functional Element responses the status of the operation whether it is successful or failure
6119 to the user and the use case ends.

6120 **2.24.7.1.2.2 Alternative Flows**

6121 1: WSDL error.

6122 1.1: In the Basic Flow 2.1.1, if the WSDL could not be retrieved, "WSDL error" will be sent
6123 back.

6124 2: Service does not exist

6125 2.1: In the Basic Flow 2.2.1 and 2.3.1, if the service name does not exist, "Service does not
6126 exist" error will be sent back.

6127 **2.24.7.1.3 Special Requirements**

6128 None.

6129 **2.24.7.1.4 Pre-Conditions**

6130 None.

6131 **2.24.7.1.5 Post-Conditions**

6132 None.

6133

6134 **2.24.7.2 Manage Handler**

6135 **2.24.7.2.1 Description**

6136 This use case allows any user to add, remove and view handler to the service router.

6137 **2.24.7.2.2 Flow of Events**

6138 **2.24.7.2.2.1 Basic Flow**

6139 This use case starts when the user of registry server wishes to add, remove or view web service
6140 handlers.

6141 1: The user initiates a request type to the Functional Element stating whether to add, remove or
6142 view web service handlers.

6143 2: The Functional Element checks the request. Based on the type of request, one of the sub-
6144 flows is executed. If the request is to add a new web service handler to the router, system
6145 executes 'Add Service Handler'. If the request is to view web service handlers, system executes
6146 'View Service Handlers'. If the request is to remove a handler from the router, system executes
6147 'Remove Service Handler'.

6148 2.1: Add Service Handler.

6149 2.1.1: The user provides handler name and location to The Functional Element.

6150 2.1.2: The service adds the information to the registry.

6151 2.2: View Service Handlers.

6152 2.2.1: The Functional Element receives a handler name from the user.

6153 2.2.2: The Functional Element returns the information of the handler to the user.

6154 2.3: Remove Service Handler.

6155 2.3.1: The user provides handler name to be removed from the service router.

6156 2.3.2: The Functional Element removes the service handler from the registry.

6157 3: The Functional Element responses the status of the operation whether it is successful or failure
6158 to the user and the use case ends.

6159 **2.24.7.2.2 Alternative Flows**

6160 1: Handler name error.

6161 1.1: In the Basic Flow 2.2.1 and 2.3.1, if the handler name does not exist, system displays an
6162 error message and exits the use case.

6163

6164 **2.24.7.2.3 Special Requirements**

6165 None.

6166 **2.24.7.2.4 Pre-Conditions**

6167 None.

6168 **2.24.7.2.5 Post-Conditions**

6169 None.

6170

6171 **2.24.7.3 Manage Service's Handler**

6172 **2.24.7.3.1 Description**

6173 This use case allows the user to add, remove and view handlers to the services registered in the
6174 service router.

6175 • Add a handler to a service

6176 New handler is added to a registered service.

6177 • Remove a handler to a service

6178 Existing handler is removed from a registered service.

6179 • View service's handler

6180 Existing handlers of a service could be viewed by the user.

6181 **2.24.7.3.2 Flow of Events**

6182 **2.24.7.3.2.1 Basic Flow**

6183 This use case starts when the user of service router wishes to add, remove or view handlers to a
6184 service.

6185 1: The user initiates a request type to the Functional Element stating whether to add, remove or
6186 view handlers to a service.

6187 2: The Functional Element checks the request. Based on the type of request, one of the sub-
6188 flows is executed. If the request is to add a new web service handler to a registered web service,
6189 system executes 'Add Service Handler'. If the request is to view web service handlers, system
6190 executes 'View Service Handlers'. If the request is to remove a handler from a service, system
6191 executes 'Remove Service Handler'.

- 6192 2.1: Add Service Handler.
- 6193 2.1.1: The user provides handler name, service name and parameter mappings to The
6194 Functional Element.
- 6195 2.1.2: The service adds the information to the registry.
- 6196 2.2: View Service Handlers.
- 6197 2.2.1: The Functional Element receives the service name from the user.
- 6198 2.2.2: The Functional Element retrieves all the handlers and return to the user.
- 6199 2.3: Remove Service Handler.
- 6200 2.3.1: The user provides handler name and service name to be removed from the
6201 service router.
- 6202 2.3.2: The Functional Element removes the service handler from the registry.
- 6203 3: The Functional Element responses the status of the operation whether it is successful or failure
6204 to the user and the use case ends.
- 6205 **2.24.7.3.2 Alternative Flows**
- 6206 1: Handler name or service name does not exist.
- 6207 1.1: In the Basic Flow 2.1.1, 2.2.1 and 2.3.1, if the service name or the handler name does
6208 not exist, system displays an error message and exits the use case.
- 6209 **2.24.7.3.3 Special Requirements**
- 6210 None.
- 6211 **2.24.7.3.4 Pre-Conditions**
- 6212 None.
- 6213 **2.24.7.3.5 Post-Conditions**
- 6214 None.
- 6215
- 6216 **2.24.7.4 Deploy Service**
- 6217 **2.24.7.4.1 Description**
- 6218 This use case allows the user to deploy registered services to an application server.
- 6219 • Add server information to The Functional Element
- 6220 New server is added to a registered service.
- 6221 • Remove server information to The Functional Element
- 6222 Existing server is removed from a registered service.
- 6223 • View server information

6224 Existing server information could be viewed by the user.

6225 • Deploy service

6226 Deploy a registered service to a server.

6227 .

6228 **2.24.7.4.2 Flow of Events**

6229 **2.24.7.4.2.1 Basic Flow**

6230 This use case starts when the user of service router wishes to add, remove, view server
6231 information or deploy a web service to a server.

6232 1: The user initiates a request type to the Functional Element stating whether to add, remove or
6233 view server's information or deploy service.

6234 2: The Functional Element checks the request. Based on the type of request, one of the sub-
6235 flows is executed. If the request is to add a server to the router, system executes 'Add Server'. If
6236 the request is to view server information, system executes 'View Server'. If the request is to
6237 remove a server from the router, system executes 'Remove Server'. If the request is to deploy a
6238 service to a server, system executes 'Deploy Service'.

6239 2.1: Add Server.

6240 2.1.1: The user provides server name and location of the server.

6241 2.1.2: The service adds the information to the registry.

6242 2.2: View Server.

6243 2.2.1: The Functional Element receives the server name from the user.

6244 2.2.2: The Functional Element retrieves the information and return to the user.

6245 2.3: Remove Server.

6246 2.3.1: The user provides the server name from the service router.

6247 2.3.2: The Functional Element removes the server from the registry.

6248 2.4: Deploy Service.

6249 2.4.1: The user provides the server name and service name from the service router.

6250 2.4.2: The Functional Element generate code package the service and deploy it to
6251 the server.

6252 3: The Functional Element responses the status of the operation whether it is successful or failure
6253 to the user and the use case ends.

6254 **2.24.7.4.2.2 Alternative Flows**

6255 1: Service name or server name does not exist.

6256 1.1: In the Basic Flow 2.2.1, 2.3.1 and 2.4.1, if the service name or the server name does not
6257 exist, system displays an error message and exits the use case.

6258

6259 **2.24.7.4.3 Special Requirements**

6260 None.

6261 **2.24.7.4.4 Pre-Conditions**

6262 None.

6263 **2.24.7.4.5 Post-Conditions**

6264 None.

6265

6266 **2.24.7.5 Invoke Service**

6267 **2.24.7.5.1 Description**

6268 This use case allows the user to invoke registered services through the Service Router. It is
6269 expected to utilise the Notification FE and Log Util FE in the implementation of this use case.

6270 **2.24.7.5.2 Flow of Events**

6271 **2.24.7.5.2.1 Basic Flow**

6272 This use case starts when the user of service router wishes to invoke a deployed or registered
6273 service.

6274 1: The user initiates a request to the Service Router.

6275 2: The Functional Element checks the request, and determines if the invoked service has any
6276 pre-invocation Functional Handlers. If so, the handlers are invoked.

6277 3: The Functional Element then routes the request to the actual service based on registration
6278 information captured.

6279 4: When the result from the actual service is returned, the Functional Element checks if there is
6280 any post-invocation Functional Handlers. If so, the handlers are invoked.

6281 5: The Functional Element returns the result of invocation to the user and the use case ends.

6282

6283 **2.24.7.5.2.2 Alternative Flows**

6284 1: Functional Handlers are not available.

6285 1.1: In the Basic Flow 2 and 4, if the Functional Handlers are not available, an error message
6286 will be returned, and the use case ends.

6287 2: Invoked Service is not available.

6288 2.1: In the Basic Flow 3, if the invoked Service is not available, an error message will be
6289 returned, and the use case ends.

6290

6291 **2.24.7.5.3 Special Requirements**

6292 None.

6293 **2.24.7.5.4 Pre-Conditions**

6294 None.

6295 **2.24.7.5.5 Post-Conditions**

6296 None.

6297

6298 **2.25 Service Tester Functional Element (Deprecated)**

6299

6300 This Functional Element has been deprecated in this version. Please refer to its replacement,
6301 2.15 QoS Functional Element (new) for further details.

6302 **2.26 Transformer Functional Element (new)**

6303 **2.26.1 Motivation**

6304 Different applications support different format of files or message. Sometimes same information
6305 needs to be represented in different format in different use cases. This element tries to provide a
6306 framework to facilitate transformation between files or messages.

6307

6308 This Functional Element fulfills the following requirements from the Functional Elements
6309 Requirements:

- 6310 • Primary Requirements
- 6311 • DELIVERY-150,
- 6312 • DELIVERY-151,
- 6313 • DELIVERY-152,
- 6314 • DELIVERY-153,
- 6315 • DELIVERY-155, and
- 6316 • DELIVERY-157.

6317

6318 **2.26.2 Terms Used**

Terms	Description
API Handlers	Binary components which are deployed at the same location as the element. This component provides a set of APIs for the element to invoke to transform files or messages.
Web Services Handler	A web service which are used by the element to invoke to transform files or messages.
WSDL	Web Services Description Language
XSLT	Extensible Stylesheet Language Transformation

6319

6320 Figure 32 depicts the basic concepts of 2 steps approach of Transformer Functional Element.
6321 Step 1 begins when the user (service requester) requests to define supported message, file
6322 types, XSLT templates and process handlers. The Function Element persists these definitions
6323 the return the results. Step 2 begins when the user requests for file or message transformation.
6324 The user provides messages or files to be transformed. The Functional Element will do the
6325 transformation and returns the result to the user.

6326

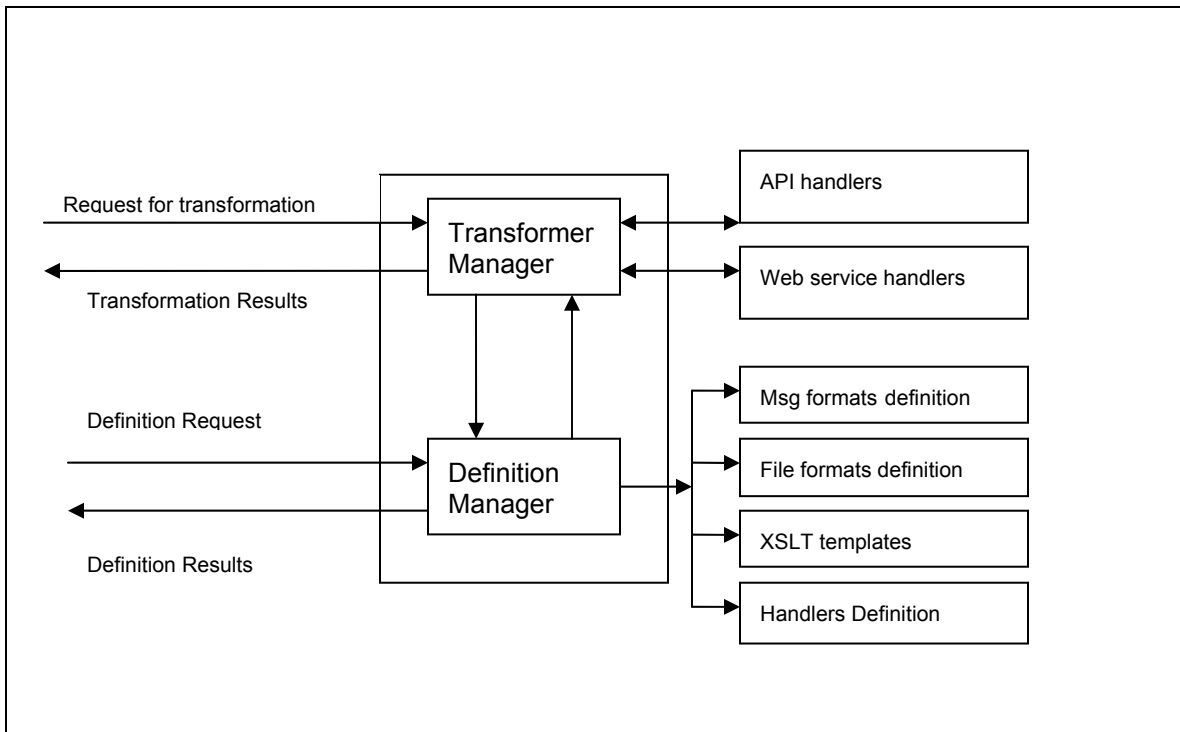


Figure 32: An Overview of Transformer Functional Element

6328

6329 2.26.3 Key Features

6330 Implementations of the Transformer Functional Element are expected to provide the following key
6331 features:

- 6332 1. The Functional Element MUST provide the capability to manage supported files and
6333 messages.
- 6334 2. The Functional Element MUST provide the capability to manage XSLT templates.
- 6335 3. The Functional Element MUST provide the capability to manage handlers for transformation.
- 6336 4. The Functional Element MUST provide the handler to transform SOAP, WSDL messages.

6337

6338 In addition, the following key features could be provided to enhance the Functional Element
6339 further:

- 6340 1. The Functional Element MAY provide the capability to chain handlers.
- 6341 2. The Functional Element MAY provide the capability to measure the performance of handlers.
- 6342 3. The Functional Element MAY provide the capability to select the efficient handlers to do the
6343 transformation.

6344

6345 2.26.4 Interdependencies

Direct Dependency

Log Utility Functional Element	The Log Utility Functional Element is used to record the data.
--------------------------------	----------------------------------------------------------------

6346

6347 **2.26.5 Related Technologies and Standards**

Specifications	Description
SOAP 1.2	The ability to parse the SOAP message.
WSDL 1.1	The ability to parse the WSDL.

6348

6349 **2.26.6 Model**

6350

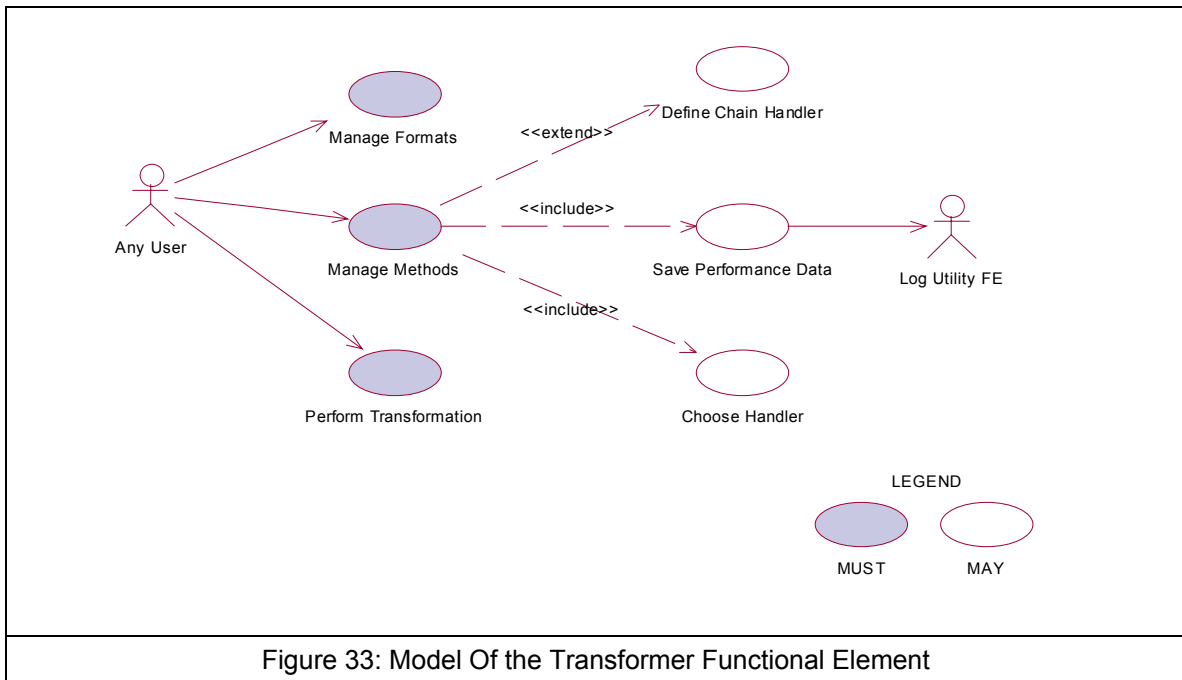


Figure 33: Model Of the Transformer Functional Element

6351

6352 **2.26.7 Usage Scenarios**

6353 **2.26.7.1 Manage Formats**

6354 **2.26.7.1.1 Description**

6355 This use case allows the user to manage file or message formats supported by this element.

6356 **2.26.7.1.2 Flow of Events**

6357 **2.26.7.1.2.1 Basic Flow**

6358 This use case starts when the user wants to manage file or message formats.

6359 1: The user provides the management operation to the functional element.

6360 2: Based on the operation one of the following sub-flow is executed. If the operation is “add-
6361 format” sub-flow 2.1 is executed. If the operation is “delete-format” sub-flow 2.2 is executed. If
6362 the operation is “query-format” sub-flow 2.3 is executed.

6363 2.1: Add format

6364 2.1.1: The system gets the format name, file extension name.

6365 2.1.2: The system save this information.

6366 2.2: Delete format

6367 2.2.1: The system gets the format name.

6368 2.2.2: The system deletes format information.

6369 2.3: Query format:

6370 2.3.1: The system gets the format name.

6371 3: The Functional Element responses the status of the operation whether it is successful or failure
6372 to the user and the use case ends.

6373 **2.26.7.1.2.2 Alternative Flows**

6374 1: Format Name Already Registered.

6375 1.1 In Basic Flow 2.1.2, if the format name already registered, the system will assign error
6376 message to the result message.

6377 2: Format Name Does Not Exist

6378 2.1 In Basic Flow 2.2.2, if the format name does not exist, the system will assign error
6379 message to the result message.

6380 **2.26.7.1.3 Special Requirements**

6381 None.

6382 **2.26.7.1.4 Pre-Conditions**

6383 None.

6384 **2.26.7.1.5 Post-Conditions**

6385 None.

6386

6387

6388 **2.26.7.2 Manage Methods**

6389 **2.26.7.2.1 Description**

6390 This use case allows the user to manage the methods that are used to do the transformation.

6391 **2.26.7.2.2 Flow of Events**

6392 **2.26.7.2.2.1 Basic Flow**

6393 This use case starts when a user wants to manage the methods that are used to do the
6394 transformation.

6395 1. The user provides the management operation and data.

6396 2. Based on the operation it specified, one of the following sub-flows is expected. If the operation
6397 is 'Add Method', then sub-flow 2.1 is executed. If the operation is 'Delete Method', then sub-flow
6398 2.2 is executed. If the operation is "Query Method", then sub-flow 2.3 is executed.

6399 2.1: Add Method.

6400 2.1.1: The user sets the file method name, type (API or Web Service), Input file format
6401 location and Output file format location, or user submits the WDSL of a known web
6402 service.

6403 2.1.2: The system save this information.

6404 2.2: Delete Method.

6405 2.2.1: The user sets the method name.

6406 2.2.2: The system deletes this information

6407 2.3: Query Method.

6408 2.3.1: The user sets the method name, or input format, or output format.

6409 3: The Functional Element responses the status of the operation whether it is successful or failure
6410 to the user and the use case ends.

6411 **2.26.7.2.2.2 Alternative Flows**

6412 1: Method Name Already Registered.

6413 1.1 In Basic Flow 2.1.2, if the format name already registered, the system will assign error
6414 message to the result message.

6415 2: Method Name Does Not Exist.

6416 2.1 In Basic Flow 2.2.2, if the format name does not exist, the system will assign error
6417 message to the result message.

6418 **2.26.7.2.3 Special Requirements**

6419 None.

6420 **2.26.7.2.4 Pre-Conditions**

6421 None.

6422 **2.26.7.2.5 Post-Conditions**

6423 None.

6424

6425

6426 **2.26.7.3 Perform Transformation**

6427 **2.26.7.3.1 Description**

6428 This use case allows the user to transform a file from one format to another format.

6429 **2.26.7.3.2 Flow of Events**

6430 **2.26.7.3.2.1 Basic Flow**

6431 This use case starts when a user wants to transform a file from one format to another format.

6432 1: The user set the file name to be transformed and the destination format.

6433 2: The system checks all the methods which use this file as input.

6434 3: The system checks all the methods which use the destination format as output.

6435 4: Select one method based on the performance data recorded before.

6436 5: Invoke the methods and save the performance data.

6437 6: Return the results and the use case ends.

6438 **2.26.7.3.2.2 Alternative Flows**

6439 1: If in Basic Flow 4 there is there is no method to do the transformation, the system return error
6440 message to the user and this use case ends.

6441 **2.26.7.3.3 Special Requirements**

6442 None.

6443 **2.26.7.3.4 Pre-Conditions**

6444 None.

6445 **2.26.7.3.5 Post-Conditions**

6446 None.

6447

6448

6449 **2.26.7.4 Define Chain Handler**

6450 **2.26.7.4.1 Description**

6451 This use case allows the user to create new handler based on the existing handler if a
6452 transformation could be done directly but could be done indirectly through a chain of existing
6453 handler.

6454 **2.26.7.4.2 Flow of Events**

6455 **2.26.7.4.2.1 Basic Flow**

6456 1: User sets the chain handler name and the handlers involved in this chain.

6457 2: The system gets the input format name of the first handler and the output format name of the
6458 last handler.

6459 3: The system save this information.

6460 4: Return the results to the user and end the use case.

6461 **2.26.7.4.2.2 Alternative Flows**

6462 1: If the handler name could not be found in Basic Flow 2, system returns the results to the user
6463 and the use case ends.

6464 **2.26.7.4.3 Special Requirements**

6465 None.

6466 **2.26.7.4.4 Pre-Conditions**

6467 None.

6468 **2.26.7.4.5 Post-Conditions**

6469 None.

6470

6471

6472 **2.26.7.5 Choose Handler**

6473 **2.26.7.5.1 Description**

6474 This use case allows the system to choose a handler for transformation.

6475 **2.26.7.5.2 Flow of Events**

6476 **2.26.7.5.2.1 Basic Flow**

6477 This use case starts when the transform use case needs a handler to do the transformation.

6478 1. The system checks the handlers that match the input and out put format.

6479 2: The system returns the name of the handler to the transform use case and ends this use case.

6480 **2.26.7.5.2.2 Alternate Flow**

6481 1: In Basic Flow 1, if there are more handlers available and performance data are available, then
6482 the system select the handler with the best performance data. Otherwise select any one.

6483 2: In Basic Flow 1, if the handler is a XSLT template, return the template name to the transform.

6484 **2.26.7.5.3 Special Requirements**

6485 None.

6486 **2.26.7.5.4 Pre-Conditions**

6487 None.

6488 **2.26.7.5.5 Post-Conditions**

6489 None.

6490

6491

6492 **2.26.7.6 Save Performance Data**

6493 **2.26.7.6.1 Description**

6494 This use case saves performance data of each handler.

6495 **2.26.7.6.2 Flow of Events**

6496 **2.26.7.6.2.1 Basic Flow**

6497 This use case starts when user wants to measure the performance of the handlers.

6498 1: It starts time counting.

6499 2: Collection CPU information, DISK access information and Network traffic information.

6500 3: Waiting for the termination of the handler.

6501 4: Save this information and end the use case.

6502 **2.26.7.6.2.2 Alternative Flows**

6503 1: In Basic Flow 3, If the log file is not available, the Functional Element returns an error and the
6504 user case ends.

6505 **2.26.7.6.3 Special Requirements**

6506 None.

6507 **2.26.7.6.4 Pre-Conditions**

6508 None.

6509 **2.26.7.6.5 Post-Conditions**

6510 None.

6511

6512

6513 **2.27 User Management Functional Element**

6514 **2.27.1 Motivation**

6515 The User Management Functional Element is expected to be an integral part of the user access
6516 management (UAM) functionalities that is expected to be needed by a Web Service-enabled
6517 implementation. This FE is expected to fulfill the needs arising out of managing resources within
6518 an application, with a user-centric viewpoint. As such it will cover aspects that include:

- 6519 Basic user accounts management facilities,
- 6520 Ability to extend dynamically from the basic set of account information,
- 6521 Capability for configurable policies governing account management,
- 6522 Providing log trails for user activities, and
- 6523 Management of user authentication means, either directly or indirectly.

6524

6525 This Functional Element fulfills the following requirements from the Functional Elements
6526 Requirements, Working Draft 01a:

6527 Primary Requirements

- 6528 • MANAGEMENT-001 to MANAGEMENT-003,
- 6529 • MANAGEMENT-005,
- 6530 • MANAGEMENT-008,
- 6531 • MANAGEMENT-012, and
- 6532 • SECURITY-002 (all).

6533 Secondary Requirements

- 6534 • SECURITY-001.

6535

6536 **2.27.2 Terms Used**

Terms	Description
Namespace	Namespace is use to segregate the instantiation of the application across different application domains. If a company has two separate standalone application, for example, an email application and an equipment booking application, then these two are considered as separate application domains.
User	A user is loosely defined to include both human and virtual users. Virtual users could include service users and application (or machine) users that are utilising other services in a SOA environment.

User Access Management / UAM	<p>User Access Management or UAM refer to the concept of managing users in a holistic manner, considering all aspect which includes:</p> <p>Defining a set of basic user information that should be stored in any enterprise application.</p> <p>Providing a means to extend this basic set of user information when needed.</p> <p>Simplifying management by grouping related users together through certain criteria.</p> <p>Having the flexibility of adopting both coarse/fine grain access controls.</p>
User Repository	User Repository is where the user information is stored. It can be a database or a flat file.

6537

6538 2.27.3 Key Features

6539 Implementations of the User Management Functional Element are expected to provide the
6540 following key features:

- 6541 1. The Functional Element MUST provide a User Repository.
- 6542 2. The Functional Element MUST be able to control access to such a User Repository.
- 6543 3. The Functional Element MUST provide a basic User structure with a set of pre-defined
6544 attributes.
- 6545 4. The Functional Element MUST provide the capability to extend on the basic User structure
6546 dynamically.
- 6547 5. As part of Key Feature (4), this dynamic extension MUST be definable and configurable at
6548 runtime implementation of the Functional Element.
- 6549 6. The Functional Element MUST provide the capability to manage the creation and deletion of
6550 instances of Users based on defined structure.
- 6551 7. The Functional Element MUST provide the capability to manage all the information (attribute
6552 values) stored in such Users. This includes the capability to:
 - 6553 7.1. Retrieve and update attribute's values belonging to a User,
 - 6554 7.2. Generate a random password,
 - 6555 7.3. Encrypt sensitive user information, and
 - 6556 7.4. Authenticate a user.
- 6557 8. As part of Key Feature (7.4), the authentication of a User MUST be achieved at least through
6558 the use of a password.
- 6559 9. The Functional Element MUST provide a mechanism for managing Users across different
6560 application domains.

6561 *Example: Namespace control mechanism*

6562

6563 In addition, the following key features could be provided to enhance the Functional Element
6564 further:

- 6565 1. The Functional Element MAY provide a mechanism to control the username format.
6566 *Example: Usernames must be at least 8 characters long.*
- 6567 2. The Functional Element MAY provide additional security mechanisms to enhance the
6568 security of sensitive information like user passwords.

- 6569 *Example: Passwords are stored in security tokens, or a more secure encryption algorithms*
 6570 *for passwords.*
- 6571 3. If Key Feature (2) is provided, the Functional Element MAY also provide a selection of
 6572 selectable encryption algorithms.
- 6573 4. The Functional Element MAY provide additional security policies to ensure that systems are
 6574 not compromised.
- 6575 *Example: Passwords must be changed every 30 days.*
- 6576 5. If Key Feature (4) is provided, the Functional Element MAY also provide a facility to notify
 6577 users before the password expires.
- 6578

6579 **2.27.4 Interdependencies**

Interaction Dependencies	
Group Management Functional Element	The Group Management Functional Element may be used to provide useful aggregation of the users.
Phase and Lifecycle Management Functional Element	The Phase and Lifecycle Management Functional Element may be used to maintain the relationships between various phases of a project lifecycle and the group who is working on it.
Role and Access Management Functional Element	The Role and Access Management Functional Element may be used to manage the user's access rights by virtue of it's association with a group, phase or even the complete lifecycle of the project.

6580

6581 **2.27.5 Related Technologies and Standards**

6582 None

6583 **2.27.6 Model**

6584

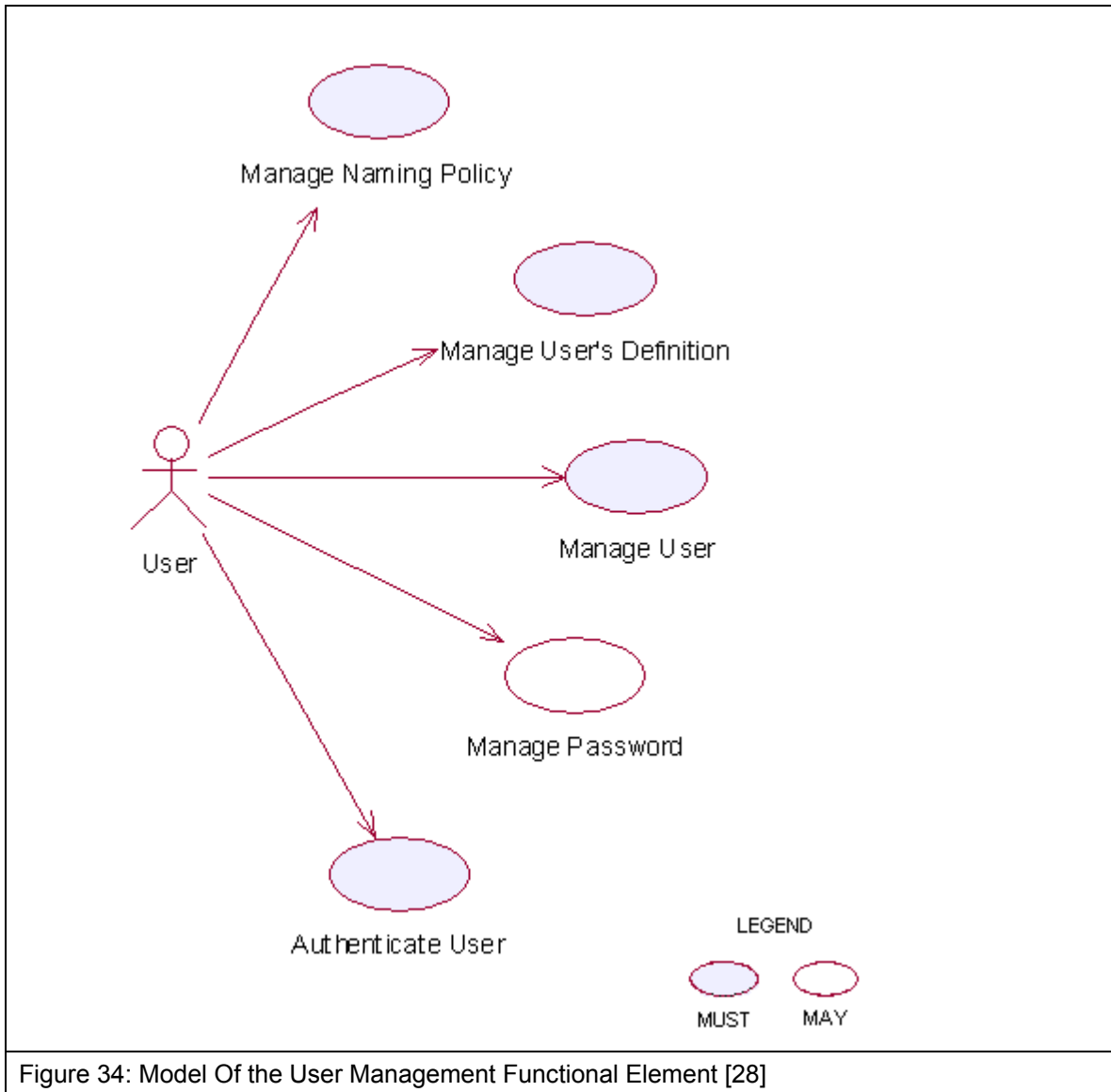


Figure 34: Model Of the User Management Functional Element [28]

6585 **2.27.7 Usage Scenarios**

6586 **2.27.7.1 Manage Naming Policy**

6587 **2.27.7.1.1 Description**

6588 This use case allows any user to manage naming policy when creating/updating user accounts.
 6589 The service user may create, update, retrieve and delete a naming policy.

6590 **2.27.7.1.2 Flow of Events**

6591 **2.27.7.1.2.1 Basic Flow**

6592 This use case starts when any user wants to manage naming policy for creating/updating user
 6593 account.

- 6594 1: The user sends Manage Naming Policy request to the Functional Element together with the
6595 specified operation.
- 6596 2: Functional Element gets the operation. Based on the operation, one of the sub-flows is
6597 executed.
- 6598 If the service user provides '**Create Naming Policy**', then sub-flow 2.1 is executed.
- 6599 If the service user provides '**Update Naming Policy**', then sub-flow 2.2 is executed.
- 6600 If the service user provides '**Delete Naming Policy**', then sub-flow 2.3 is executed.
- 6601 2.1: Create Naming Policy.
- 6602 2.1.1: The service user specifies namespace, name and description of the policy to
6603 create, for example, the policy name may be name length, the policy description may be
6604 "=7".
- 6605 2.1.2: The Functional Element checks the existing naming policy.
- 6606 2.1.3: The Functional Element generates naming policy information and adds to the
6607 Functional Element and the use case ends.
- 6608 2.2: Update Naming Policy.
- 6609 2.2.1: The service user specifies the policy to update.
- 6610 2.2.2: The Functional Element retrieves the existing naming policy information.
- 6611 2.2.3: The service user provides the update naming policy information according to the
6612 policy name used in creating a naming policy.
- 6613 2.2.4: The Functional Element updates the naming policy with the updated information
6614 and ends use case.
- 6615 2.3: Retrieve Naming Policy.
- 6616 2.3.1: The service user specifies the policy to retrieve.
- 6617 2.3.2: The Functional Element retrieves the existing naming policy information and ends
6618 the use case.
- 6619 2.4: Delete Naming Policy.
- 6620 2.4.1: The service user specifies the policy to delete.
- 6621 2.4.2: The Functional Element retrieves the existing naming policy information.
- 6622 2.4.3: The Functional Element deletes the naming policy from the Functional Element
6623 and the use case ends.

6624 **2.27.7.1.2.2 Alternative Flows**

- 6625 1: Invalid Policy.
- 6626 1.1: If in the basic flow 2.1.1, Functional Element detects any invalid description, Functional
6627 Element returns general error message and ends the use case.
- 6628 2: Naming Policy already exists.

6629 2.1: If in the basic flow 2.1.2, the Functional Element checks the existing naming policy and
6630 finds the naming policy already exists. The Functional Element returns an error and ends the
6631 use case.

6632 **2.27.7.1.3 Special Requirements**

6633 **2.27.7.1.4 Pre-Conditions**

6634 None.

6635 **2.27.7.1.5 Post-Conditions**

6636 If the use case was successful, the naming policy information is added to the Functional Element.
6637 To do any creating and updating of User information after the naming policy is added must satisfy
6638 the naming policies defined. If unsuccessful, the Functional Element's state is unchanged.

6639 **2.27.7.2 Manage User Definition**

6640 **2.27.7.2.1 Description**

6641 The use case allows any user to manage user definition when more basic user definition can not
6642 satisfied in creating/updating user accounts. The service user may create, update, retrieve and
6643 delete a user definition.

6644 **2.27.7.2.2 Flow of Events**

6645 **2.27.7.2.2.1 Basic Flow**

6646 This use case starts when any user wants to manage user definition for creating/updating user
6647 account.

6648 1: The user sends Manage User Definition request to the Functional Element together with the
6649 specified operation.

6650 2: Functional Element gets the operation. Based on the operation, one of the sub-flows is
6651 executed.

6652 If the service user provides '**Create User Definition**', then sub-flow 2.1 is executed.

6653 If the service user provides '**Update User Definition**', then sub-flow 2.2 is executed.

6654 If the service user provides '**Delete User Definition**', then sub-flow 2.3 is executed.

6655 2.1: Create User Definition.

6656 2.1.1: The service user specifies namespace, name and description of the user definition
6657 fields to create.

6658 2.1.2: The Functional Element checks the existing user definition fields (including basic
6659 ones).

6660 2.1.3: The Functional Element generates user definition information and adds to the
6661 Functional Element and the use case ends.

6662 2.2: Update User Definition.

6663 2.2.1: The service user specifies the user definition field to update.

6664 2.2.2: The Functional Element retrieves the existing user definition information.
6665 2.2.3: The service user provides the update user definition information.
6666 2.2.4: The Functional Element updates the user definition with the updated information
6667 and ends use case.
6668 2.3: Retrieve User Definition.
6669 2.3.1: The service user specifies the user definition to retrieve.
6670 2.3.2: The Functional Element retrieves the existing user definition information and ends
6671 the use case.
6672 2.4: Delete User Definition.
6673 2.4.1: The service user specifies the user definition to delete.
6674 2.4.2: The Functional Element retrieves the existing user definition information.
6675 2.4.3: The Functional Element deletes the user definition from the Functional Element
6676 and the use case ends.

6677 **2.27.7.2.3 Alternative Flows**

6678 1: Invalid User Definition.
6679 1.1: If in basic flow 2.1.1, Functional Element detects any invalid description, Functional
6680 Element returns general error message and ends the use case.
6681 2: User Definition already exists.
6682 2.1: If in basic flow 2.1.2, the Functional Element checks the existing user definition and finds
6683 the user definition already exists. The Functional Element returns an error and ends the use
6684 case.
6685 3: User Definition not exists.
6686 3.1: If in basic flow 2.2.2, 2.3.2 and 2.4.2, the Functional Element checks the existing user
6687 definition and finds the user definition does not exist. The Functional Element returns an
6688 error and ends the use case.

6689 **2.27.7.2.4 Special Requirements**

6690 None

6691 **2.27.7.2.5 Pre-Conditions**

6692 None.

6693 **2.27.7.2.6 Post-Conditions**

6694 If the use case was successful, the user definition information is added to the Functional Element.
6695 Thereafter, when creating and updating User, the User information must satisfy the user definition
6696 defined earlier. If the use case fails, the Functional Element's state is unchanged.

6697 **2.27.7.3 Manage User**

6698 This use case describes the management of a user, namely the creation, deletion, retrieval and
6699 update of the user.

6700 **2.27.7.3.1 Flow of Events**

6701 **2.27.7.3.1.1 Basic Flow**

6702 This use case starts when the user wants to manage a user.

6703 If user wants to **Create User**, then basic flow 1 is executed.

6704 If user wants to **Retrieve User**, then basic flow 2 is executed.

6705 If user wants to **Update User**, then basic flow 3 is executed.

6706 If user wants to **Delete User**, then basic flow 4 is executed.

6707 1: Create User.

6708 1.1: User provides the information that is necessary for creating a user.

6709 1.2: The Functional Element validates the user information provided against the naming
6710 policy.

6711 1.3: The Functional Element validates the user information provided against the user's
6712 definition.

6713 1.4: Functional Element creates the user and the use case ends.

6714 2: Retrieve User.

6715 2.1: User provides the necessary information for retrieving the complete user's attributes.

6716 2.2: The Functional Element returns the user's information and the use case ends.

6717 3: Update User.

6718 3.1: User provides the necessary information for updating the group's attributes.

6719 3.2: The Functional Element validates the user's information provided against the naming
6720 policy.

6721 3.3: The Functional Element validates the user information provided against the user's
6722 definition.

6723 3.4: The Functional Element updates the user and the use case ends.

6724 4: Delete User.

6725 4.1: User provides the necessary information for deleting a user group.

6726 4.2: Functional Element deletes the user and the use case ends.

6727 **2.27.7.3.1.2 Alternative Flows**

6728 1: User Exist.

6729 1.1: In basic flow 1.4, if the Functional Element detects an identical user, the Functional
6730 Element returns an error message and the use case ends.

- 6731 2: User Does Not Exist.
- 6732 1.1: In basic flow 2.2, 3.4 and 4.2, if the Functional Element cannot find a user that matches
6733 the user's criteria, the Functional Element returns an error message and the use case ends.
- 6734 **2.27.7.3.2 Special Requirements**
- 6735 None.
- 6736 **2.27.7.3.3 Pre-Conditions**
- 6737 None.
- 6738 **2.27.7.3.4 Post-Conditions**
- 6739 None.
- 6740 **2.27.7.4 Authenticate User**
- 6741 **2.27.7.4.1 Description**
- 6742 This use case allows users to authenticate a user.
- 6743 **2.27.7.4.2 Flow of Events**
- 6744 **2.27.7.4.2.1 Basic Flow**
- 6745 This use case starts when users wish to authenticate a user.
- 6746 1: Users provide user name and password to Functional Element.
- 6747 2: The Functional Element checks the user name and password.
- 6748 3: The Functional Element returns the result to users and the use case ends.
- 6749 **2.27.7.4.2.2 Alternative Flows**
- 6750 None.
- 6751 **2.27.7.4.3 Special Requirements**
- 6752 None.
- 6753 **2.27.7.4.4 Pre-Conditions**
- 6754 None.
- 6755 **2.27.7.4.5 Post-Conditions**
- 6756 None.
- 6757 **2.27.7.5 Manage Password**
- 6758 This use case describes the management of password in this Functional Element.

6759 **2.27.7.5.1 Flow of Events**

6760 **2.27.7.5.1.1 Basic Flow**

6761 This use case starts when the user wants to obtain an encrypted password. This can be
6762 achieved via one of the following basic flow.

6763 If user wants to '**Generate Password**', then basic flow 1 is executed.

6764 If user wants to '**Encrypt Password**', then basic flow 2 is executed.

6765 1: Generate Password

6766 1.1: The user specifies the option of format of password among available options in the
6767 Functional Element.

6768 1.2: The Functional Element generates clear text password based on the format specified by
6769 the service user.

6770 1.3: The Functional Element includes "Encrypt Password" use case to encrypt the clear text
6771 password.

6772 1.4: The Functional Element returns the clear text password and encrypted password to user
6773 and the use case ends.

6774 2: Encrypt Password

6775 1.1: The user provides clear text password to Functional Element.

6776 1.2: The user specifies the encryption algorithm to be used.

6777 1.3: The Functional Element encrypts the clear text password.

6778 1.4: The Functional Element returns the encrypted password to user and the use case ends.

6779 **2.27.7.5.1.2 Alternative Flows**

6780 None.

6781 **2.27.7.5.2 Special Requirements**

6782 None.

6783 **2.27.7.5.3 Pre-Conditions**

6784 None.

6785 **2.27.7.5.4 Post-Conditions**

6786 None.

6787 **2.28 Web Service Aggregator Functional Element**

6788 **2.28.1 Motivation**

6789 In any Web Service-enabled application, it is expected that complex business functions have to
6790 be realized via aggregation of multiple Web Services. This Functional Element is expected to
6791 fulfill the needs arising out of Web Services composition. As such it will cover aspects that
6792 include:

6793 Facilitating the composition of Web Services, and

6794 Testing of aggregated Web Services.

6795

6796 This Functional Element fulfills the following requirements from the Functional Elements
6797 Requirements, Working Draft 01a:

6798 Primary Requirements

- 6799 • PROCESS-010 to PROCESS-014.

6800 Secondary Requirements

- 6801 • PROCESS-131

6802

6803 **2.28.2 Terms Used**

Terms	Description
Aggregated Web Service	Aggregated Web Service is single Web Services that invoke multiple Web Services to realize its functionality.
Composition Rule	A Composition Rule is an expression specifying how individual Web Services are invoked to form aggregated Web Services. It includes the name of Web Services that are included in aggregation, specification of aggregation sequence, data dependency among the individual Web Services.

6804

6805 The following diagram shows the meaning of the terms in the context of Web Services
6806 aggregation.

6807

6808

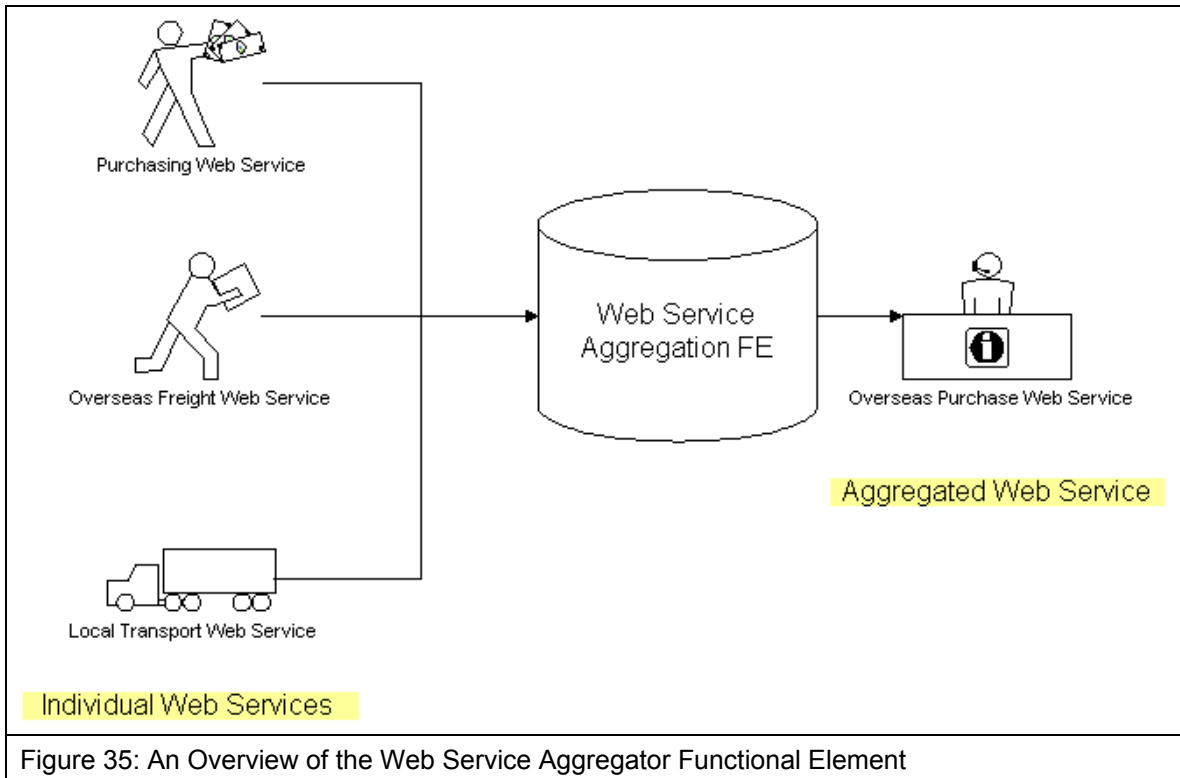


Figure 35: An Overview of the Web Service Aggregator Functional Element

6809

6810 2.28.3 Key Features

6811 Implementations of the Web Service Aggregator Functional Element are expected to provide the
6812 following key features:

- 6813 1. The Functional Element MUST provide a mechanism for composing any number of Web
6814 Services into single Web Service according to specified Composition Rule(s).
- 6815 2. Individual web services can reside at any location, but it is expected to be accessible.
- 6816 3. As part of Key Feature (1), the WSDL of a web service used for composition MUST be
6817 available.
- 6818 4. The Functional Element MUST support the definition, modification and removal of
6819 Composition Rules.
- 6820 5. The Functional Element MUST encapsulate the composition logic used into an interpretable
6821 XML-based script based on a particular standard*.

6822 *Example: BPEL or WSCI. The TC will have to decide on which standard to use*

6823

6824 In addition, the following key features could be provided to enhance the Functional Element
6825 further:

- 6826 1. The Functional Element MAY provide the capability to transform the interpretable XML-based
6827 script into an executable program.
- 6828 2. If Key Feature (1) is provided, then the Functional Element MAY also have the following
6829 capabilities:
 - 6830 2.1 The ability to test the functionality of the aggregated Web Service,
 - 6831 2.2 A WSDL to describe the aggregated Web Service, and
 - 6832 2.3 The capability to publish the aggregated Web Service into an UDDI-compliant registry

6833 **2.28.4 Interdependencies**

Interaction Dependencies	
Services Tester Functional Element	The Services Tester Functional Element may be used to test the performance of the aggregated web services
Service Registry Functional Element	The Services Registry Functional Element may be used to publish the aggregated web services

6834

6835 **2.28.5 Related Technologies and Standards**

Specifications	Specific References
Business Process Execution Language for Web Services version 2.0 [29]	Web Services Business Process Execution Language Version 2.0, Committee Draft, 01 September 2005

6836

6837 **2.28.6 Model**

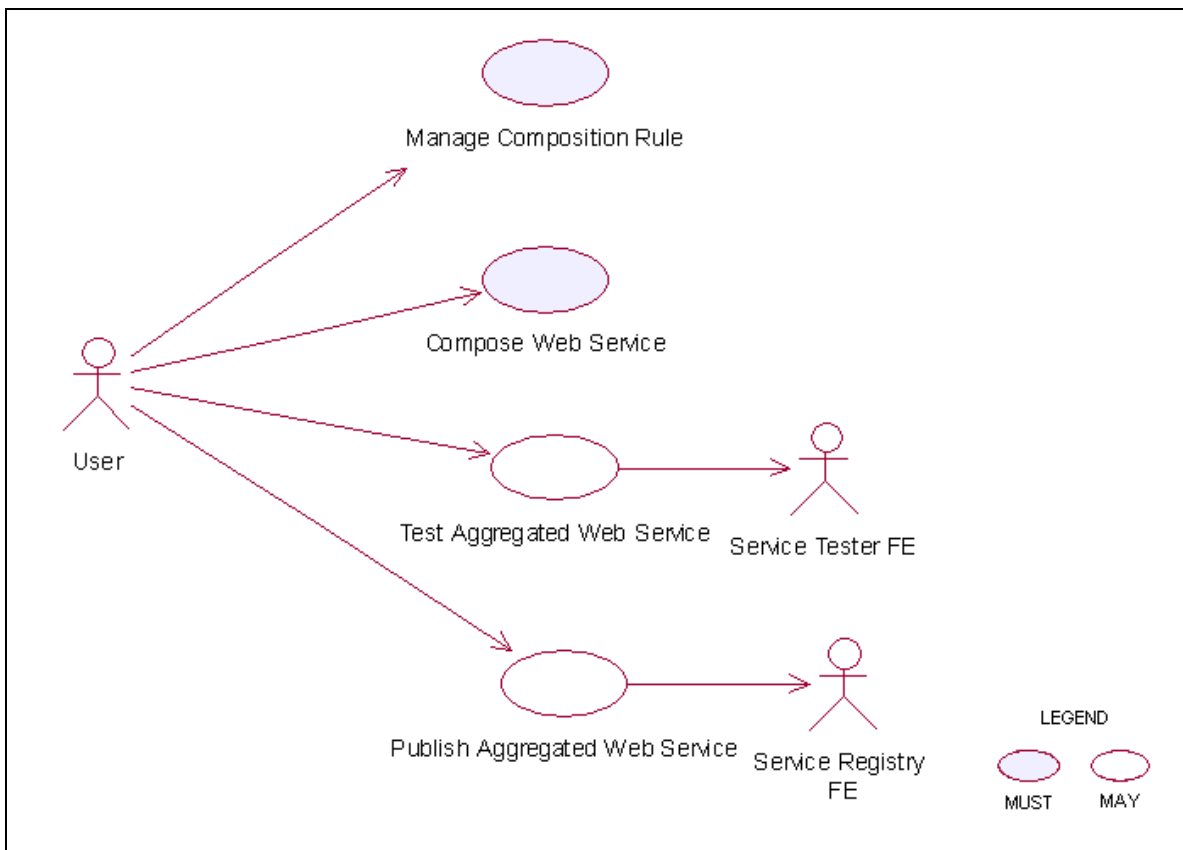


Figure 36: Model Of the Web Service Aggregation Functional Element [30]

6838

- 6839 **2.28.7 Usage Scenarios**
- 6840 **2.28.7.1 Manage composition rule**
- 6841 **2.28.7.1.1 Description**
- 6842 This use case allows the user to manage the composition rule used for Web Services
6843 aggregation.
- 6844 **2.28.7.1.2 Flow of Events**
- 6845 **2.28.7.1.2.1 Basic Flow**
- 6846 The use case begins when the user wants to manage a composition rule.
- 6847 1: The user sends a request to the Functional Element together with the composition rule and
6848 operation.
- 6849 2: Based on the operation it specified, one of the following sub-flows is executed:
- 6850 If the operation is '**Define a rule**', then sub-flow 2.1 is executed.
- 6851 If the operation is '**Update a rule**', then sub-flow 2.2 is executed.
- 6852 If the operation is '**Retrieve a rule**', then sub-flow 2.3 is executed.
- 6853 If the operation is '**Remove a rule**', then sub-flow 2.4 is executed.
- 6854 2.1: Define Rule.
- 6855 2.1.1: The Functional Element gets the composition rule, i.e. names of all Web Service,
6856 the sequence specification, parameters mapping between Web Services.
- 6857 2.1.2: The Functional Element verifies the correctness of composition rule.
- 6858 2.1.3: The Functional Element saves the composition rule to persistent mechanism.
- 6859 2.2: Update Rule.
- 6860 2.2.1: The Functional Element gets the name of composition rule.
- 6861 2.2.2: The Functional Element retrieves the composition rule definition from persistent
6862 mechanism.
- 6863 2.2.3: The Functional Element verifies the correctness of composition rule.
- 6864 2.2.4: The Functional Element updates the composition rule.
- 6865 2.3: Retrieve Rule.
- 6866 2.3.1: The Functional Element gets the name of composition rule.
- 6867 2.3.2: The Functional Element retrieves the definition of composition rule.
- 6868 2.3.3: The Functional Element returns the definition of rule.
- 6869 2.4: Remove Rule.
- 6870 2.4.1: The Functional Element gets the name of composition rule.

6871 2.4.2: The Functional Element checks whether the rule exists.

6872 2.4.3: The Functional Element removes the rule.

6873 3: The Functional Element returns the results to indicate the success or failure of this operation to
6874 the user and the use case ends.

6875 **2.28.7.1.2.2 Alternative Flows**

6876 1: Composition Rule Already Created.

6877 1.1: If in the basic flow 2.1.2, the same rule already created, Functional Element will return an
6878 error message to the user and the use case ends.

6879 2: Composition Rule Not Exist.

6880 2.1: If in the basic flow 2.2, 2.3, and 2.4 the specified rule does not exist, Functional Element
6881 will return an error message to the user and the use case ends.

6882 3: Persistency Mechanism Error.

6883 3.1: If in the basic flow 2.1, 2.2, 2.3, and 2.4, the Functional Element cannot perform data
6884 persistency, Functional Element will return an error message to the user and the use case
6885 ends.

6886 **2.28.7.1.3 Special Requirements**

6887 None.

6888 **2.28.7.1.4 Pre-Conditions**

6889 None.

6890 **2.28.7.1.5 Post-Conditions**

6891 None.

6892 **2.28.7.2 Compose Web Services**

6893 **2.28.7.2.1 Description**

6894 This use case will allow users to aggregate several simpler services into a higher-level service.

6895 **2.28.7.2.2 Flow of Events**

6896 **2.28.7.2.2.1 Basic Flow**

6897 This use case begins when any user wants to compose a Web Service.

6898 1: The user passes in a list of parameters for composition, including URLs of the WSDL,
6899 composition rules.

6900 2: Functional Element checks the signature of the Web Services to be composed via accessing
6901 WSDL.

6902 3: Functional Element generates interpretable XML-based script to encapsulate the composition
6903 logic.

6904 4: Functional Element returns the generated script and the use case ends.

6905 **2.28.7.2.2 Alternative Flows**

6906 1: Functional Element generates executable program and WSDL.

6907 1.1: At basic flow 3, Functional Element may transform the interpretable XML-based script
6908 into an executable program, if the user requested.

6909 1.2: At basic flow 3, Functional Element may generate WSDL for the executable program, if
6910 the user requested.

6911 1.3: Functional Element returns the code of executable program and WSDL file

6912 2: Functional Element detects ambiguity in Web Services signature.

6913 2.1: At basic flow 2, Functional Element encounters an ambiguity in the Web Services
6914 signature which it cannot resolve.

6915 2.2: Functional Element returns an error message that there is a composition error.

6916 3: Functional Element detects error in Web Services composition.

6917 3.1: At basic flow 3, Functional Element encounters an error in the Web Services
6918 composition.

6919 3.2: Functional Element returns an error message that there is a composition error.

6920 **2.28.7.2.3 Special Requirements**

6921 None.

6922 **2.28.7.2.4 Pre-Conditions**

6923 The composition rule for this Web Services aggregation must be pre-defined.

6924 **2.28.7.2.5 Post-Conditions**

6925 The generated program is ready for deployment in any Web Services container.

6926

6927 **2.28.7.3 Test Aggregated Web Services**

6928 **2.28.7.3.1 Description**

6929 This use case will allow users to test the functionality of aggregate web service.

6930 **2.28.7.3.2 Flow of Events**

6931 **2.28.7.3.2.1 Basic Flow**

6932 This use case begins when any user wants to test aggregated web service.

6933 1: The user passes in a list of parameters for testing, including URLs of the WSDL, values of
6934 parameters for invocation.

6935 2: Functional Element invokes the aggregated web service with parameters.

6936 3: Functional Element compares the returned parameter with the expected values.

6937 4: Functional Element returns the result of comparison and the use case ends.

6938 **2.28.7.3.2.2 Alternative Flows**

6939 1: Functional Element cannot invoke the aggregated web service.

6940 1.1: At basic flow 2, Functional Element encounters problems of invoking the aggregated web
6941 services.

6942 1.2: Functional Element returns an error message that indicates the invocation error.

6943 **2.28.7.3.3 Special Requirements**

6944 None.

6945 **2.28.7.3.4 Pre-Conditions**

6946 The executable program must be generated and deployed in web services hosting environment
6947 and ready for invocation.

6948 **2.28.7.3.5 Post-Conditions**

6949 None.

6950 **2.28.7.4 Publish Aggregated Web Services**

6951 **2.28.7.4.1 Description**

6952 This use case will allow users to publish the aggregated web services into UDDI registry.

6953 **2.28.7.4.2 Flow of Events**

6954 **2.28.7.4.2.1 Basic Flow**

6955 This use case begins when any user wants to publish the aggregated web services into UDDI
6956 registry.

6957 1: The user passes in a list of parameters for publishing, including URLs of the WSDL of
6958 aggregated web services, URL of UDDI and parameters of business and services description.

6959 2: Functional Element checks the availability of UDDI.

6960 3: Functional Element publishes services description of aggregated web services into UUDI.

6961 4: Functional Element returns the publish result and the use case ends.

6962 **2.28.7.4.2.2 Alternative Flows**

6963 1: UDDI registry server is not available

6964 1.1: At basic flow 2, Functional Element cannot connect to UDDI registry if UDDI registry
6965 server is not available.

6966 1.2: Functional Element returns the error message that UDDI connection cannot be built.

6967 2: Functional Element detects error in Web Services publishing.

6968 2.1: At basic flow 3, Functional Element encounters an error in the publishing Web Services.

6969 2.2: Functional Element returns an error message that there is a publishing error.

6970 **2.28.7.4.3 Special Requirements**

6971 None.

6972 **2.28.7.4.4 Pre-Conditions**

6973 The WSDL of the aggregated web services must exist.

6974 **2.28.7.4.5 Post-Conditions**

6975 None

6976

3 Functional Elements Usage Scenarios

6977

The Functional Elements are designed to be building blocks that can be assembled to accelerate web service-enabled applications. From these Functional Elements, a variety of solutions can be built. In this section, the following solutions are provided as examples:

6978

6979

6980

- A service monitoring solution for the management of services in a SOA model

6981

- Enabling security through the Secure SOAP Functional Element

6982

6983

- Decoupled User Access Management with support for multi-domain capabilities in a web service environment

6984

- Single-Sign On for Distributed Services (Applications)

6985

6986

6987

3.1 Service Monitoring

6988

In a SOA environment, management of services includes the capability to monitor services within the management domain. These includes:

6989

6990

Monitoring the performance of services invoked

6991

Generating audit trails of services invoked

6992

Monitoring and testing the availability of services on the remote machine (server)

6993

A basic solution can be realised through the aggregation of two Functional Element, namely Service Management and Service Tester, as shown in Figure 19. This solution can be improved with notification capabilities, using the Notification Engine, be it to a remote client, a system administrator or an end user of a particular service. Further enhancement can be added with a Rule Engine that will have the cognitive ability to make decisions. An example of this enhancement would be the ability to decide when should notifications or alerts be sent and in what form.

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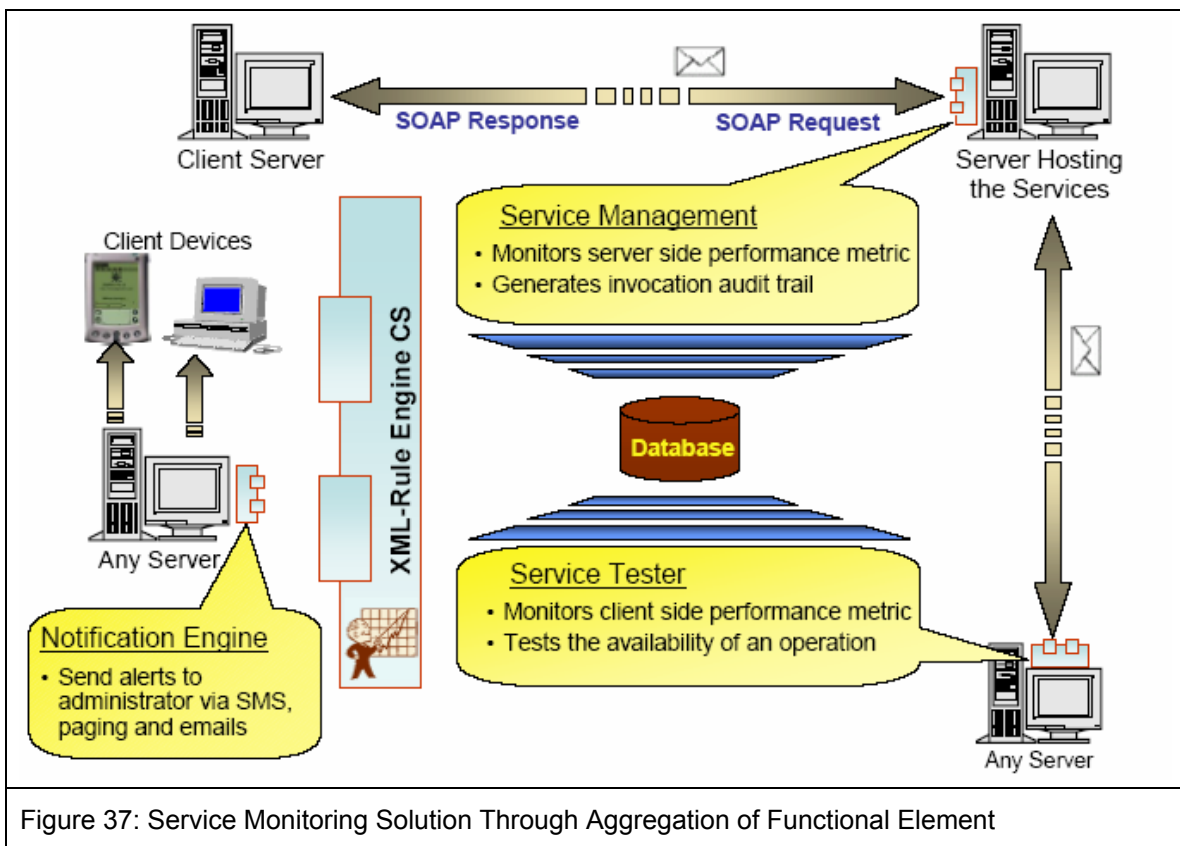
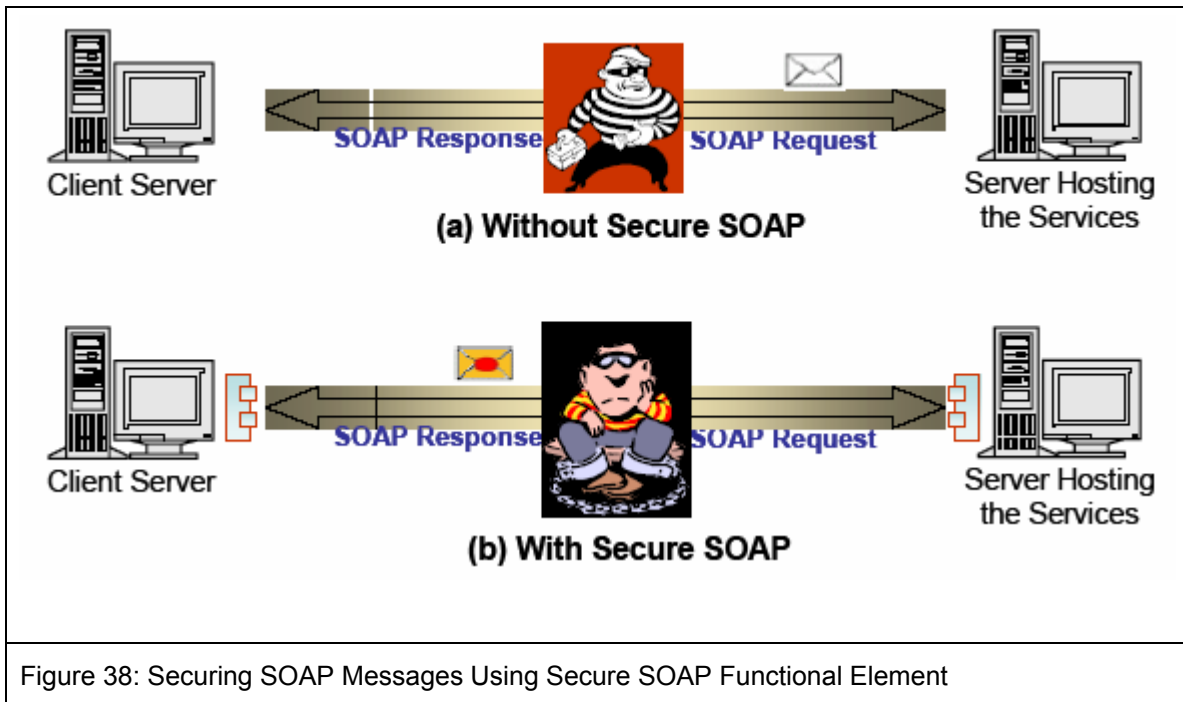


Figure 37: Service Monitoring Solution Through Aggregation of Functional Element

7000

7001 **3.2 Securing SOAP Messages**

7002 SOAP in its pure form does not have any built in security as it is meant to be a simple and
7003 lightweight protocol. As such, where security is needed, additional capabilities must be provided.
7004 Presently, standards like XML Encryption and XML Signature are available. Making use of these
7005 standards, the Secure Soap Functional Element, when deployed on both the sending and
7006 receiving parties, will be able to provide encryption and signing of messages as illustrated in
7007 Figure 20.
7008



7009

7010 **3.3 Decoupled User Access Management**

7011 User Access Management (UAM) has been implemented in many forms and in a wide variety of
7012 ways, from the most basic to the most complex. At the most simple form, the functionality would
7013 include username and password support. On the end of the scale, it would include functionalities
7014 like distributed access management, replication capabilities and fine-grain controls just to name a
7015 few.

7016 In this specification, the goal is to provide a set of Functional Element that can be used as
7017 building blocks for UAM, and can be extended when the need arises. It is provided as a
7018 decoupled building blocks consisting of four Functional Elements, namely User Management,
7019 Group Management, Role & Access Management and Phase & Lifecycle Management, as
7020 illustrated in Figure 21. These Functional Elements can be used in a variety of combinatorial
7021 forms, and some of these examples include:

- 7022
- 7023 • User Management only, or
 - 7024 • User Management and Group Management, or
 - 7025 • User Management and Role & Access Management, or
 - 7026 • User Management, Group Management and Role & Access Management, or
 - 7027 • All the four Functional Elements in tandem

7028 On the same token, any of the Functional Elements can be replaced with similar functionality third
7029 party web services. As these services are designed to be in a web service environment, each of
7030 them also supports the concept of namespace. This namespace provision enables each of the
7031 Functional Elements to be used as web services that can be accessed by multiple organisations
7032 or to cater for users from different domains. With this, access control for example, can be defined
7033 for multiple domains without corruption or interferences problems.

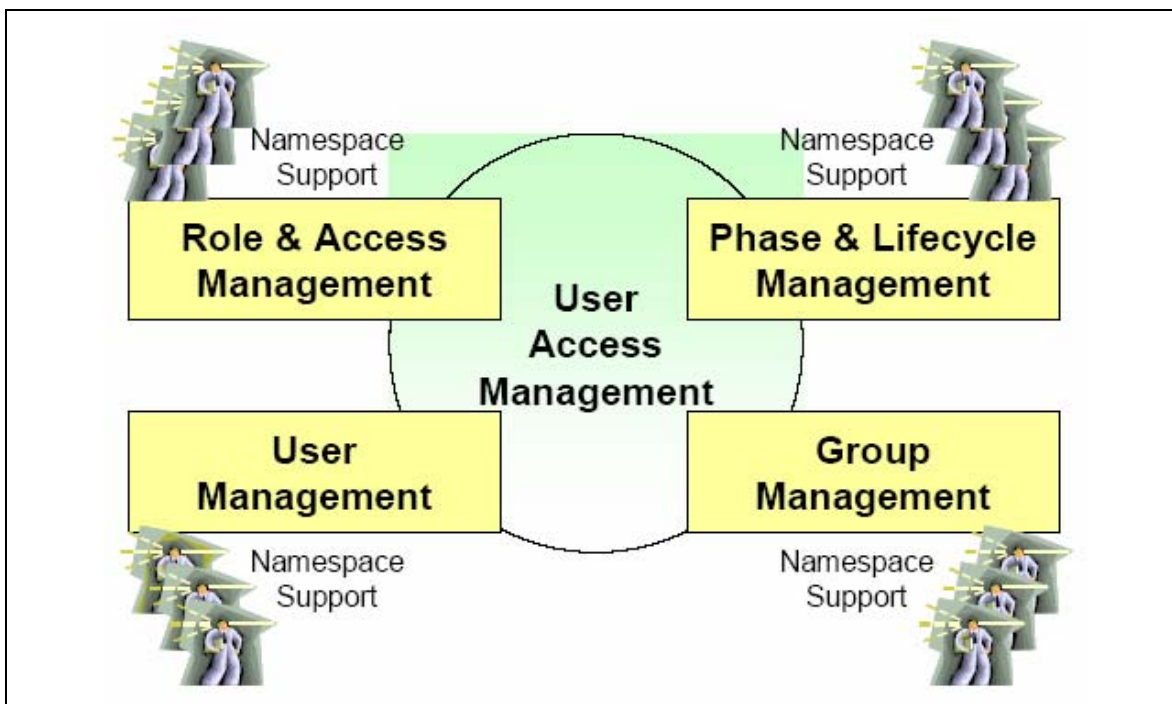


Figure 39: User Access Management via Functional Element

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3.4 Single-Sign-On for Distributed Services (Applications)

In a SOA world, it is very likely that services for a composite application can be potentially made up of multiple 3rd party services from different application domains. It is also very likely that each of these domains will require authentication of the user separately. However, it is not user friendly to enforce re-authentication as the user moves from one domain to another. Using the Identity Management Functional Element, with the potential combination of Secure SOAP Functional Element and other user access management Functional Elements like User Management, a solution for such an environment can be put together to enable Single-Sign-On. In this scenario of use, a Circle of Trust between different application domains can be established using the Identity Management Functional Element, and the exchanges between these domains can be secured using the Secure SOAP Functional Element. Access and authentication to individual domains remain the purview of the distributed applications, and can potentially also leveraged on the Decoupled User Access Management scenario detailed in section 3.3.

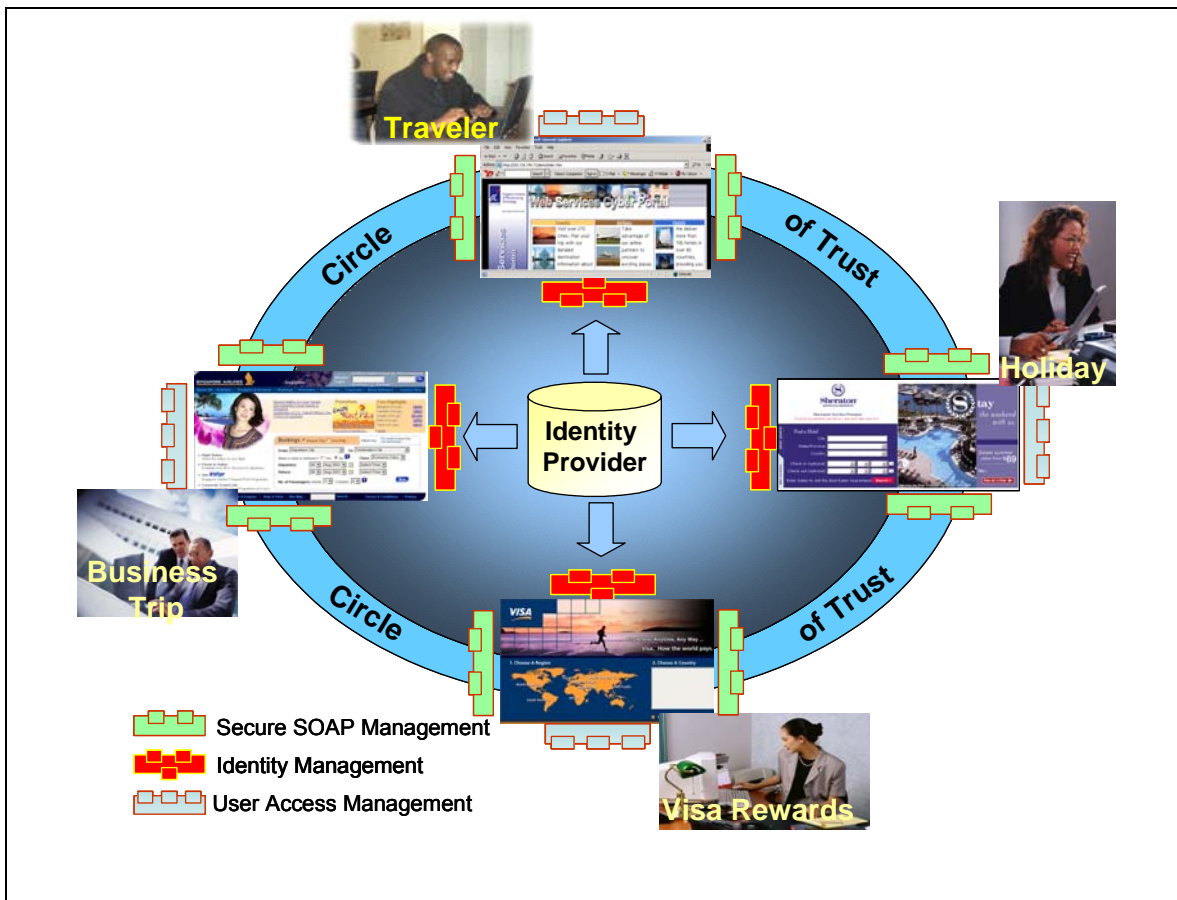


Figure 40: User Access Management via Functional Element

7048
7049
7050

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7052 **Appendix A. Acknowledgments**

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7063 provided by Jamie Clark throughout the course of the TC work.

7064

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7066 Ltd. for kindly agreeing to allow the use of the Rational Tools towards the creation of the Use
7067 Case Model used in this document.

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7070

Appendix B. Revision History

7071

The following revision of this document represents the major milestones achieved.

7072

Rev	Date	By Whom	What
FWSI-FESC-specifications-01.doc	01-Jul-2004	Huang Kheng Cheng Puay Siew Tan	First Draft
FWSI-FESC-specifications-02.doc	18-Oct-2004	Huang Kheng Cheng Puay Siew Tan	Second Draft
fws-fe-1.0-guidelines-spec-wd-03.doc	25-Nov- 2004	Huang Kheng Cheng	Second Draft (Voted version)
fws-fe-1.0-guidelines-spec-cs-01.doc	04-Mar-2005	Puay Siew Tan	Update the document to reflect its change of status to a Committee Specs (as of 16 Dec 2004)
fws-fe-1.0-guidelines-spec-cs-02.doc	27-May-2005	Puay Siew Tan	Update the document on syntactical errors. Features are not changed.
fws-fe-2.0-guidelines-spec-wd-01.doc	28-Oct-2005	Puay Siew Tan	<p>New working draft for Version 2.0 of the FE Specs:</p> <ul style="list-style-type: none"> • Deprecated 2 FEs, namely Presentation Transformer and Service Tester • Replaced the deprecated FEs with Transformer and Quality of Service (QoS) FEs respectively • Added 10 new FEs identified for version 2.0 • Minor changes to the following FEs: <ul style="list-style-type: none"> ○ Phase & Lifecycle Management ○ Secure SOAP Management ○ Sensory ○ Service Management ○ Service Registry ○ Web Service Aggregator • Usage Scenarios (added 1 more

Rev	Date	By Whom	What
			usage scenario for SSO)
fws-fe-2.0-guidelines-spec-wd-02.doc	20-Dec-2005	Puay Siew Tan	<p>Revision of working draft for Version 2.0 of the FE Specs. This is based on feedback/comments received todate:</p> <ul style="list-style-type: none"> • Added the “Deprecated” phrase in the title of Presentation Transformer and Service Tester. Easier for readers to see. • Added the checking of permission sets for Data Integrator • Added Invoke Service Use Case in Service Router • Corrected some minor syntax and grammar errors

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