



Framework for EPR-Based SML Reference Schemes

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Abstract

The Service Modeling Language [[SML](#)] ~~1.1~~ specification extends ~~XML~~ [[XML](#)] and ~~XML Schema~~ [[XML Schema](#)] with a mechanism for incorporating into XML documents references to other documents or document fragments. This technical note addresses the construction of SML reference schemes for document or document fragment references that employ WS-Addressing [[WS-A](#)] endpoint references (EPRs).

Comment [LKC1]: [content] Drop version number?

Comment [LKC2]: [style] Add reference to spec

Comment [LKC3]: [style] Add reference to spec

Status of this Document

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Please send comments related to this document to public-sml@w3.org ([public archive](#)).

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This document is intended to serve as guidance for designing SML reference schemes that employ WS-Addressing [[WS-A](#)] endpoint references (EPRs). Currently, this document is consistent with the [[SML](#) 1.1 and [[SML-IF](#) 1.1] specifications, but it may be obsoleted by future versions of these specifications.

Comment [LKC4]: [content] Suggest dropping version numbers since the referenced specs are already versioned.

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1. Introduction [\[ToC\]](#)

Comment [LKC5]: [content] Replace with “Back to Contents” throughout. Note that this link is only visible when hovering over the heading text.

The Service Modeling Language [[SML](#)] specification extends XML and XML Schema with a mechanism for incorporating into XML documents references to other documents

or document fragments. A reference to another document or document fragment is encoded by means of markup compliant with one or more ~~reference schemes~~ [reference schemes]. The SML specification defines one reference scheme, the SML URI Reference Scheme, which enables XML documents to use URIs to identify documents or document fragments. The SML URI Reference Scheme has the significant advantage of guaranteeing referential conformance of models that are exchanged between vendors (see ~~[SML-IF 1.1, section 5.1]~~ section 5.1 in [SML-IF]).

Comment [LKC6]: [style] Link to definition in SML spec.

Comment [LKC7]: [style] Inter-doc section ref hyperlink "section 5.1" and "[SML-IF]".

However, not all documents or document fragments can be retrieved simply by means of ~~a URI that may function as a URL~~ a URI that may be dereferenced. For example, the targeted document may be accessible only through a Web service endpoint. There are several protocols, each specifying its own message exchange pattern (MEP), that make documents and document fragments available through interaction with a Web service. These include (but are not limited to):

Comment [LKC8]: [content] Per WG decision 2/9/09

- WS-Transfer [\[WS-T\]](#) and WS-Management [\[WS-Man\]](#)
- WS-ResourceProperties [\[WS-RP\]](#) and Web Services Distributed Management [\[WSDM\]](#)
- CMDB Federation [\[CMDBf\]](#)

Other such services may be defined in the future. It is a common characteristic of these services that their endpoints must be addressed using endpoint references, ~~EPRs,~~ [EPRs] as defined in the WS-Addressing [\[WS-A\]](#) specification. Consequently, this note considers how SML reference schemes can use Web services endpoint references to refer to services that provide documents or document fragments through message exchanges.

Comment [LKC9]: [style]

The SML specification provides a mechanism to define other reference schemes beyond the SML URI Reference Scheme in order to accommodate special purpose reference schemes as well as reference schemes that fall outside of the capabilities of URIs. The purpose of this Note is to propose a framework for defining SML reference schemes that accommodate references to documents accessed via EPRs.

EPRs cannot simply be placed in browsers and dereferenced to locate the target resource. Processors must know how to process a given EPR and this knowledge often involves knowing (1) the operations offered by the service and (2) the protocol required for invoking the targeted operation of the service. In this sense, the use of EPRs goes beyond the standard architecture of the Web [\[AWWW\]](#). Therefore, use of the SML URI Reference Scheme is encouraged and remains the recommended approach for SML models. Nevertheless, it is recognized that in some cases model documents may be accessible only through a service that requires being addressed by means of an EPR. For further discussion of EPRs and interoperability, see [section 4.2](#).

2.Framework: Core Characteristics of EPR-Based Reference Schemes [\[ToC\]](#)

This section proposes a set of characteristics, or framework, for EPR-based SML reference schemes. These characteristics are based on the Reference Scheme definition requirements of ~~[SML 1.1, section 4.3]~~ section 4.3 of [SML].

Comment [LKC10]: [style] Inter-doc section ref.

2.1 Framework for SML EPR Reference Schemes

The following guidance is recommended for defining EPR-based SML reference schemes:

1. An SML reference element should be identified as an instance of an EPR-based reference scheme if and only if exactly one element information item whose [local name] is EndpointReference and whose [namespace name] is defined by a WS-Addressing specification (for example, <http://www.w3.org/2005/08/addressing>) is present as a child of the SML reference element.
2. An instance of an EPR-based SML reference scheme should be resolved by the SML validator by constructing the appropriate message to the service based on the provided EPR and any additional information it has or is provided about how to interact with the Web service endpoint. This additional information includes the signature of the operation that is to be invoked to access the targeted document or document fragment. This operation needs to be bound into a message to the service (e.g., a SOAP [SOAP] message) according the rules identified below (items a through c).

Comment [LKC11]: [style] Add hyperlink.

Comment [LKC12]: [style] Add hyperlink.

Comment [LKC13]: [style] Remove hyperlink. This text is an example of a namespace name; not meant to be dereferenced.

Note that to resolve an instance of an EPR-based SML reference scheme compliant with this framework, the SML validator must be a Web services client. If the validator does not have adequate information to construct the appropriate Web services request to the service providing access to the targeted document, then the EPR-based SML reference is unresolved.

Comment [LKC14]: [style] Delete. Redundant with "[SOAP]" ref.

Comment [LKC15]: [style] delete

Comment [LKC16]: [style] delete

The resolution process should conform to the following rules:

- a. The Web service client should follow the appropriate binding rules for the EPR as specified in the WS-Addressing ~~[WS-A]~~ specification.
 - b. The appropriate binding rules for the operation (~~WSDL bindings~~ [WSDL]) should be applied in constructing the request to the service.
 - c. The ~~SML reference target~~ [\[http://www.w3.org/TR/sml/#target\]](http://www.w3.org/TR/sml/#target) SML reference [target] should be the content or a child within the content of the service response message. If there is no response message returned by the service (as defined by the service protocol), then the SML reference is unresolved.
3. Since the URI [IRI] in the wsa:Address element of the EPR identifies only an endpoint of a service and typically requires out-of-band knowledge to retrieve a document or document fragment from that endpoint, an EPR-based SML reference scheme does not use ~~target complete identifiers~~ [target-complete identifiers].

Comment [LKC17]: [style] Delete. Not necessary to ref the spec each time a standard is mentioned.

Comment [LKC18]: [content] Wordsmith. Are WSDL binding the one and only appropriate bindings? Or one possibility?

Comment [LKC19]: [style] Per WG decision on 2/9/09

Comment [LKC20]: [style] All IRIs are URIs, so redundant

Comment [LKC21]: [style] Font change

Comment [LKC22]: [style] Link to definition in SML spec.

The preceding definition of the Framework Core (FC) is provided as non-normative. However, if this FC is adopted as the basis of defining EPR-based SML reference schemes (see [section 3.1](#)), then testing compliance with the framework would require the following changes to the language of the framework.

- All positive FC assertions (e.g. "should", "is") MUST be interpreted as requirements (MUSTs) in conformity with [\[RFC 2119\]](#).
- All negative FC assertions (e.g. "should not", "is not") MUST be interpreted as requirements (MUST NOTs) in conformity with [\[RFC 2119\]](#).
- All FC assertions of explicit variability (e.g. "may") MUST be interpreted as explicit points of variability (implementation-defined) in conformity with [\[RFC 2119\]](#).

Comment [LKC23]: [content] Move to the beginning of the section. Also suggest dropping the word "core" and consistently calling it "the Framework" – capitalized, no abbreviation.

Comment [LKC24]: [content] I don't understand what is being said here, so I suggest the entire sentence be rewritten for clarity.

As noted in point 2 above, the additional knowledge that is required by a Web service client to resolve an instance of the ~~SML EPR reference scheme framework~~ an EPR-based reference scheme may include knowledge of the operations supported by the service endpoint. Because the operations are typically not provided in the EPR itself, and ~~the SML EPR reference scheme framework~~ the Framework does not constrain these bindings, two otherwise equal EPRs associated with different service bindings could target different documents. Specific knowledge regarding the MEPs needed to interact with the service pointed to by the EPR may need to be made available to the SML model validator. See [section 3.1](#) for a means by which such knowledge may be made available through an EPR-based SML reference scheme.

Comment [LKC25]: [content]

Comment [LKC26]: [content]

2.2 Example of an SML EPR Reference Scheme

Consider the following ~~(very)~~ simple XML document:

Comment [LKC27]: [style]

```
<UniversityCourses xmlns="http://www.university.example.org/ns">
  <PHY101>
    .
    .
    .
  </PHY101>
  <PHY102>
    .
    .
    .
  </PHY102>
</UniversityCourses>
```

This simple document will illustrate both the following example and the EPR-based SML reference scheme to be developed in [section 3](#). In the following example we will assume that each course entry is indexed ~~by an xs:ID or xs:keyref, CourseName, by an information item named CourseName, whose type is xs:ID or xs:keyref and~~ whose value is the name of the element.

Comment [LKC28]: [content]

The following example illustrates ~~how the EnrolledCourse SML reference that references a course, PHY101, can be represented using the use of an EPR-based SML Reference Scheme~~ reference scheme that is compliant with the ~~preceding framework~~.

Comment [LKC29]: [style] Capitalize only when denoting a specific ref scheme. Apply this change throughout.

Framework. The `EnrolledCourse` element references a course named `PHY101` from the preceding document:

```
<EnrolledCourse xmlns:sml="http://www.w3.org/sml/2007/02"
  sml:ref="true">
  <wsa:EndpointReference
    xmlns:wsa="http://www.w3.org/2005/08/addressing">
    <wsa:Address>
      http://www.university.example.org?CourseName=PHY101
    </wsa:Address>
    </wsa:EndpointReference>
  </EnrolledCourse>
```

Comment [LKC30]: [style]

Comment [LKC31]: [content] Paragraph reworded for clarity.

The service providing the university's list of courses is addressed by the `URL URI` `http://www.university.example.org`. ~~In this case, the service endpoint expects to receive the identifier of the desired document fragment as a query component, `CourseName`, in the address.~~ The service endpoint expects a course name to be encoded in the query component of the URI in the `wsa:Address` element. Access to the same content may require a different EPR-based SML reference scheme if the university's service interface ~~involved~~ involves a different means to target the desired fragment. For example, [section 3.2](#) provides another example of an SML reference using a totally different EPR-based SML reference scheme.

Comment [LKC32]: [content]

Comment [LKC33]: [content] Rewrote sentence for clarity.

Comment [LKC34]: [content] verb tense w/it "my"

3.Using the Framework with Web Services Protocols [\[ToC\]](#)

Because of the virtually unlimited latitude in specifying Web service interfaces for retrieving documents, EPR-based SML reference schemes may be defined with mechanisms to address the requirements of specific service protocols. For example, it may be desirable to include in the reference scheme definition a specific `wsa:Action` that the Web service client is to use in constructing the message to the service, or to provide a fragment identifier as a separate operation parameter in the form of a QName or ~~XPath~~ `[XPath]` expression. In some cases, because of the service protocol, it may not be feasible to include this additional information within the `wsa:EndpointReference` element itself. The definition of a specific EPR reference scheme should use the Framework ~~Core~~ as its basis and may add several conditions for identifying an instance of the specific scheme.

Comment [LKC35]: [style] Add reference.

Comment [LKC36]: [style]

3.1 An `[SML]` WS-ResourceFramework Reference Scheme

~~For example, let~~ Let us assume that the course listing in the previous example ([section 2.2](#)) is maintained by a WS-Resource conformant to the WS-ResourceFramework `[WS-RF]` specification, and each course is a resource property of this resource. ~~(aAn XML Schema is provided in section 3.2.)~~ A definition of a specific SML ~~WSRF~~ `[WS-RF]` Reference Scheme might proceed as follows:

Comment [LKC37]: [style] Suggest consistent use of "SML WS-RF Reference Scheme" throughout text. Or some other formulation, as long as it is consistent.

Comment [LKC38]: [style]

Comment [LKC39]: [style]. Split into 2 sentences.

Comment [LKC40]: [style] Consistently abbreviate as "WS-RF" throughout.

SML WSRF Reference Scheme Definition:

Comment [LKC41]: [style] Suggest that the list be numbered, not bulleted.

- This reference scheme fully complies with the Framework ~~(Core (FC))~~ defined in ~~[Framework: Core Characteristics]~~ Section 2.1.
- An SML reference element is identified as an instance of the SML WSRF Reference Scheme if and only if it is identified as using the ~~(EPR)~~ Framework and it contains the following:

Comment [LKC42]: [style]

Comment [LKC43]: [style] Use consistent intra-doc references.

Comment [LKC44]: [style]

- It has exactly one child element information item for which all of the following are true:

- Its ~~[local name]~~ is EndpointReference.
- Its [namespace name] is <http://www.w3.org/2005/08/addressing>.

Comment [LKC45]: [style] Add hyperlink to definition. Do this for all [foo] throughout doc.

- It has exactly one child element information item for which all of the following are true:

- Its [local name] is Action.
- Its [namespace name] is <http://www.w3.org/2005/08/addressing>.
- The content of this element must be a URI ~~from the domain docs.oasis-open.org/wsrf/~~ that represents a valid WS-ResourceProperties [WS-RP] request operation.

Comment [LKC46]: [content] All WS-RP action URIs share a common prefix of <http://docs.oasis-open.org/wsrf/fault>. Nevertheless, I suggest deleting this since the WS-RP spec explicitly specifies all of the URIs that may be used in a wsa:Action, and the term "domain" is confusing here.

- It has at most one valid ~~[WS-RP]~~ WS-RF message request element for which all the following are true:

- Its [local name] corresponds to a WS-ResourceProperties operation element.
- Its [namespace name] is <http://docs.oasis-open.org/wsrf/rp-2>.
- The content of this element is a single QName or XPath expression. ~~[t]~~

Comment [LKC47]: [style] Refnot necessary.

- Resolution of this reference scheme should conform with the following rules:

- The EndpointReference element is mapped to SOAP ~~[Header]~~ element(s) as specified in the WS-Addressing SOAP Binding specification [WS-A SOAP].
- The Action child element is mapped to a SOAP ~~[Header]~~ element with the same QName and content value.
- The WSRF message request element, if present, is mapped to the SOAP ~~[Body]~~ element with the same QName and content value.
- The SML reference ~~target~~ ~~[target]~~ is the content of the service response message. If there is no response message returned by the service, then the SML reference is unresolved.

Comment [LKC48]: [style] Replace footnote with inline text.

Comment [LKC49]: [style] Font change

Comment [LKC50]: [style] Font change

Comment [LKC51]: [style] Font change

Comment [LKC52]: [style] Add ref.

- As a consequence of conforming to ~~FC~~ the Framework, and not placing additional constraints on the resolution process sufficient to make it fully deterministic in the absence of outside knowledge, this reference scheme does not use ~~target-complete identifiers~~ [target-complete identifiers].

Comment [LKC53]: [style]

Comment [LKC54]: [style] Add ref.

Note that this definition is not proposed as a normative definition of a WS-ResourceFramework reference scheme; however, this lack of normative standing should not be taken as precluding a similar definition being normatively defined. Section

[4.1](#) will identify further components of this definition that are required to insure that the reference scheme is interoperable.

3.2 WSRF Reference Scheme Example

This section illustrates the WSRF Reference Scheme defined in the preceding section. For simplicity, we will use the same simple XML document introduced in [section 2.2](#). To conform to the WS-ResourceFramework, we assume that the schema of this document is constructed in the following manner:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="http://www.university.example.org/ns"
  targetNamespace="http://www.university.example.org/ns">

  <xs:complexType name="CourseType">
    <xs:sequence>
      . . .
    </xs:sequence>
  </xs:complexType>

  <xs:element name="PHY101" type="tns:CourseType"/>
  <xs:element name="PHY102" type="tns:CourseType"/>
  . . .
  <xs:element name="UniversityCourses">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="tns:PHY101"/>
        <xs:element ref="tns:PHY102"/>
        . . .
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

(NOTE:) This example is not meant to imply that this is the best way to design the XML document or the schema for this kind of list; it is meant only as a means to enable **both** SML reference scheme examples to reference instance documents the same simple structure.)

Comment [LKC55]: [style] Either delete the leading text or make this paragraph an inline note (left indented). Delete parens either way.

Comment [LKC56]: [content] Stray word, or sentence needs rewording.

To retrieve the PHY101 element via the WSRF Reference Scheme, the WS-ResourceProperties GetResourceProperty operation may be used. This operation has a wsa:Action as follows:

```
<wsa:Action>
  http://docs.oasis-open.org/wsrf/rpw-
  2/GetResourceProperty/GetResourcePropertyRequest
</wsa:Action>
```


The WS-ResourceProperties **[WS-RP]** message request element specifies the QName of the targeted document fragment, which must be a **[Global Element Declaration (GED)]**, as the content value of the element representing the operation:

Comment [LKC57]: [style] Ref not necessary.

Comment [LKC58]: [style] Link to definition?

```
<wsrp:GetResourceProperty
  xmlns:wsrp="http://docs.oasis-open.org/wsrf/rp-2"
  xmlns:tns="http://www.university.example.org/ns">
  tns:PHY101
</wsrp:GetResourceProperty>
```

Thus, a functionally equivalent SML reference to the reference in [section 2.2](#) (for an **[identically]** **[identically]** structured XML instance document) could be specified with the WSRF Reference Scheme as follows:

Comment [LKC59]: [content] Typo.

```
<EnrolledCourse
  xmlns:sml="http://www.w3.org/sml/2007/02"
  xmlns:wsrp="http://docs.oasis-open.org/wsrf/rp-2"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  sml:ref="true">
  <wsa:EndpointReference>
    <wsa:Address>http://www.university.example.org</wsa:Address>
  </wsa:EndpointReference>
  <wsa:Action>
    http://docs.oasis-open.org/wsrf/rpw-
    2/GetResourceProperty/GetResourcePropertyRequest
  </wsa:Action>
  <wsrp:GetResourceProperty
    xmlns:tns="http://www.university.example.org/ns">
    tns:PHY101
  </wsrp:GetResourceProeprty>
</EnrolledCourse>
```

WSRF Reference Scheme instances provide to the SML model validator three essential parts for constructing the message that is to be sent to the university course service: the EPR of the service, the `wsa:Action` that is bound into the SOAP **[Header]**, and the content of the SOAP **[Body]**. Note that knowledge of how to use the service bindings in constructing a SOAP message, for example, what component(s) should go into the SOAP **[Header]** and which into the SOAP **[Body]**, must be made available to the model consumer. This information is typically provided by the WSDL binding for the service.

Comment [LKC60]: [style]

Comment [LKC61]: [style]

Comment [LKC62]: [style]

Comment [LKC63]: [style]

4. Interchange and Interoperability Considerations [\[ToC\]](#)

4.1 Using EPR-Based SML Reference Schemes in SML-IF Documents

Interchanging SML models consisting of documents containing SML references that use EPR-based SML reference schemes requires special consideration. Interchange is performed by packaging the documents comprising an SML model into a single document as described in the [\[SML-IF\]](#) specification. In order to perform interchange set

validation, the SML-IF validator must first look to validate any SML reference in terms of what is packaged in the SML-IF document itself. If validation fails from this perspective, SML-IF validators may choose to pursue the reference outside of the SML-IF document; however, given the complexity of de-referencing an EPR, SML-IF validators may be reluctant to do so.

In order to support this internal test of SML reference validity, the SML-IF specification introduces the notion of a document ~~alias~~ ~~[SML-IF 1.1, section 5.3.3]~~ ~~[alias]~~. For aliases to be usable in the context of SML-IF, an alias name (a URI) must be derivable from the reference scheme instance so that the validator can determine what document in the interchange set the reference scheme is intending to point to. Thus if an EPR-based SML reference scheme will be used in the context of SML-IF, the reference scheme definition should include a method for mapping each EPR to a predictable URI.

Comment [LKC64]: [style] Link to <http://www.w3.org/TR/sml-if#alias>

The following considerations pertain to the processing of SML references exposing EPR-based SML reference schemes in SML-IF documents by means of aliasing:

4.1.1 Document Aliases

Unless the EPR-based SML reference scheme is sufficiently constrained to make use of target-complete identifiers, which is unlikely for EPRs, its `wsa:Address` cannot be used as an SML-IF document alias. Nevertheless, the referenced document may be embedded in the SML-IF document. If maintaining the fidelity of these links during interchange is necessary, several alternatives are available, including but not limited to:

1. For each EPR-based SML reference scheme of an SML reference, the SML-IF producer adds a second reference scheme instance understood by the receiving SML-IF consumer. This second reference could use a URI that does not follow the SML-IF rules for resolving target-complete identifiers, ~~see [SML-IF 1.1, section 5.3.4].~~ (See section 5.3.4 in [SML-IF]). That is, the URI would fall into "category 3" discussed in that section. Note that the identifier value must be generated dynamically from the information given in the EPR reference scheme instance. Care must be taken to avoid collisions, since SML-IF allows document aliases to be preserved across multiple interchanges.
2. An EPR-based SML reference scheme definition can specify an algorithm for generating target-complete identifiers for the purpose of SML-IF URI reference processing as described in ~~[SML-IF 1.1, section 5.3.4]~~ section 5.3.4 in [SML-IF].

Comment [LKC65]: [style] End sentence. Add inter-doc section ref in parens.

Comment [LKC66]: [style] Inter-doc section ref.

Using the first case as an example, the SML-IF document producer generates a reference scheme instance based on information in the given instance of the EPR reference scheme that is sufficient to uniquely identify the target document or document fragment within the interchange model. Thus, this scheme specifies a document alias. For example, the SML reference from the example in [section 3.2](#) may have a generated reference scheme ~~instance~~ with an algorithmically generated identifier as shown in the following ~~(bolded in the following code)~~:

Comment [LKC67]: [content] Added word.

Comment [LKC68]: [content] Replaced with explanation following the XML fragment. See comment 68.

```

<EnrolledCourse
  xmlns:sml="http://www.w3.org/sml/2007/02"
  xmlns:wsrp="http://docs.oasis-open.org/wsrf/rp-2"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  sml:ref="true">
  <wsa:EndpointReference>
    <wsa:Address>http://www.university.example.org</wsa:Address>
  </wsa:EndpointReference>
  <wsa:Action>
    http://docs.oasis-open.org/wsrf/rpw-
2/GetResourceProperty/GetResourcePropertyRequest
  </wsa:Action>
  <wsrp:GetResourceProperty
    xmlns:tns="http://www.university.example.org/ns">
    tns:PHY101
  </wsrp:GetResourceProperty>
  <newScheme:generatedWSRFIdentifier
    xmlns:newScheme="http://www...myNewScheme_namespace..."
    xmlns:tns="http://www.university.example.org/ns">
    http://www.university.example.org?GetResourceProperty=tns:PHY101
  </newScheme:generatedWSRFIdentifier>
</EnrolledCourse>

```

Comment [LKC69]: [content] Suggest using a syntactically valid URI here.

The generated reference scheme instance is comprised by the `newScheme:generatedWSRFIdentifier` element. (It is left as an exercise for the reader to trace through the algorithmic steps by which the URI in the `newScheme:generated` instance can be generated from the preceding EPR Reference Scheme instance. Obviously, the schema declaration of `EnrolledCourse` must allow additional elements.)

Comment [LKC70]: [content] Added sentence.

Comment [LKC71]: Which URI does this refer to?

Comment [LKC72]: [content] Replaced word.

This new reference scheme targets the document independently of how the document is made available through the Web service targeted by the preceding EPR-based Reference Scheme. The alias for this reference would be:

Comment [LKC73]: [content] Added.

```

<alias>
  http://www.university.example.org?GetResourceProperty=tns:PHY101
</alias>

```

Moreover, the process by which the identifier is resolved to the targeted document within the SML-IF document must be defined in the reference scheme definition similar to the way the resolution process for target-complete URI references is defined in ~~SML-IF 1.1, section 5.3.4~~ section 5.3.4 of ~~SML-IF~~. (This resolution algorithm is also left as an exercise for the reader.)

Comment [LKC74]: [content] Added missing word.

Comment [LKC75]: [style] Inter-doc section ref.

NOTE: While the SML-IF consumer may recognize the reference scheme added by the SML-IF producer, we assume that the reference scheme will ~~NOT~~ *not* be recognized by the SML model processor; thus the SML model processor will not attempt to resolve it. Should the SML model processor recognize the reference scheme (e.g., if the SML URI Reference Scheme is used to contain the document alias URI) and should the SML model processor attempt to resolve it by normal processing for that reference scheme, the reference may fail. Implementations may take steps to prevent this failure.

Comment [LKC76]: [style] Style this paragraph as an inline note (indented).

Comment [LKC77]: [style]

If the targeted service exposes only the targeted document, or, more precisely, the `address` element of the EPR uniquely identifies the target document within the service, it may be possible to utilize the second strategy above and generate a `target-complete identifier` to both identify and serve as a document alias to the document or document fragment in the SML-IF document. For example, if the university.example service above fulfills the condition of exposing only that one document, a target-complete identifier in the preceding example might be:

```
http://www.university.example.org#smlxpath1(/u:UniversityCourses/u:PHY101)
```

where `UniversityCourses` is the root element of the document and `u` the `u prefix` represents the `http://www.university.example.org/ns` namespace. It is not expected that EPR-based SML reference schemes will typically be able to support a target-complete identifier.

Comment [LKC78]: [content] Should be `wsa:Address?`

Comment [LKC79]: [content] delete dash

Comment [LKC80]: [style] Necessary to mark-up all terms of art with links to their corresponding definitions?

Comment [LKC81]: [content] Should be a more precise way to refer to the example.

Comment [LKC82]: [content] reword

4.1.2 Document Locators

EPRs as values of the SML-IF `document/locator` element are subject to the same semantic and processing requirements as are EPR-based reference schemes. EPR `document/locators` `[document locators]` should be avoided if wide interoperability is desired.

Comment [LKC83]: [style] Link to defn in SML-IF spec.

4.2 Interoperability

Because EPR-based SML reference schemes cannot in general be represented by SML URI Reference schemes, an SML-IF document containing EPR-based reference schemes cannot typically be referentially conforming as defined by [\[SML-IF 1.1, section 5.1\]](#) [section 5.1 of \[SML-IF\]](#). However, the two mechanisms defined in [section 4.1.1](#) for generating aliases within the SML-IF document partially address interoperability issues at the level of the SML-IF document. [\[**\]](#)

Comment [LKC84]: [style] Inter-doc section ref.

Comment [LKC85]: [style] Move footnote here as inline note.

Definitions of EPR-based SML reference schemes should be sufficiently rigorous to support model interoperability amongst those vendors who agree to use a specific EPR-based reference scheme.

5. Summary [\[ToC\]](#)

The following points summarize the issues that should be considered when defining an EPR-based SML reference scheme.

1. Consideration should be given to using the Framework Core described in [section 2](#) and to adopting it as normative.
2. Consideration should be given to the operations and their parameters offered by the service interface through which the document or document fragment is accessed. The critical issue in defining an EPR-based SML reference scheme is

how much of this special knowledge should be captured in the EPR-based SML reference scheme itself and how much might be otherwise made available to the model consumer.

3. If the EPR-based SML reference scheme will be used in the context of an SML-IF document, then a method for supporting SML-IF document aliases should be defined as part of the reference scheme definition. This note explored several strategies by which this issue could be addressed. These strategies involve:
 - a. Defining an algorithm for generating a reference scheme using a URI identifier with an explicitly stated resolution process, so that targeted documents can be identified within the SML-IF document by SML-IF aliasing mechanism, or
 - b. Defining an algorithm for generating a target-complete URI reference scheme so that the alias can be resolved by the mandated process for resolving SML URI Reference Schemes.

A. **References** *[ToC]*

Comment [LKC86]: [content] Double-check all URIs for accuracy

[AWWW]

[*Architecture of the World Wide Web, Volume One*](#), I. Jacobs, N. Walsh, Editors. W3C Recommendation, World Wide Web Consortium, 15 December 2004. This version of the Architecture of the World Wide Web, Volume One Recommendation is at <http://www.w3.org/TR/2004/REC-webarch-20041215/>. The [latest version](#) is available at <http://www.w3.org/TR/webarch/>.

[CMDBf]

[*CMDB Federation Specification 1.0.0*](#). Johnson, Mark, et. al. Authors. DMTF DSP1095, Work in progress. The [current working draft document](#) is available at http://www.dmtf.org/standards/published_documents/DSP1095_1.0.0.pdf.

[RFC 2119]

[*Key words for use in RFCs to Indicate Requirement Levels*](#). S. Bradner, Author. Internet Engineering Task Force, June 1999. This [RFC](#) is available at <http://www.ietf.org/rfc/rfc2119.txt>.

[SML]

[*Service Modeling Language, Version 1.1*](#), Bhalchandra Pandit, Valentina Popescu, Virginia Smith, Editors. World Wide Web Consortium, 25 November 2008. This version of the Service Modeling Language specification is available at <http://www.w3.org/TR/2008/CR-sml-20081125/>. The [latest version of Service Modeling Language, Version 1.1](#) is available at <http://www.w3.org/TR/sml/>.

[SML-IF]

[*Service Modeling Language Interchange Format Version 1.1*](#), Bhalchandra Pandit, Valentina Popescu, Virginia Smith, Editors. World Wide Web Consortium, 25 November 2008. This version of the Service Modeling Language Interchange Format specification is available at <http://www.w3.org/TR/2008/CR-sml-if-20081125/>. The [latest version of the Service Modeling Language Interchange Format Version 1.1](#) specification is available at <http://www.w3.org/TR/sml-if/>.

[WS-A SOAP]

[Web Services Addressing 1.0 - SOAP Binding](#), Martin Gudgin, Marc Hadley, Tpnny Rogers, Editors. World Wide Web Consortium, 9 May 2006. This version of the WS-Addressing SOAP Binding specification is <http://www.w3.org/TR/2006/REC-ws-addr-soap-20060509>. The [latest version of WS-Addressing SOAP Binding](#) is available at <http://www.w3.org/TR/ws-addr-soap>.

[WS-A]

[Web Services Addressing 1.0 - Core](#), Martin Gudgin, Marc Hadley, Tony Rogers, Editors. World Wide Web Consortium, 9 May 2006. This version of the WS-Addressing Core specification is <http://www.w3.org/TR/2006/REC-ws-addr-core-20060509>. The [latest version of WS-Addressing Core](#) is available at <http://www.w3.org/TR/ws-addr-core>.

[SOAP]

[SOAP Version 1.2 Part 1: Messaging Framework \(Second Edition\)](#), Martin Gudgin, Marc Hadley, Noah Mendelsohn, Jean-Jacques Moreau, Henrik Frystyk Nielsen, Anish Karmarkar, Yves Lafon, Editors. World Wide Web Consortium, 27 April 2007. This version is <http://www.w3.org/TR/2007/REC-soap12-part1-20070427/>. The [latest version](#) is available at <http://www.w3.org/TR/soap12-part1/>.

[WS-Man]

[WS-Management Specification, 1.0.0](#). Raymond McCollum, Bryan Murray, Brian Reistad, Editors. DMTF DSP0226. This version available at http://www.dmtf.org/standards/published_documents/DSP0226.pdf.

[WS-RF]

[WS-ResourceFramework](#) is a family of specifications consisting of *WS-Resource*, *WS-ResourceProperties* [[WS-RP](#)], *WS-ResourceLifetime*, *WS-ServiceGroup*, and *WS-BaseFaults*. [Current versions of these specifications](#) are available at <http://www.oasis-open.org/specs/index.php#wsrf>.

[WS-RP]

[Web Services Resource Properties 1.2](#), Steve Graham, Jem Treadwell, Editors. This [version](#) is available at http://docs.oasis-open.org/wsrf/wsrf-ws_resource_properties-1.2-spec-os-01.pdf http://docs.oasis-open.org/wsrf/wsrf-ws_resource_properties-1.2-spec-os.pdf

Comment [LKC87]: [content] Correct URI

[WS-T]

[Web Services Transfer](#). J. Alexander et al. Authors. September 2006. W3C Member Submission. Current [version](#) is available at <http://www.w3.org/Submission/2006/SUBM-WS-Transfer-20060927/>.

[WSDL]

[Web Services Description Language \(WSDL\) Version 2.0 Part 1: Core Language](#), R. Chinnici, J. J. Moreau, A. Ryman, S. Weerawarana, Editors. World Wide Web Consortium, 26 June 2007. This version of the WSDL 2.0 specification

is <http://www.w3.org/TR/2006/REC-wsdl20-20070626>. The [latest version of WSDL 2.0](#) is available at <http://www.w3.org/TR/wsdl20>.

[WSDM]

[Web Services Distributed Management: Management using Web Services \(MUWS 1.1\) Part 1](#). Vaughn Bullard, William Vambenepe, Editors. Current [version](#) is available at <http://docs.oasis-open.org/wsdm/wsdm-muws-part1-1.1.pdf>.

B. Acknowledgments [\[ToC\]](#)

This note is based on based on input from the members of the SML Working Group, particularly John Arwe (IBM).

* The WS-ResourceProperties `GetResourcePropertyDocument` operation does not require a message request element. The other WS-RP operations, `GetResourceProperty`, and `QueryResourceProperties`, require an appropriate element as the content of the SOAP `Body`. Note that the WS-ResourceProperties `GetMultipleResourceProperties` operation, which may retrieve multiple resource properties (elements), would, under conditions of normal usage, yield an invalid SML reference because it references multiple elements.

Comment [LKC88]: [style] font change

Comment [LKC89]: [style] font change

Comment [LKC90]: [style] font change

Comment [LKC91]: [style] font change

Comment [LKC92]: [style] font change

** Other considerations related to interoperability exist even if the reference schemes may be defined with sufficient rigor to insure interoperability amongst those who adopt the reference scheme. These other issues include whether model documents are embedded or included by reference only in the SML-IF document and whether the SML-IF document is schema-complete. These issues lie beyond the scope of this Note. For further discussion, see [\[SML-IF 1.1, section 4.5\]](#) [section 4.5 of \[SML-IF\]](#).

Comment [LKC93]: [style] Inter-doc section ref