



## OSLC Change Management Version 3.0. Part 1: Specification

OASIS Standard with Approved Errata 01

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**Additional components:**

This specification is one component of a Work Product that also includes:

- OSLC Change Management Version 3.0. Part 1: Specification (this document). <https://docs.oasis-open-projects.org/oslc-op/cm/v3.0/errata01/os/change-mgt-spec.html>
- OSLC Change Management Version 3.0. Part 2: Vocabulary. <https://docs.oasis-open-projects.org/oslc-op/cm/v3.0/errata01/os/change-mgt-vocab.html>
- OSLC Change Management Version 3.0. Part 3: Constraints. <https://docs.oasis-open-projects.org/oslc-op/cm/v3.0/errata01/os/change-mgt-shapes.html>
- OSLC Change Management Version 3.0. Part 4: Machine Readable Vocabulary Terms. <https://docs.oasis-open-projects.org/oslc-op/cm/v3.0/errata01/os/change-mgt-vocab.ttl>
- OSLC Change Management Version 3.0. Part 5: Machine Readable Constraints. <https://docs.oasis-open-projects.org/oslc-op/cm/v3.0/errata01/os/change-mgt-shapes.ttl>

**Related work:**

This specification is related to:

- Open Services for Lifecycle Collaboration Change Management Specification Version 2.0. <http://open-services.net/bin/view/Main/CmSpecificationV2>

**RDF Namespaces:**

<http://open-services.net/ns/cm#>

**Abstract:**

This document includes approved errata, as described in Appendix C. Errata.

This specification defines the OSLC Change Management domain, a RESTful web services interface for the management of product change requests, activities, tasks and relationships between those and related resources such as requirements, test cases, or architectural resources. To support these scenarios, this specification defines a set of HTTP-based RESTful interfaces in terms of HTTP methods: GET, POST, PUT and DELETE, HTTP response codes, content type handling and resource formats.

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## Standards Track Work Product

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## 1. Introduction

*This section is non-normative.*

This specification defines the OSLC Change management domain as a RESTful web services interface for the management of product change requests, activities, tasks and relationships between those and related resources such as project, category, release and plan. To support these scenarios, this specification defines a set of HTTP-based RESTful interfaces in terms of HTTP methods: GET, POST, PUT and DELETE, HTTP response codes, content type handling and resource formats.

The intent of this specification is to define the capabilities needed to support integration scenarios defined by the OASIS OSLC Open Project and not to provide a comprehensive interface to Change Management. The resource formats and operations may not match exactly the native models supported by change management servers but are intended to be compatible with them. The approach to supporting these scenarios is to delegate operations, as driven by server contributed user interfaces, as much as possible and not require a server to expose its complete data model and application logic.

### 1.1 Terminology

Terminology uses and extends the terminology and capabilities of [OSLCCore3].

#### Change Request Resource

A request for change to an application or product. Typically a product request for enhancement, a report for a resolution of a product defect or simply a bug report.

#### Client

An implementation of the OSLC Change Management specifications as a client. OSLC CM Clients consume services provided by servers.

#### Server

An implementation of the OSLC Change Management specifications as a server. OSLC CM clients consume services provided by Servers. The use of the terms Client and Server are intended to distinguish typical consumers and providers of OSLC resources in a distributed environment based on REST. A particular application component could be a client for some OSLC domain services and a server for the same or another domain.

### 1.2 References

#### 1.2.1 Normative references

##### [OSLCCore2]

S. Speicher; D. Johnson. [OSLC Core 2.0](http://open-services.net). <http://open-services.net>. Finalized. URL: <http://open-services.net/bin/view/Main/OslcCoreSpecification>

##### [OSLCCore3]

Jim Amsden; S. Speicher. [OSLC Core 3.0](https://docs.oasis-open-projects.org/oslc-op/core/v3.0/oslc-core.html). OASIS. Project Specification. URL: <https://docs.oasis-open-projects.org/oslc-op/core/v3.0/oslc-core.html>

##### [OSLCCoreVocab]

Jim Amsden; S. Padgett; S. Speicher. [OSLC Core Vocabulary](https://docs.oasis-open-projects.org/oslc-op/core/v3.0/core-vocab.html). OASIS. Project Specification. URL: <https://docs.oasis-open-projects.org/oslc-op/core/v3.0/core-vocab.html>

##### [OSLCResourcePreview]

Jim Amsden; S. Speicher. [OSLC Core 3.0 Resource Preview](https://docs.oasis-open-projects.org/oslc-op/core/v3.0/resource-preview.html). OASIS. Project Specification. URL: <https://docs.oasis-open-projects.org/oslc-op/core/v3.0/resource-preview.html>

##### [OSLCShapes]

Arthur Ryman; Jim Amsden. [OSLC Resource Shape 3.0](https://docs.oasis-open-projects.org/oslc-op/core/v3.0/resource-shape.html). OASIS. Project Specification. URL: <https://docs.oasis-open-projects.org/oslc-op/core/v3.0/resource-shape.html>

##### [OpenIDConnect]

[OpenID Connect](http://openid.net). openid.net. URL: <http://openid.net/connect/>

##### [RFC2119]

S. Bradner. [Key words for use in RFCs to Indicate Requirement Levels](https://www.rfc-editor.org/rfc/rfc2119). IETF, March 1997. Best Current Practice. URL: <https://www.rfc-editor.org/rfc/rfc2119>

##### [RFC8174]

B. Leiba. [Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words](https://www.rfc-editor.org/rfc/rfc8174). IETF, May 2017. Best Current Practice. URL: <https://www.rfc-editor.org/rfc/rfc8174>

#### 1.2.2 Informative references

##### [LDPPatch]

[Linked Data Patch Format](http://www.w3.org/). <http://www.w3.org/>. Working Group Note. URL: <http://www.w3.org/TR/ldpatch/>

##### [OSLCActions]

Martin Pain; Steve Speicher. [Open Services for Lifecycle Collaboration Actions Specification Version 2.0](http://open-services.net/wiki/core/Actions-2.0/). <http://open-services.net>. Finalization. URL: <http://open-services.net/wiki/core/Actions-2.0/>

##### [OSLCCM20]

S. Speicher. [Open Services for Lifecycle Collaboration Change Management Specification Version 2.0](http://open-services.net/bin/view/Main/CmSpecificationV2). <http://open-services.net>. Finalized. URL: <http://open-services.net/bin/view/Main/CmSpecificationV2>

##### [OSLCQM]

Paul McMahan. [Open Services for Lifecycle Collaboration Quality Management Specification Version 2.0](http://open-services.net/bin/view/Main/QmSpecificationV2). <http://open-services.net>. Final. URL: <http://open-services.net/bin/view/Main/QmSpecificationV2>

##### [OSLCRM]

Ian Green. [Open Services for Lifecycle Collaboration Requirements Management Specification Version 2.0](http://open-services.net/bin/view/Main/RmSpecificationV2). <http://open-services.net>. Final. URL: <http://open-services.net/bin/view/Main/RmSpecificationV2>

### 1.3 Typographical Conventions and Use of RFC Terms

As well as sections marked as non-normative, all authoring guidelines, diagrams, examples, and notes in this specification are non-normative. Everything else in this specification is normative.

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The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this specification are to be interpreted as described in [BCP 14](#) [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 2. Base Requirements

The following sub-sections define the mandatory and optional requirements for an OSLC Change Management (OSLC CM) server.

### 2.1 Base Compliance

This specification is based on [OSLCCore3]. OSLC CM servers **MUST** be compliant with both the core specification, **MUST** follow all the mandatory requirements in the normative sections of this specification, and **SHOULD** follow all the guidelines and recommendations in both these specifications. [cm-1]

An OSLC CM server **MUST** implement the domain vocabulary defined in [OSLC Change Management Version 3.0, Part 2: Vocabulary](#) [cm-2]

The following table summarizes the requirements from OSLC Core Specification as well as some additional requirements specific to the CM domain. Note that this specification further restricts some of the requirements for OSLC Core Specification. See the previous sections in this specification or the OSLC Core Specification to get further details on each of these requirements.

Requirement	Meaning
Unknown properties and content	OSLC servers <b>MAY</b> ignore unknown content and OSLC clients <b>MUST</b> preserve unknown content [cm-3]
Resource Operations	OSLC service <b>MUST</b> support resource operations via standard HTTP operations [cm-4]
Resource Paging	OSLC servers <b>MAY</b> provide paging for resources but only when specifically requested by client [cm-5]
Partial Resource Representations	OSLC servers <b>MUST</b> support request for a subset of a resource's properties via the osc.properties URL parameter retrieval via HTTP GET [cm-6]
Partial Update	OSLC servers <b>MAY</b> support partial update of resources using [LDPPatch], or via HTTP PUT. [cm-7]
Discovery	OSLC servers <b>SHOULD</b> provide a ServiceProvider resource for Core v2 compatibility, <b>MAY</b> provide a ServiceProviderCatalog, and <b>MAY</b> provide other forms of discovery described in Core 3.0 Discovery. [cm-8]
Creation Factories	OSLC servers <b>MUST</b> provide LDPC creation factories to enable resource creation of Change Management resources via HTTP POST [cm-9]
Query Capabilities	OSLC servers <b>SHOULD</b> provide query capabilities to enable clients to query for resources [cm-10]
Query Syntax	OSLC query capabilities <b>SHOULD</b> support the OSLC Core Query Syntax and <b>MAY</b> use other query syntax [cm-11]
Delegated UI Dialogs	OSLC Services <b>MUST</b> offer delegated UI dialogs (creation and selections) specified via OSLC Core 3.0 Delegated Dialogs and <b>SHOULD</b> include discovery through a ServiceProvider resource for OSLC v2 compatibility [cm-12]
UI Preview	OSLC Services <b>SHOULD</b> offer UI previews for resources that may be referenced by other resources specified via OSLC Core 3.0 Preview and <b>SHOULD</b> include discovery through a server resource for OSLC v2 compatibility [cm-13]
Authentication	OSLC Services <b>SHOULD</b> follow the recommendations for Authentication specified in [OSLCCore3] [cm-14]
Error Responses	OSLC Services <b>SHOULD</b> provide error responses using OSLC Core 3.0 defined error formats [cm-15]
Turtle Representations	OSLC servers <b>MUST</b> provide a Turtle representation for HTTP GET requests and <b>SHOULD</b> support Turtle representations on POST and PUT requests. [cm-16]
RDF/XML Representations	OSLC servers <b>SHOULD</b> provide an RDF/XML representation for HTTP GET requests and <b>SHOULD</b> support RDF/XML representations on POST and PUT requests for compatibility with Change Management 2.0. [cm-17]
XML Representations	OSLC servers <b>SHOULD</b> provide a XML representation for HTTP GET, POST and PUT requests that conform to the Core 2.0 Guidelines for XML. [cm-18]
JSON Representations	OSLC servers <b>MUST</b> provide JSON-LD representations for HTTP GET, POST and PUT requests that conform to the Core Guidelines for JSON-LD [cm-19]
HTML Representations	OSLC servers <b>SHOULD</b> provide HTML representations for HTTP GET requests [cm-20]

### 2.2 Specification Versioning

This specification follows the specification version guidelines given in [OSLCCore3].

### 2.3 Namespaces

In addition to the namespace URIs and namespace prefixes *oslc*, *rdf*, *dcterms* and *foaf* defined in the [OSLCCore3], OSLC CM defines the namespace URI of <http://open-services.net/ns/cm#> with a namespace prefix of *oslc\_cm*.

This specification also uses these namespace prefix definitions:

- *oslc\_rm* : <http://open-services.net/ns/cm#> [OSLCRM]
- *oslc\_qm* : <http://open-services.net/ns/qm#> [OSLQCM]

### 2.4 Resource Formats

In addition to the requirements for resource representations in [OSLCCore3], this section outlines further refinements and restrictions.

For HTTP GET requests on all OSLC CM and OSLC Core defined resource types,

- CM servers **MUST** provide Turtle and JSON-LD, and **SHOULD** provide RDF/XML and XML representations. The XML and JSON representations **SHOULD** follow the guidelines outlined in the [OSLC Core Representations Guidance](#) to maintain compatibility with [OSLCCore2]. [cm-21]
- CM clients requesting RDF/XML **SHOULD** be prepared for any valid RDF/XML document. CM clients requesting XML **SHOULD** be prepared for representations that follow the guidelines outlined in the [OSLC Core Representations Guidance](#). [cm-22]
- CM servers **SHOULD** support an [X]HTML representation and a user interface (UI) preview as defined by [UI Preview Guidance](#) [cm-23]

For HTTP PUT/POST request formats for resource type of ChangeRequest:

- CM servers **MUST** accept Turtle and JSON-LD representations and **SHOULD** accept RDF/XML and XML representations. CM servers accepting RDF/XML **SHOULD** be prepared for any valid RDF/XML document. For XML CM servers **SHOULD** be prepared for representations that follow the guidelines outlined in the [OSLC Core Representations Guidance](#). [cm-24]

For HTTP GET response formats for Query requests,

CM servers **MUST** provide Turtle and JSON-LD, **SHOULD** provide RDF/XML, XML, and **MAY** provide Atom Syndication Format XML representations. [cm-25]

When CM clients request:

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- `text/turtle` CM servers **MUST** respond with Turtle representation.
- `application/ld+json` CM servers **MUST** respond with JSON-LD representation.
- `application/rdf+xml` CM servers **SHOULD** respond with RDF/XML representation without restrictions.
- `application/xml` CM servers **SHOULD** respond with OSLC-defined abbreviated XML representation as defined in the [OSLC Core Representations Guidance](#)
- `application/atom+xml` CM servers **SHOULD** respond with Atom Syndication Format XML representation as defined in the [OSLC Core Representations Guidance](#)
- The Atom Syndication Format XML representation **SHOULD** use RDF/XML representation without restrictions for the `atom:content` entries representing the resource representations.

[cm-26]

See Query Capabilities for additional information when Resource Shapes affect representation.

## 2.4.1 Content Negotiation

[OSLCCore3] specifies RDF representations (and specifically Turtle and JSON-LD) as a convention that all OSLC server implementations minimally provide and accept. OSLC CM server implementations are strongly encouraged to adopt this convention. Future versions of this specification are expected to require RDF representations for all operations and relax requirements for specialized XML representations.

**XML Representation** - identified by the `application/xml` content type. Format representation rules are outlined in Core [OSLC Core Resource Formats section](#)

**RDF/XML Representation** - identified by the `application/rdf+xml` content type. No additional guidance is given.

**JSON-LD Representation** - identified by the `application/ld+json` content type. Format representation rules are specified in [JSON-LD 1.0](#).

**Atom Syndication Format XML Representation** - identified by the `application/atom+xml` content type. Format representation rules are outlined in Core [OSLC Core Resource Formats section](#).

## 2.5 Authentication

[OSLCCore3] specifies the recommended OSLC authentication mechanisms. In addition to the OSLC Core authentication requirements, OSLC CM servers **SHOULD** support [OpenIDConnect]. [cm-27]

## 2.6 Error Responses

[OSLCCoreVocab] specifies the OSLC Core error responses. OSLC CM puts no additional constraints on error responses.

## 2.7 Pagination

OSLC CM servers **SHOULD** support pagination of query results and **MAY** support pagination of a single resource's properties as defined by [OSLCCore3]. [cm-28]

## 2.8 Requesting and Updating Properties

### 2.8.1 Requesting a Subset of Properties

A client **MAY** request a subset of a resource's properties as well as properties from a referenced resource. In order to support this behavior a server **MUST** support the `oslc.properties` and `oslc.prefix` URL parameter on a HTTP GET request on individual resource request or a collection of resources by query. If the `oslc.properties` parameter is omitted on the request, then all resource properties **MUST** be provided in the response. [cm-29]

### 2.8.2 Updating a Subset of Properties

A client **MAY** request that a subset of a resource's properties be updated by using the [LDPPatch] PATCH method. [cm-30]

For compatibility with [OSLCCore2], CM servers class='conformance' also support partial update by identifying those properties to be modified using the `oslc.properties` URL parameter on a HTTP PUT request. [cm-31]

If the parameter `oslc.properties` contains a valid resource property on the request that is not provided in the content, the server **MUST** set the resource's property to a null or empty value. If the parameter `oslc.properties` contains an invalid resource property, then a 409 Conflict **MUST** be returned. [cm-32]

### 2.8.3 Updating Multi-Valued Properties

For multi-valued properties that contain a large number of values, it may be difficult and inefficient to add or remove property values. OSLC CM servers **MAY** provide support for a partial update of the multi-valued properties as defined by draft specification [LDPPatch]. CM servers **MAY** also support partial updates through HTTP PUT where only the updated properties are included in the entity request body. [cm-33]

## 2.9 Status, State and State Predicates

Probably the most important property of a Change Request is the status property. "Status" specifies the location of a Change Request in a workflow. The `oslc_cm:status` property is a typically read-only string that servers can set to describe the status of a ChangeRequest. In queries the `oslc_cm:status` property can be used to filter change request (e.g. all change requests that are "fixed") and may be used to perform state transitions (not part of this specification) on a change request, e.g. closing a change request as "fixed".

The problem is that different CM servers may use different properties (or even a set of properties) and different values to represent the change request's state. Even providing access to meta data does not help because knowing all possible state values does not reveal the semantics of a state.

[OSLCCM20] introduced State Predicates to define single-value often read-only Boolean properties on a Change Request resource that allow servers to translate their specific status string values into a standard boolean state predicate value. For example, a CM server could set `oslc_cm:status` to "BeingInvestigated", and map this status to the following state predicate values:

- `oslc_cm:closed=false`
- `oslc_cm:inProgress=true`
- `oslc_cm:fixed=false`
- `oslc_cm:approved=false`
- `oslc_cm:reviewed=false`
- `oslc_cm:verified=false`

An attempt to update read-only predicates **SHOULD** be answered with a 409 Conflict HTTP status code. Their presence in a resource representation used for an update via PUT **MUST NOT** prevent the resource from being updated. Predicates **MUST** be queryable. The Change Request resource definition sections defines the complete set of predicates. [cm-34]

OSLC CM 3.0 provides a similar means of defining a set of standard states that is also extensible. The `oslc_cm:state` property can have a value of type `oslc_cm:State` which represents an enumeration of individuals representing a standard set of ChangeRequest states. Servers **MAY** define additional individuals to extend the states of different ChangeRequest types and lifecycles. The property `oslc_cm:status` is now deprecated; use of `oslc_cm:state` and state predicates is preferred. [cm-35]

## 2.10 Labels for Relationships



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*This section is non-normative.*

Change Management relationships to other resources are represented by RDF properties. Instances of a relationship - often called links - are RDF triples with a subject URI, a predicate that is the property, and a value (or object) that is the URI of target resource. When a link is to be presented in a user interface, it may be helpful to display an informative and useful textual label instead of or in addition to the URI of the predicate and or object. There are three items that clients could display:

- **The property:** OSLC recommends using the `rdfs:label` property of the `rdf:Property` from the vocabulary to display the property.
- **The value, or object of the triple:** OSLC recommends using OSLC resource preview [OSLCResourcePreview] to obtain an appropriate icon and label, and possibly a small and/or large dialog for displaying the object.
- **The link:** The link is a combination of the subject, predicate and object of the triple (RDF statement or assertion). In the case where the link requires a unique label that is not available from the target resource, only then OSLC servers may support a `dcterms:title` on a reified statement to provide a label for a link that describes the assertion itself.

Turtle example using a reified statement:

## EXAMPLE 1

```
@prefix ns0: <http://open-services.net/ns/cm#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dcterms: <http://purl.org/dc/terms/> .

<http://example.com/bugs/4321>
  a <http://open-services.net/ns/cm#ChangeRequest> ;
  ns0:relatedChangeRequest <http://anotherexample.com/defects/123> .

<http://njh.me/#link1>
  a rdf:Statement ;
  rdf:subject <http://example.com/bugs/4321> ;
  rdf:predicate ns0:relatedChangeRequest ;
  rdf:object <http://anotherexample.com/defects/123> ;
  dcterms:title "Defect 123: Problems during install" .
```

JSON-LD example using reified statement:

## EXAMPLE 2

```
{
  "@context": {
    "dcterms": "http://purl.org/dc/terms/",
    "rdf": "http://www.w3.org/1999/02/22-rdf-syntax-ns#",
    "oslc": "http://open-services.net/ns/core#",
    "oslc_cm": "http://open-services.net/ns/cm#"
  },
  "@id": "http://example.com/bugs/4321",
  "@type": "oslc_cm:ChangeRequest",
  "oslc_cm:relatedChangeRequest": {
    "@id": "http://anotherexample.com/defects/123",
    "dcterms:title": "Defect 123: Problems during install"
  }
}
```

## 2.11 Vocabulary Terms and Constraints

[OSLC Change Management Version 3.0, Part 2: Vocabulary](#) Defines the vocabulary terms and constraints for OSLC Change Management resources. These terms and constraints are specified according to [OSLCCoreVocab].

## 2.12 CM Server Capabilities

### 2.12.1 Server Resources

OSLC CM servers **MUST** support OSLC Discovery capabilities defined by [OSLCCore3]. [cm-36]

OSLC CM servers **MAY** provide a `ServiceProvider` Resource that can be retrieved at a implementation dependent URI. [cm-37]

OSLC CM servers **MAY** provide a `ServiceProviderCatalog` Resource that can be retrieved at a implementation dependent URI. [cm-38]

OSLC CM servers **MAY** provide a `oslc:serviceProvider` property for their defined resources that will be the URI to a `ServiceProvider` Resource. [cm-39]

OSLC CM servers **MUST** supply a value of `http://open-services.net/ns/cm#` for the property `oslc:domain` on either `oslc:Service` or `oslc:ServiceProviderCatalog` resources. [cm-40]

OSLC CM servers **MAY** allow `ChangeRequest` state change through [OSLCActions]. [cm-41]

### 2.12.2 Creation Factories

OSLC CM servers **MUST** support [Creation Factories](#) and list them in the Service Provider Resource as defined by OSLC Core. OSLC CM servers **SHOULD** support Resource Shapes for Creation Factories as defined in [OSLCShapes] [cm-42]

### 2.12.3 Query Capabilities

OSLC CM servers **SHOULD** support the [Query Capabilities](#) as defined by [OSLCCore3]. OSLC CM servers **SHOULD** support Resource Shapes for Query Capability as defined in [OSLCShapes] [cm-43]

The Query Capability, if supported, **MUST** support these parameters:

- `oslc.select`
- `oslc.properties`
- `oslc.prefix`

[cm-44]

If shape information is NOT present with the Query Capability, servers **SHOULD** use these default properties to contain the result:

- For RDF/XML and XML, use `rdf:Description` and `rdfs:member` as defined in [OSLC Core RDF/XML Examples](#).
- For JSON, the query results are contained within `oslc:results` array. See [OSLC Core Representation Guidance for JSON](#)

[cm-45]

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## 2.12.4 Delegated UIs

OSLC CM servers **MUST** support the selection and creation of resources by delegated web-based user interface dialogs [Delegated UIs](#) as defined by [\[OSLCCore3\]](#). [\[cm-46\]](#)

OSLC CM servers **MAY** support the pre-filling of creation dialogs based on the definition at [Delegated UIs](#). [\[cm-47\]](#)

## 2.12.5 Usage Identifiers

An OSLC CM server can identify or distinguish the usage of various services with additional property values for the [OSLC Core](#) defined `oslc:usage` property on `oslc:Dialog`, `CreationFactory` and `QueryCapability`. The `oslc:usage` property value of `http://open-services.net/ns/core#default` will be used to designate the default or primary service to be used by clients when multiple entries are found.

The additional Change Management property values for `oslc:usage` are:

- `http://open-services.net/ns/cm#defect` - primarily used by QM tools to report defects in testing.
- `http://open-services.net/ns/cm#planItem` - used by QM and PPM tools for associating change requests into plans (project, release, sprint, etc).
- `http://open-services.net/ns/cm#task` - used by QM and PPM tools for associating change requests into executable and track-able items.
- `http://open-services.net/ns/cm#requirementsChangeRequest` - used by RM tools for associating a change request for usage in tracking changes to a Requirements resource

## 2.13 Conformance

Implementations of this specification need to satisfy the following conformance clauses.

Clause Number	Requirement
<a href="#">cm-1</a>	This specification is based on <a href="#">[OSLCCore3]</a> . OSLC CM servers <b>MUST</b> be compliant with both the core specification, <b>MUST</b> follow all the mandatory requirements in the normative sections of this specification, and <b>SHOULD</b> follow all the guidelines and recommendations in both these specifications.
<a href="#">cm-2</a>	An OSLC CM server <b>MUST</b> implement the domain vocabulary defined in <a href="#">OSLC Change Management Version 3.0, Part 2: Vocabulary</a>
<a href="#">cm-3</a>	OSLC servers <b>MAY</b> ignore unknown content and OSLC clients <b>MUST</b> preserve unknown content
<a href="#">cm-4</a>	OSLC service <b>MUST</b> support resource operations via standard HTTP operations
<a href="#">cm-5</a>	OSLC servers <b>MAY</b> provide paging for resources but only when specifically requested by client
<a href="#">cm-6</a>	OSLC servers <b>MUST</b> support request for a subset of a resource's properties via the <code>oslc.properties</code> URL parameter retrieval via HTTP GET
<a href="#">cm-7</a>	OSLC servers <b>MAY</b> support partial update of resources using <a href="#">[LDPPatch]</a> , or via HTTP PUT.
<a href="#">cm-8</a>	OSLC servers <b>SHOULD</b> provide a <code>ServiceProvider</code> resource for Core v2 compatibility, <b>MAY</b> provide a <code>ServiceProviderCatalog</code> , and <b>MAY</b> provide other forms of discovery described in Core 3.0 Discovery.
<a href="#">cm-9</a>	OSLC servers <b>MUST</b> provide LDPC creation factories to enable resource creation of Change Management resources via HTTP POST
<a href="#">cm-10</a>	OSLC servers <b>SHOULD</b> provide query capabilities to enable clients to query for resources
<a href="#">cm-11</a>	OSLC query capabilities <b>SHOULD</b> support the OSLC Core Query Syntax and <b>MAY</b> use other query syntax
<a href="#">cm-12</a>	OSLC Services <b>MUST</b> offer delegated UI dialogs (creation and selections) specified via OSLC Core 3.0 Delegated Dialogs and <b>SHOULD</b> include discovery through a <code>ServiceProvider</code> resource for OSLC v2 compatibility
<a href="#">cm-13</a>	OSLC Services <b>SHOULD</b> offer UI previews for resources that may be referenced by other resources specified via OSLC Core 3.0 Preview and <b>SHOULD</b> include discovery through a server resource for OSLC v2 compatibility
<a href="#">cm-14</a>	OSLC Services <b>SHOULD</b> follow the recommendations for Authentication specified in <a href="#">[OSLCCore3]</a>
<a href="#">cm-15</a>	OSLC Services <b>SHOULD</b> provide error responses using OSLC Core 3.0 defined error formats
<a href="#">cm-16</a>	OSLC servers <b>MUST</b> provide a Turtle representation for HTTP GET requests and <b>SHOULD</b> support Turtle representations on POST and PUT requests.
<a href="#">cm-17</a>	OSLC servers <b>SHOULD</b> provide an RDF/XML representation for HTTP GET requests and <b>SHOULD</b> support RDF/XML representations on POST and PUT requests for compatibility with Change Management 2.0.
<a href="#">cm-18</a>	OSLC servers <b>SHOULD</b> provide a XML representation for HTTP GET, POST and PUT requests that conform to the Core 2.0 Guidelines for XML.
<a href="#">cm-19</a>	OSLC servers <b>MUST</b> provide JSON-LD representations for HTTP GET, POST and PUT requests that conform to the Core Guidelines for JSON-LD
<a href="#">cm-20</a>	OSLC servers <b>SHOULD</b> provide HTML representations for HTTP GET requests
<a href="#">cm-21</a>	CM servers <b>MUST</b> provide Turtle and JSON-LD, and <b>SHOULD</b> provide RDF/XML and XML representations. The XML and JSON representations <b>SHOULD</b> follow the guidelines outlined in the <a href="#">OSLC Core Representations Guidance</a> to maintain compatibility with <a href="#">[OSLCCore2]</a> .
<a href="#">cm-22</a>	CM clients requesting RDF/XML <b>SHOULD</b> be prepared for any valid RDF/XML document. CM clients requesting XML <b>SHOULD</b> be prepared for representations that follow the guidelines outlined in the <a href="#">OSLC Core Representations Guidance</a> .
<a href="#">cm-23</a>	CM servers <b>SHOULD</b> support an [X]HTML representation and a user interface (UI) preview as defined by <a href="#">UI Preview Guidance</a>
<a href="#">cm-24</a>	CM servers <b>MUST</b> accept Turtle and JSON-LD representations and <b>SHOULD</b> accept RDF/XML and XML representations. CM servers accepting RDF/XML <b>SHOULD</b> be prepared for any valid RDF/XML document. For XML CM servers <b>SHOULD</b> be prepared for representations that follow the guidelines outlined in the <a href="#">OSLC Core Representations Guidance</a> .
<a href="#">cm-25</a>	CM servers <b>MUST</b> provide Turtle and JSON-LD, <b>SHOULD</b> provide RDF/XML, XML, and <b>MAY</b> provide Atom Syndication Format XML representations.
<a href="#">cm-26</a>	When CM clients request: <ul style="list-style-type: none"><li>• <code>text/turtle</code> CM servers <b>MUST</b> respond with Turtle representation.</li><li>• <code>application/ld+json</code> CM servers <b>MUST</b> respond with JSON-LD representation.</li><li>• <code>application/rdf+xml</code> CM servers <b>SHOULD</b> respond with RDF/XML representation without restrictions.</li><li>• <code>application/xml</code> CM servers <b>SHOULD</b> respond with OSLC-defined abbreviated XML representation as defined in the <a href="#">OSLC Core Representations Guidance</a></li><li>• <code>application/atom+xml</code> CM servers <b>SHOULD</b> respond with Atom Syndication Format XML representation as defined in the <a href="#">OSLC Core Representations Guidance</a></li><li>• The Atom Syndication Format XML representation <b>SHOULD</b> use RDF/XML representation without restrictions for the <code>atom:content</code> entries representing the resource representations.</li></ul>
<a href="#">cm-27</a>	<a href="#">[OSLCCore3]</a> specifies the recommended OSLC authentication mechanisms. In addition to the OSLC Core authentication requirements, OSLC CM servers <b>SHOULD</b> support <a href="#">[OpenIDConnect]</a> .
<a href="#">cm-28</a>	OSLC CM servers <b>SHOULD</b> support pagination of query results and <b>MAY</b> support pagination of a single resource's properties as defined by <a href="#">[OSLCCore3]</a> .
<a href="#">cm-29</a>	A client <b>MAY</b> request a subset of a resource's properties as well as properties from a referenced resource. In order to support this behavior a server <b>MUST</b> support the <code>oslc.properties</code> and <code>oslc.prefix</code> URL parameter on a HTTP GET request on individual resource request or a collection of resources by query. If the <code>oslc.properties</code> parameter is omitted on the request, then all resource properties <b>MUST</b> be provided in the response.
<a href="#">cm-30</a>	A client <b>MAY</b> request that a subset of a resource's properties be updated by using the <a href="#">[LDPPatch]</a> PATCH method.
<a href="#">cm-31</a>	For compatibility with <a href="#">[OSLCCore2]</a> , CM servers class="conformance" also support partial update by identifying those properties to be modified using the <code>oslc.properties</code> URL parameter on a HTTP PUT request.
<a href="#">cm-32</a>	If the parameter <code>oslc.properties</code> contains a valid resource property on the request that is not provided in the content, the server <b>MUST</b> set the resource's property to a null or empty value. If the parameter <code>oslc.properties</code> contains an invalid resource property, then a 409 Conflict <b>MUST</b> be returned.
<a href="#">cm-33</a>	For multi-valued properties that contain a large number of values, it may be difficult and inefficient to add or remove property values. OSLC CM servers <b>MAY</b> provide support for a partial update of the multi-valued properties as defined by draft specification <a href="#">[LDPPatch]</a> . CM servers <b>MAY</b> also support partial updates through HTTP PUT where only the updated properties are included in the entity request body.

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Clause Number	Requirement
<a href="#">cm-34</a>	An attempt to update read-only predicates <b>SHOULD</b> be answered with a 409 Conflict HTTP status code. Their presence in a resource representation used for an update via PUT <b>MUST NOT</b> prevent the resource from being updated. Predicates <b>MUST</b> be queryable. The Change Request resource definition sections defines the complete set of predicates.
<a href="#">cm-35</a>	OSLC CM 3.0 provides a similar means of defining a set of standard states that is also extensible. The <code>oslc_cm:state</code> property can have a value of type <code>oslc_cm:State</code> which represents an enumeration of individuals representing a standard set of ChangeRequest states. Servers <b>MAY</b> define additional individuals to extend the states of different ChangeRequest types and lifecycles. The property <code>oslc_cm:status</code> is now deprecated; use of <code>oslc_cm:state</code> and state predicates is preferred.
<a href="#">cm-36</a>	OSLC CM servers <b>MUST</b> support OSLC Discovery capabilities defined by <a href="#">[OSLCCore3]</a> .
<a href="#">cm-37</a>	OSLC CM servers <b>MAY</b> provide a ServiceProvider Resource that can be retrieved at a implementation dependent URI.
<a href="#">cm-38</a>	OSLC CM servers <b>MAY</b> provide a ServiceProviderCatalog Resource that can be retrieved at a implementation dependent URI.
<a href="#">cm-39</a>	OSLC CM servers <b>MAY</b> provide a <code>oslc:serviceProvider</code> property for their defined resources that will be the URI to a ServiceProvider Resource.
<a href="#">cm-40</a>	OSLC CM servers <b>MUST</b> supply a value of <code>http://open-services.net/ns/cm#</code> for the property <code>oslc:domain</code> on either <code>oslc:Service</code> or <code>oslc:ServiceProviderCatalog</code> resources.
<a href="#">cm-41</a>	OSLC CM servers <b>MAY</b> allow ChangeRequest state change through <a href="#">[OSLCActions]</a> .
<a href="#">cm-42</a>	OSLC CM servers <b>MUST</b> support <a href="#">Creation Factories</a> and list them in the Service Provider Resource as defined by OSLC Core. OSLC CM servers <b>SHOULD</b> support Resource Shapes for Creation Factories as defined in <a href="#">[OSLCShapes]</a>
<a href="#">cm-43</a>	OSLC CM servers <b>SHOULD</b> support the <a href="#">Query Capabilities</a> as defined by <a href="#">[OSLCCore3]</a> . OSLC CM servers <b>SHOULD</b> support Resource Shapes for Query Capability as defined in <a href="#">[OSLCShapes]</a>
<a href="#">cm-44</a>	<p>The Query Capability, if supported, <b>MUST</b> support these parameters:</p> <ul style="list-style-type: none"> <li>• <code>oslc.select</code></li> <li>• <code>oslc.properties</code></li> <li>• <code>oslc.prefix</code></li> </ul>
<a href="#">cm-45</a>	<p>If shape information is NOT present with the Query Capability, servers <b>SHOULD</b> use these default properties to contain the result:</p> <ul style="list-style-type: none"> <li>• For RDF/XML and XML, use <code>rdf:Description</code> and <code>rdfs:member</code> as defined in <a href="#">OSLC Core RDF/XML Examples</a>.</li> <li>• For JSON, the query results are contained within <code>oslc:results</code> array. See <a href="#">OSLC Core Representation Guidance for JSON</a></li> </ul>
<a href="#">cm-46</a>	OSLC CM servers <b>MUST</b> support the selection and creation of resources by delegated web-based user interface dialogs <a href="#">Delegated UIs</a> as defined by <a href="#">[OSLCCore3]</a> .
<a href="#">cm-47</a>	OSLC CM servers <b>MAY</b> support the pre-filling of creation dialogs based on the definition at <a href="#">Delegated UIs</a> .

## Appendix A. Version Compatibility with 2.0 Specifications

### A.1 Deprecated terms

Terms introduced in early development of the OSLC Change Management domain were deprecated in the finalized [OSLCCM20] specification. These terms are summarized here in order to indicate they remain deprecated.

Prefixed Name	Occurs	Read-only	Value-type	Representation	Range	Description
<i>deprecated</i> dcterms:type	zero-or-more	unspecified	String	n/a	n/a	A short string representation for the type, example <i>Defect</i> .
<b>Relationship properties:</b> This grouping of properties are used to identify relationships between resources managed by other OSLC servers						
<i>deprecated</i> oslc_cm:testedByTestCase	zero-or-many	False	Resource	Reference	any	Test case by which this change request is tested. It is likely that the target resource will be an <i>oslc_cm:TestCase</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:affectsTestResult	zero-or-many	False	Resource	Reference	any	Associated QM resource that is affected by this Change Request. It is likely that the target resource will be an <i>oslc_cm:TestResult</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:blocksTestExecutionRecord	zero-or-many	False	Resource	Reference	any	Associated QM resource that is blocked by this Change Request. It is likely that the target resource will be an <i>oslc_cm:TestExecutionRecord</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestExecutionRecord	zero-or-many	False	Resource	Reference	any	Related to a QM test execution resource. It is likely that the target resource will be an <i>oslc_cm:TestExecutionRecord</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestCase	zero-or-many	False	Resource	Reference	any	Related QM test case resource. It is likely that the target resource will be an <i>oslc_cm:TestCase</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestPlan	zero-or-many	False	Resource	Reference	any	Related QM test plan resource. It is likely that the target resource will be an <i>oslc_cm:TestPlan</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestScript	zero-or-many	False	Resource	Reference	any	Related QM test script resource. It is likely that the target resource will be an <i>oslc_cm:TestScript</i> , but that is not necessarily the case.

### A.2 Changes from 2.0

The following lists the significant vocabulary changes that were introduced in this specification. The changes are all upward compatible additions and therefore do not introduce incompatibilities with version 2.0.

- Added *oslc\_cm:priority* and *oslc\_cm:severity*
- Added new change management types

## Appendix B. Acknowledgements

*This section is non-normative.*

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

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## Appendix C. Errata

OSLC Change Management version 2.0 deprecated a number of properties that refer to OSLC Quality Management artifacts. OSLC version 3.0 preserved these deprecated properties, and in addition, removed them from the resource constraints. This errata removes the deprecation of the following properties and adds them back to the resource constraints:

- `oslc_cm:testedByTestCase`
- `oslc_cm:affectsTestResult`
- `oslc_cm:blocksTestExecutionRecord`
- `oslc_cm:relatedTestExecutionRecord`
- `oslc_cm:relatedTestCase`
- `oslc_cm:relatedTestPlan`
- `oslc_cm:relatedTestScript`

These links were deprecated as part of the resolution of [Issue on redundant inverse predicates](#). OSLC CM 3.0 does define the corresponding properties representing links from the other direction, but marks them as deprecated. This was done to follow link guidance best practices and only define the links from one direction to avoid backlinks and data redundancy issues.

With the introduction of OSLC Configuration Management 1.0, and that OSLC Change Management resources are not versioned resources, these properties will now be required to create links between non-versioned Change Management resources and versioned Quality Management resources. Therefore these properties are no longer deprecated, and their ResourceShapes have been added to the constraints.

The specific changes are listed in the following subsections.

### C.1 Errata Appendix Added

This appendix was added to describe the issue being addressed, its motivation, and all of the specific changes made.

### C.2 Vocabulary terms are no longer deprecated

In [change-mgt-vocab.ttl](#) and [change-mgt-vocab.html](#) (as generated from the .ttl file), the property value `vs:term_status "archaic;"` was removed from the following properties to indicate they are no longer deprecated:

- `oslc_cm:testedByTestCase`
- `oslc_cm:affectsTestResult`
- `oslc_cm:blocksTestExecutionRecord`
- `oslc_cm:relatedTestExecutionRecord`
- `oslc_cm:relatedTestCase`
- `oslc_cm:relatedTestPlan`
- `oslc_cm:relatedTestScript`

### C.3 Added missing resource constraints

In [change-mgt-shapes.ttl](#) and [change-mgt-shapes.html](#) (as generated from the .ttl file), Resource Constraints were added for the formerly deprecated properties. This includes adding the following optional properties to ChangeRequest, Defect and Enhancement:

- `:testedByTestCase`
- `:affectsTestResult`
- `:blocksTestExecutionRecord`
- `:relatedTestExecutionRecord`
- `:relatedTestCase`
- `:relatedTestPlan`
- `:relatedTestScript`

Here's an example of one of the constraints that was added, the others are similar.

```
:testedByTestCase a      oslc:Property ;
oslc:name           "testedByTestCase" ;
oslc:occurs         oslc:Zero-or-many ;
oslc:propertyDefinition oslc_cm:testedByTestCase ;
oslc:range          oslc_config:ChangeSet ;
oslc:representation oslc:Reference ;
oslc:valueType      oslc:Resource ;
dcterms:description "Test case by which this change request is tested. It is likely that the target resource will be an oslc_cm:TestCase but that is not necessarily the case." ;
dcterms:title       "Tested By Test Case" .
```

### C.4 Updated Deprecated Properties Table

The table in appendix A.1 Deprecated terms was updated to remove the following terms that are no longer deprecated.

Prefix Name	Occurs	Read-only	Value-type	Representation	Range	Description
<b>Relationship properties:</b> This grouping of properties are used to identify relationships between resources managed by other OSLC servers						
<i>deprecated</i> <code>oslc_cm:testedByTestCase</code>	zero-or-many	False	Resource	Reference	<b>any</b>	Test case by which this change request is tested. It is likely that the target resource will be an <code>oslc_cm:TestCase</code> , but that is not necessarily the case.
<i>deprecated</i> <code>oslc_cm:affectsTestResult</code>	zero-or-many	False	Resource	Reference	<b>any</b>	Associated QM resource that is affected by this Change Request. It is likely that the target resource will be an <code>oslc_cm:TestResult</code> , but that is not necessarily the case.
<i>deprecated</i> <code>oslc_cm:blocksTestExecutionRecord</code>	zero-or-many	False	Resource	Reference	<b>any</b>	Associated QM resource that is blocked by this Change Request. It is likely that the target resource will be an <code>oslc_cm:TestExecutionRecord</code> , but that is not necessarily the case.

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Prefixed Name	Occurs	Read-only	Value-type	Representation	Range	Description
<i>deprecated</i> oslc_cm:relatedTestExecutionRecord	zero-or-many	False	Resource	Reference	any	Related to a QM test execution resource. It is likely that the target resource will be an <i>oslc_qm:TestExecutionRecord</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestCase	zero-or-many	False	Resource	Reference	any	Related QM test case resource. It is likely that the target resource will be an <i>oslc_qm:TestCase</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestPlan	zero-or-many	False	Resource	Reference	any	Related QM test plan resource. It is likely that the target resource will be an <i>oslc_qm:TestPlan</i> , but that is not necessarily the case.
<i>deprecated</i> oslc_cm:relatedTestScript	zero-or-many	False	Resource	Reference	any	Related QM test script resource. It is likely that the target resource will be an <i>oslc_qm:TestScript</i> , but that is not necessarily the case.

### C.5 Table of Contents Updated

The table of contents was updated to properly show the appendices.