Infrastructure Working Group

SIF Contexts

Revision 1.4
September 11th, 2006

Contents

SIF Contexts
Infrastructure Feature for SIF 2.0

1 Preface

1.1 Change History

Version	Date	Author	Comments
DRAFT 0.2	12/21/2005	Eric Petersen	First draft of proposal for distribution to Data Model and Infrastructure working groups
DRAFT 0.3	01/05/2006	Eric Petersen	At the suggestion of Peter Waldschmidt – and the overwhelming approval of everyone I consulted – modified all occurrences of "Historical" to "SIF_Longitudinal" to better reflect the purpose of that context.
DRAFT 0.4	1/31/2006	Eric Petersen	Incorporated feedback from Infrastructure contributors: Rewrote the Overview; added a Best Practices section; removed Use Cases and all references to suggested use cases like "Informative vs. Authoritative" because they are not being considered for SIF 2.0 and have proven confusing to the discussion; added a table (Section 4.2.2) to list all recognized context names; added Section 4.3 *Overlapping Contexts*; reworked Section 4.1. *Contexts and Zone Provisioning*; moved the SIF_Context element from the message payload to the SIF_Header to make it consistent with current design and easier for ZIS servers to implement; removed discussion of *Broadcasted Events* and *Broadcasted Requests* from the Appendix as they are not in scope for SIF 2.0 and are not dependent on contexts. Some comments still exist and are ==highlighted==.
Final	3/22/2006	Eric Petersen	Changed "Metadata Task Force" with "Data Model Working Group" in the glossary; added SIF_ZoneStatus XML example
1.1	4/11/2006	Eric Petersen	Changed @Context attribute in SIF_ZoneStatus children to be a child element rather than an attribute
1.2	4/18/2006	Eric Petersen	Changed @Context attribute to an element in SIF_Provision, SIF_Provide, SIF_Subscribe, SIF_Unprovide, and SIF_Unsubscribe; forgot to do this in previous revision of the document.
1.3	7/27/2006	Mark Ward	Added context changes for SIF_Event and Request/Response for repeatable context.
1.4	09/08/2006	Andrew Elmhorst	Changed the default context name to "SIF_Default" and changed the definition of the zone context registry to state that it must provisioned by an administrator

2 Overview

The SIF Zone is the primary means of partitioning data, applications, and policies. Zones are typically organized around geographic boundaries (e.g. school, district, region, state) or functional boundaries (e.g. horizontal integration, student locator services, data warehousing and reporting services). Although partitioning data in this way has proven successful in implementations to date, new use cases are being developed that require the data within a zone be viewed in more than one dimension or context.

This document specifies a new feature of the SIF 2.0 infrastructure known as a *SIF Context*. Contexts offer a way to further partition a zone, usually to describe more than one dimension to its data. For example, using Contexts a student information system can publish the current state of student objects while a data warehouse can independently publish historical or longitudinal state. Contexts enable vendors and system integrators to work with data in new ways while retaining the zone topologies that are commonly in use today.

In addition to offering different perspectives on a zone's data, SIF Contexts allow two or more agents to register as a provider of the same object type within a zone. This may lead to future solutions built around Contexts; for example, to better define how systems that publish similar objects cooperate in the same zone (e.g. student information systems and special education packages). Contexts also make it easier to apply a different set of business rules to one audience than another.

Unlike SIF Zones, which can be named and assembled in a variety of ways at the discretion of system integrators, SIF Contexts are to be treated as a part of the specification. The SIF Association will sanction contexts and provide an adjunct specification that clearly defines each context's purpose and any associated message choreographies and business rules for it. To that end, SIF 2.0 defines a single context named "SIF_Longitudinal" to further promote it as a vertical reporting and data collection infrastructure. Its use is governed by the *Longitudinal Data Collection* specification. (See also Section 4.2.2 Pre-Defined Contexts). It is important to note this document does not define implementations of SIF Contexts, but rather describes the mechanism as it relates to the SIF Infrastructure.

2.1 Definitions

These terms are important to the discussion of *SIF Contexts*:

Term	Definition
Horizontal Application Integration	A common use of SIF to support real-time interoperability among disparate K-12 applications within a district ("horizontally"). For example, exchanging SIS records with library, foodservice, and transportation systems. Horizontal Integration implies a current, transactional view of data rather than a longitudinal one.
Data Collection	A relatively new use of SIF to collect data elements from SIF-enabled providers in district, usually for the purpose of data warehousing and reporting. Data Collections often have an end goal of analyzing or presenting data longitudinally, and therefore must view data in both a current and longitudinal context.
Longitudinal Data Collection	The broad term given to the set of best practices defined by a separate document titled "*Longitudinal Data Collection*" (Data Model working group). It is one of many potential use cases proposed for SIF Contexts.
Metadata / SIF_Metadata	A new common element in SIF 2.0 that enables metadata to be attached to any object in the SIF Data Model. The specification for metadata is published and owned by the *Data Model Working*

	Group.
Default Context	The default context in a SIF 2.0 zone when no context is explicitly named in a message. The string name of this context is "SIF_Default".
Longitudinal	Concerned with the development of persons or groups over time. With regard to SIF Contexts, the "SIF_Longitudinal" context is a pre-defined context name specified by the *Longitudinal Data Collection* specification. Data warehouses and similar systems use this context to publish the longitudinal state of data independent of the current state of data used in horizontal integration.

2.2 Impact

Support for *SIF Contexts* is **optional** in both SIF Agent software and SIF implementations. SIF 2.0 Zone Integration Servers will be required to support this new feature of the infrastructure.

Contexts are intended to be backward compatible with existing SIF 1.x software and implementations. Each zone has an implicit "SIF_Default" context that is assumed when no context is specified in a message. This means zone integration servers can route messages in the same manner as SIF 1.5; for example, a SIF_Request for StudentPersonal that does not specify a context will be routed to the StudentPersonal provider in the "SIF_Default" context.

3 Best Practices

3.1.1 When to Use Contexts and When to Use Zones

SIF Contexts are not a replacement for SIF Zones. Zones should be used as they have traditionally been used to date in SIF 1.x implementations: that is, to partition data along geographic boundaries. Examples of prevalent zone topologies include:

- School zones (contain data for one school)

- District zones (contain data for all schools in a district)

- Regional zones (contain data for two or more districts in a region)

- State zones (used for Student Locator and Vertical Reporting purposes)

Once data has been partitioned into zones, contexts may be used to view or work with the zone's data in different ways. They are particularly useful when SIF Agents are required to implement competing sets of business rules for different audiences – such as horizontal integration versus longitudinal data collection – on the same set of data objects available in a zone. Contexts may also be useful to solve use cases where more than one provider of an object type is required, or when generic filtering of data (e.g. by school year) is needed.

3.1.2 RefId Considerations

A RefId assigned to a data object should persist for the life of that object. This is a general requirement in SIF and holds true regardless of the zones or contexts in which an object has been published. When a given object is represented in more than one context it must be identified by the same RefId.

Consider an object published by a data warehouse in the "SIF_Longitudinal" context. Because that context is intended to represent the historical or longitudinal state of objects, it will be common to have several

instances of the same data object representing its state at various points in time. A request for a student's demographics might therefore yield many StudentPersonal objects, one from each year the student has been enrolled in the district. Each of these StudentPersonal objects must be identify by the same RefId. Again, this is a general requirement of SIF and not specific to contexts. Since the SIF 2.0 Infrastructure does not provide a mechanism for RefId management, reconciliation is something agent vendors must take into account when implementing solutions that work with data over time and from more than one publishing systems.

4 SIF Contexts

A *SIF Context* is a logical partition within a zone used to sub-divide the zone's data. A zone may have one or more contexts, each identified by a simple string name. Each zone has an implicit context named "SIF_Default" that is assumed when no context is specified in a SIF_Request, SIF_Response, or SIF_Event message.

When a SIF Request, SIF Response, or SIF_Event message specifies a context the name of the context is specified in the message header with the SIF_Context element:

```
<SIF_Header>
  <SIF_MsgId>666DD33C998F2CCE49CBB7837FB2F211</SIF_MsgId>
  <SIF_Date>20060101</SIF_Date>
  <SIF_Time Zone="UTC-07:00">20:39:12</SIF_Time>
  <SIF_SourceId>RamseyDataWarehouse</SIF_SourceId>
  <SIF_Context>SIF_Longitudinal</SIF_Context>
</SIF_Header>
```

When no SIF_Context element is specified in the header the ZIS routes the message to the "SIF_Default" context.

4.1 Contexts and Zone Provisioning

The primary purpose of a Context is to enable agents to work with the objects in a zone in more than one way; usually from a different perspective than the state the object exists in the default context. A student information system, for example, could exchange current StudentPersonal objects with other horizontally integrated applications, while a data warehouse simultaneously provides the longitudinal state of those same objects to reporting applications.

SIF 1.x is limited to one registered Provider per object type in each zone. With the introduction of Contexts, there can be one Provider of each object type per context, and therefore multiple providers in a zone. In addition, an agent can request and subscribe to objects in more than one context; for example, a data warehouse can request and subscribe to objects from the default context while separately providing those same objects in the "SIF_Longitudinal" context.

Whereas SIF 1.x Zone Integration Servers could maintain a single-dimensioned object provisioning table, SIF 2.0 Zone Integration Servers must maintain a context-specific table. The following table illustrates two independent contexts in the "Ramsey Elementary" zone.

Zone: Ramsey Elementary

Context: "SIF_Default"					
Object	Provider	Subscribers	Requests	Responds	Events
StudentPersonal	SIS	SIS Cafe Portal Library Warehouse	Cafe Portal Library Warehouse	SIS Library	SIS Library
SchoolInfo	SIS	Cafe Portal Library Warehouse	Cafe Portal Library Warehouse	SIS	SIS
StudentMeal	Cafe	SIS	SIS	Cafe	Café

		Portal Warehouse	Portal Warehouse		
LibraryPatronStatus	Library	*-n/a-*	Portal Warehouse	Library	*-n/a-*

Context: "SIF_Longitudinal"					
Object	**Provider**	**Subscribers**	**Requests**	**Responds**	**Events**
StudentPersonal	Warehouse	Reporter	Reporter	Warehouse	Warehouse
SchoolInfo	Warehouse	Reporter	Reporter	Warehouse	Warehouse
StudentMeal	Warehouse	Reporter Portal	Reporter Portal	Warehouse	Warehouse
LibraryPatronStatus	Warehouse	Reporter Portal	Reporter Portal	Warehouse	Warehouse

4.2 Context Name

Contexts are identified by a simple string name. Examples include "SIF_Default", "SIF_Longitudinal", "2006 Data", "2007 Data", and so on. Context names should be short, comprised of one or two words. However, as with SIF Zone and SIF_SourceIds, the specification places no restriction on the content or length of context names.

4.2.1 Default Context

Each zone has a default context that is implicitly used when no context is specified in a SIF_Request, SIF_Response, or SIF_Event message. The name of this default context is "SIF_Default".

4.2.2 Pre-Defined Contexts

The SIF 2.0 Specification will enumerate all defined context names and make available an adjunct specification governing the context's use. At this time, all context names are to be considered reserved by the SIF Association. This restriction could be lifted in the future if it is determined that "user-defined" contexts are required to satisfy future use cases, and that such contexts can be used in the field without impeding interoperability. At the moment, however, contexts are reserved and new context names must be defined by a separate specification.

Vendors are encouraged to build SIF Agent and ZIS products that are capable of supporting both multiple zones and multiple contexts within a zone, but are discouraged from offering the ability to create "user-defined" or ad hoc contexts. By reserving the right to strictly define how contexts are to be used for specific use cases, the SIF Association is in the best position to promote out-of-the-box interoperability.

The following SIF Context names are valid in SIF 2.0 and later:

Context Name	Governing Specification	Purpose
"SIF_Default"	*SIF Specification 2.0* Infrastructure Working Group; from *SIF Contexts* proposal, Revision 0.4 DRAFT (January 30, 2006)	The "SIF_Default" context is implicit to all zones and is reserved for the exchange of SIF Data Objects in support of general application interoperability.
"SIF_Longitudinal"	*Longitudinal Data Collection* Data Model Working Group; Revision 0.1 DRAFT (January 6, 2006)	The "SIF_Longitudinal" context is reserved for the publishing of data objects longitudinally by data warehouses, student information systems, and other applications that capture historical state. It is reserved for agents that conform to the *Longitudinal Data Collection* specification.

4.2.3 Zone Context Registry

Zone Integration Servers must maintain a registry of the contexts used in each zone in order to perform contextual message routing and to populate the new SIF_ZoneStatus/SIF_Contexts element. This registry will always contain, at a minimum, the official list of contexts defined by the version of SIF that the ZIS supports. For SIF 2.0, that means that each zone will, at a minimum, support the "SIF_Default" context. A ZIS must have support for allowing additional contexts to be defined within the context registry at the discretion of the ZIS administrator. Access Control Lists within each context must also be able to be managed by the ZIS administrator. The set of permissions for each agent within each context must be able to be set differently than ACL permissions within a different context for the same agent.

An agent can obtain a list of all contexts currently defined in a zone by requesting the SIF_ZoneStatus object and enumerating the children of its SIF_Contexts element. An agent can determine it's ACL permissions within the zone and each context by requesting the SIF_AgentACL object and enumerating the permissions and contexts defined within it.

4.3 Overlapping Contexts

It is not a requirement that a SIF Context be isolated from other contexts; indeed, data in a zone is available for use in all contexts and may flow freely between them. However, in practice it may not be very common to have contexts overlap.

As an example, consider a typical data warehousing configuration where both the "SIF_Default" and "SIF_Longitudinal" contexts are used. The data warehouse SIF Agent functions as a subscriber and requestor of data objects in the Default context in order to import data and remain synchronized with each contributing data source (SIS, foodservice, special programs, etc.). As these data sources emit SIF Events, the data warehouse agent will receive them just as all other subscribers in the Default context will. This does not require that agents operating the Default context handle events any differently than in a context-less zone, and should not be construed as a requirement that agents in the Default context must somehow implement special logic to keep the data warehouse agent up to date. Thus, even though the data objects published in the Default context also exist in the Longitudinal context, there is no real "overlap" between the zones.

4.4 SIF_Context Element & Context Attribute

Whenever a context may be specified in a SIF infrastructure message, the new SIF_Context element or @Context attribute is used to identify it. When omitted or left blank, the "SIF_Default" context is always implied. (@Context is one of only two attributes in SIF that are optional and will inherit a value if not specified; the other is SIF_Message/SIF_Version).

The SIF_Context element identifies a context in the SIF_Header of these message types:

- SIF_Request

- SIF_Response

- SIF_Event

The SIF_Context element is used in these objects:

- SIF_ZoneStatus

The @Context attribute identifies a context in these messages and objects:

- SIF_Provide/SIF_Object/@Context

- SIF_Provision (2.0)

- SIF_Unprovide/SIF_Object/@Context

- SIF_Subscribe/SIF_Object/@Context

- SIF_Unsubscribe/SIF_Object/@Context

The remainder of this section provides examples of the SIF_Context and Context attribute in each instance where it may be used.

4.4.1 Using SIF_Context in Message Headers

SIF_Context is specified along with other routing parameters in the SIF_Header element. This is consistent with elements like SIF_DestinationId and should make it easier for most ZIS implementations to extract context information from a message. In SIF 2.0 a context may be specified for SIF_Request, SIF_Response, and SIF_Event messages only. If no SIF_Header/SIF_Context element is specified, the "SIF_Default" context is implied.

NOTE: Sections 4.6 through 4.8 describe how context is applied to SIF_Request, SIF_Response, and SIF_Event messages.

The following example shows SIF_Context specified in a SIF_Request message:

```
<SIF_Request>
  <SIF_Header>
    <SIF_MsgId>666DD33C998F2CCE49CBB7837FB2F211</SIF_MsgId>
    <SIF_Date>20060101</SIF_Date>
    <SIF_Time Zone="UTC-07:00">20:39:12</SIF_Time>
    <SIF_SourceId>RamseyDataWarehouse</SIF_SourceId>
    <SIF_Context>SIF_Longitudinal</SIF_Context>
  </SIF_Header>
  <SIF_Version>1.5r1</SIF_Version>
  <SIF_MaxBufferSize>384000</SIF_MaxBufferSize>
  <SIF_Query>
    <SIF_QueryObject ObjectName="StudentMeal"/>
    <SIF_ConditionGroup Type="None">
      <SIF_Conditions Type="And">
        <SIF_Condition>
          <SIF_Element>SIF_Metadata/TimeElement/StartDateTime</SIF_Element>
          <SIF_Operator>EQ</SIF_Operator>
          <SIF_Value>20050901</SIF_Value>
        </SIF_Condition>
        <SIF_Condition>
          <SIF_Element>SIF_Metadata/TimeElement/EndDateTime</SIF_Element>
          <SIF_Operator>EQ</SIF_Operator>
          <SIF_Value>20051203</SIF_Value>
        </SIF_Condition>
      </SIF_Conditions>
    </SIF_ConditionGroup>
  </SIF_Query>
</SIF_Request>
```

4.5 Provisioning

SIF Contexts enable more than one agent to provide a given object type in a zone and therefore impact both message routing and SIF_ZoneStatus. Consequently, some changes are required of the infrastructure's provisioning messages. All changes are backward compatible with SIF 1.x as the SIF_Context element or Context attribute may be omitted and the "SIF_Default" context implied.

4.5.1 SIF_Provide

If an agent wishes to register as the provider of an object in a specific context, it may include the optional @Context attribute in the SIF_Provide/SIF_Object element. If that attribute is omitted the "SIF_Default" context is assumed.

For example,

```
<SIF_Provide>
  <SIF_Header>...</SIF_Header>
  <SIF_Object ObjectName="StudentPersonal">
    <SIF_Contexts>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
  <SIF_Object ObjectName="StudentPersonal">
    <SIF_Contexts>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
  <SIF_Object ObjectName="SchoolInfo"/>
  <SIF_Object ObjectName="StudentSchoolEnrollment"/>
</SIF_Provide>
```

Note in the above example it is not necessary to explicitly name the "SIF_Default" context for StudentPersonal. The example could be re-written as:

```
<SIF_Provide>
  <SIF_Header>...</SIF_Header>
  <SIF_Object ObjectName="StudentPersonal>
    <SIF_Contexts>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
  <SIF_Object ObjectName="StudentPersonal"/>
  <SIF_Object ObjectName="SchoolInfo"/>
  <SIF_Object ObjectName="StudentSchoolEnrollment"/>
</SIF_Provide>
```

An agent can register as the Provider of an object type in more than one context as illustrated above. However, there can only be one Provider of a given object type in each context. For example, two agents cannot both register as the provider of StudentPersonal in the "SIF_Default" context. An attempt to do so is met with a SIF_Error acknowledgement where the SIF_Category is 6 ("Provision") and SIF_Code is 4 ("Object already has a provider"). ZIS implementations are encouraged to state the context name as part of the SIF_Desc or SIF_ExtendedDesc error message.

4.5.2 SIF_Provision (2.0)

SIF 2.0 offers an alternative method of provisioning an agent: the new SIF_Provision message. The purpose of SIF_Provision is to declare, atomically and in a single message, all of the publish and subscribe capabilities of the agent. Here the optional @Context attribute may be used to specify a context in the following elements:

- SIF_ProvideObjects

- SIF_SubscribeObjects

- SIF_PublishAddObjects

- SIF_PublishChangeObjects

- SIF_PublishDeleteObjects

- SIF_RequestObjects

- SIF_RespondObjects

For example,

```
<SIF_Provision>
  <SIF_Header>...</SIF_Header>
  <SIF_ProvideObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
  </SIF_ProvideObjects>
  <SIF_SubscribeObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
  </SIF_SubscribeObjects>
  <SIF_PublishAddObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Object>
  </SIF_PublishAddObjects>
  <SIF_PublishChangeObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
        <SIF_Context>SIF_Default</SIF_Context>
      </SIF_Contexts>
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
        <SIF_Context>SIF_Default</SIF_Context>
      </SIF_Contexts>
    </SIF_Object>
  </SIF_PublishChangeObjects>
  <SIF_PublishDeleteObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
        <SIF_Context>SIF_Default</SIF_Context>
      </SIF_Contexts>
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
        <SIF_Context>SIF_Default</SIF_Context>
      </SIF_Contexts>
    </SIF_Object>
  </SIF_PublishDeleteObjects>
  <SIF_RequestObjects>
    <SIF_Object ObjectName="SchoolInfo"/>
    <SIF_Object ObjectName="StudentPersonal"/>
  </SIF_RequestObjects>
  <SIF_RespondObjects>
    <SIF_Object ObjectName="SchoolInfo">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
      </SIF_Contexts>
```

```
    </SIF_Object>
    <SIF_Object ObjectName="StudentPersonal">
      <SIF_Contexts>
        <SIF_Context>SIF_Longitudinal</SIF_Context>
      </SIF_Contexts>
    </SIF_Object>
  </SIF_RespondObjects>
</SIF_Provision>
```

4.5.3 SIF_Unprovide

An agent may remove itself as the provider of an object type in a context by sending a SIF_Unprovide message with a @Context attribute on the SIF_Object element. If no context is specified, "SIF_Default" is assumed. For example,

```
<SIF_Unprovide>
  <SIF_Header>...</SIF_Header>
  <SIF_Object ObjectName="StudentPersonal">
    <SIF_Contexts>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
</SIF_Unprovide>
```

If the agent is not the provider of the object in the specified context, the ZIS will reply with a SIF_Error acknowledgement where the SIF_Category is 6 ("Provision") and the SIF_Code is 5 ("Not the provider of the object"). ZIS implementations are encouraged to state the context as part of the SIF_Desc or SIF_ExtendedDesc message (e.g. "Not the provider of StudentPersonal in the Longitudinal context").

4.5.4 SIF_Subscribe

If an agent wishes to register as a subscriber of an object in a specific context, it may include the optional @Context attribute in the SIF_Subscribe/SIF_Object element. If that attribute is omitted the "SIF_Default" context is assumed.

For example,

```
<SIF_Provide>
  <SIF_Header>...</SIF_Header>
  <SIF_Object ObjectName="StudentPersonal">
    <SIF_Contexts>
      <SIF_Context>SomeOtherContextName</SIF_Context>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
      <SIF_Context>SIF_Default</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
</SIF_Provide>
```

An agent can subscribe to objects in more than one context as illustrated above.

4.5.5 SIF_Unsubscribe

An agent may remove itself as a subscriber to an object type in a context by sending a SIF_Unsubscribe message with a Context attribute on the SIF_Object element. If no context is specified, "SIF_Default" is assumed. For example,

```
<SIF_Unsubscribe>
  <SIF_Header>...</SIF_Header>
  <SIF_Object ObjectName="StudentPersonal">
    <SIF_Contexts>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
    </SIF_Contexts>
  </SIF_Object>
</SIF_Unsubscribe>
```

If the agent is not subscribed to the object in the specified context, the ZIS will reply with a SIF_Error acknowledgement where the SIF_Category is 6 ("Provision") and the SIF_Code is 5 ("Not a subscriber of the

object"). ZIS implements are encouraged to state the context as part of the SIF_Desc or SIF_ExtendedDesc message (e.g. "Not a subscriber of StudentPersonal in the Longitudinal context").

4.6 Contextual SIF_Request

An agent may request data from a specific context by including the optional SIF_Context element in the SIF_Request message as shown below:

```
<SIF_Request>
  <SIF_Header>
    <SIF_MsgId>666DD33C998F2CCE49CBB7837FB2F211</SIF_MsgId>
    <SIF_Date>20060101</SIF_Date>
    <SIF_Time Zone="UTC-07:00">20:39:12</SIF_Time>
    <SIF_SourceId>RamseyDataWarehouse</SIF_SourceId>
    <SIF_Context>SIF_Longitudinal</SIF_Context>
  </SIF_Header>
  <SIF_Version>1.5r1</SIF_Version>
  <SIF_MaxBufferSize>384000</SIF_MaxBufferSize>
  <SIF_Query>
    <SIF_QueryObject ObjectName="StudentMeal"/>
    <SIF_ConditionGroup Type="None">
      <SIF_Conditions Type="And">
        <SIF_Condition>
          <SIF_Element>SIF_Metadata/TimeElement/StartDateTime</SIF_Element>
          <SIF_Operator>EQ</SIF_Operator>
          <SIF_Value>20050901</SIF_Value>
        </SIF_Condition>
        <SIF_Condition>
          <SIF_Element>SIF_Metadata/TimeElement/EndDateTime</SIF_Element>
          <SIF_Operator>EQ</SIF_Operator>
          <SIF_Value>20051203</SIF_Value>
        </SIF_Condition>
      </SIF_Conditions>
    </SIF_ConditionGroup>
  </SIF_Query>
</SIF_Request>
```

The ZIS will route the SIF_Request to the queue of the agent that registered as the Provider of the object type identified by SIF_QueryObject in the context identified by SIF_Header/SIF_Context. If no context is specified the "SIF_Default" context is used. If there is no provider in the named context, the ZIS will reply with a SIF_Error acknowledgement where the SIF_Category is 8 ("Request & Response") and the SIF_Code is 4 ("No provider"). ZIS implementations are encouraged to state the context as part of the SIF_Desc or SIF_ExtendedDesc message (e.g. "No provider of StudentMeal in the Longitudinal context").

Note the SIF_Header/SIF_Context element may also be used with directed requests (i.e. SIF_Requests where the SIF_Header/SIF_DestinaionId has been supplied to instruct the ZIS to route the message to a specific agent in the zone). However, because the responding agent may not support SIF_Context, the requestor cannot assume the resulting SIF_Response messages will contain a SIF_Context element. Specifying a context in directed requests is therefore discouraged unless the SIF Profile or other specification dictating its use requires both parties to support contexts.

A SIF_Request may only reference a single context. Multiple SIF_Context elements are not permitted in SIF_Request messages.

4.7 Contextual SIF_Response

If a responding agent receives a SIF_Request message with a SIF_Header/SIF_Context element, it must include the same SIF_Header/SIF_Context element in each SIF_Response packet. Contexts place no additional requirements on responding agents.

4.8 Contextual SIF_Event

Agents that support contexts must tag SIF_Events with the optional SIF_Header/SIF_Context element, unless reporting to the "SIF_Default" context, in which case it is implied. Otherwise, the Zone Integration

Server will not be able to properly route the SIF_Event message to the proper context. This is important since agents can register as Subscribers in more than one context.

For example, if a data warehouse agent supports the *Longitudinal Data Collection* specification and is responsible for publishing data in the "SIF_Longitudinal" context, it must include the SIF_Header/SIF_Context element to identify that context the event should be reported to. If the data in a SIF_Event applies to more than one context, the agent may send multiple SIF_Event messages, each identifying the proper context or a single event whose SIF_Header contains a SIF_Context element for each context associated with the event.   See also Section 4.3

A ZIS server when processing an event will forward the vent to each agent subscribed to one or more of the contexts referenced in the event. The agent will receive a single event regardless of the number of contexts referenced in the SIF_Header. A context-aware agent will examine the SIF_Header to determine the context scopes of the event, while an agent that is not context-aware will ignore the SIF_Context elements.

If the SIF_Event is published with at least one context and if the event is to be published to the Default context then the Default context must be explicitly defined in the SIF_Header/SIF_Context.

4.9 SIF_ZoneStatus

The SIF_ZoneStatus object includes a new element, SIF_Contexts, to enumerate the contexts defined in the zone at the time the SIF_ZoneStatus request is received. The "SIF_Default" context will always be included in this list. SIF_Contexts appears after the new SIF_ResponsePublishers element and before the SIF_SIFNodes element (refer to the *SIF 2.0 SIF_ZoneStatus* document for the complete table including other proposed changes for SIF 2.0):

Element	Attribute	Char	Description
...			
SIF_Contexts		MR	Enumerates the SIF Contexts currently in use by the agents in this SIF Zone, in alphabetical order. The "SIF_Default" context is always explicitly included. If an agent has specified a context in a SIF_Provide or SIF_Subscribe message, it becomes part of the zone's context list. When no agents reference a given context, it is removed from the list.
SIF_Contexts/SIF_Context		M	Identifies a context. The context name is the value of this element.

Example:

```
<SIF_ZoneStatus>
  …
  <SIF_Providers>
    <SIF_Provider SourceId="RamseySIS">
      <SIF_Object ObjectName="StudentPersonal">
        <SIF_Contexts>
          <SIF_Context>SIF_Default</SIF_Context>
        </SIF_Contexts>
      </SIF_Object>
    </SIF_Provider>
    <SIF_Provider SourceId="DataWarehouse">
      <SIF_Object ObjectName="StudentPersonal">
        <SIF_Contexts>
          <SIF_Context>SIF_Longitudinal</SIF_Context>
        </SIF_Contexts>
      </SIF_Object>
    </SIF_Provider>
  </SIF_Providers>
  <SIF_Subscribers>
    <SIF_Subscriber SourceId="RamseyLibrary">
      <SIF_Object ObjectName="StudentPersonal">
        <SIF_Contexts>
          <SIF_Context>SIF_Default</SIF_Context>
        </SIF_Contexts>
      </SIF_Object>
    </SIF_Subscriber>
    <SIF_Subscriber SourceId="DataWarehouse">
      <SIF_Object ObjectName="StudentPersonal">
```

```
            <SIF_Contexts>
              <SIF_Context>SIF_Default</SIF_Context>
            </SIF_Contexts>
          </SIF_Object>
          <SIF_Object ObjectName="StudentPersonal"?
            <SIF_Contexts>
              <SIF_Context>SIF_Longitudinal</SIF_Context>
            </SIF_Contexts>
      </SIF_Subscriber>
    </SIF_Subscribers>
    <SIF_PublisherAdd>
      <SIF_Publisher SourceId="RamseySIS">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Default</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
      <SIF_Publisher SourceId="DataWarehouse">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Longitudinal</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
    </SIF_PublisherAdd>
    <SIF_PublisherChange>
      <SIF_Publisher SourceId="RamseySIS">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Default</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
      <SIF_Publisher SourceId="DataWarehouse">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Longitudinal</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
    </SIF_PublisherChange>
    <SIF_PublisherDelete>
      <SIF_Publisher SourceId="RamseySIS">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Default</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
      <SIF_Publisher SourceId="DataWarehouse">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Longitudinal</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
    </SIF_PublisherDelete>
    <SIF_ResponsePublishers>
      <SIF_Publisher SourceId="RamseySIS">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Default</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
      <SIF_Publisher SourceId="DataWarehouse">
        <SIF_Object ObjectName="StudentPersonal"
          <SIF_Contexts>
            <SIF_Context>SIF_Longitudinal</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
    </SIF_ResponsePublishers>
    <SIF_RequestPublishers>
      <SIF_Publisher SourceId="RamseyLibrary">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Default</SIF_Context>
          </SIF_Contexts>
```

```
        </SIF_Object>
      </SIF_Publisher>
      <SIF_Publisher SourceId="DataCollectorAgent">
        <SIF_Object ObjectName="StudentPersonal">
          <SIF_Contexts>
            <SIF_Context>SIF_Longitudinal</SIF_Context>
          </SIF_Contexts>
        </SIF_Object>
      </SIF_Publisher>
    </SIF_ResponsePublishers>
    <SIF_Contexts>
      <SIF_Context>SIF_Default</SIF_Context>
      <SIF_Context>SIF_Longitudinal</SIF_Context>
    </SIF_Contexts>
</SIF_ZoneStatus>
```

4.10 Access Control & Message Security

The Access Control features of SIF are intended to allow local control over the specific operations agents are authorized to perform against each object type. Access Control is applied by the ZIS as described in the SIF 1.5 Specification regardless of context. Similarly, Message Security features (i.e. the ability of an agent to define delivery-time encryption and authentication minimums for each message) are also applied independent of context.

4.11 Impact on SIF 1.x Software

4.11.1 Agents

Existing 1.x agents require no changes as the result of this specification. However, if an agent wishes to support SIF Contexts, the following broad changes are likely required:

- The agent must include business rules for determining when to register as a provider or subscriber of an object in a specific context, when to send SIF_Event messages to a specific context, and when to issue SIF_Requests to a context. Usually this is done at the direction of one or more SIF Profiles or sub-specifications the agent claims to conform to.

- If the agent responds to SIF_Requests for any context other than "SIF_Default", it must now include a SIF_Header/SIF_Context element in each SIF_Response to identify the context in the original SIF_Request.

4.11.2 Zone Integration Servers

Zone Integration Servers must support SIF Contexts in SIF 2.0.

- Support a context-based object/agent provisioning table such that an agent can register as a Provider or Subscriber in a specific context

- Add support for the optional SIF_Header/SIF_Context element and @Context attribute in SIF_Provide, SIF_Unprovide, SIF_Subscribe, SIF_Unsubscribe, SIF_Provision, SIF_Request, SIF_Response, and SIF_Event messages

- Allow the Administrator to administer the context registry through the ZIS administration UI, including creating and removing contexts and defining agent ACL permissions within a context.

- Add support for the SIF_ZoneStatus/SIF_Contexts element

- Add support for the routing of SIF_Request and SIF_Event messages based on context

No changes are required to any other aspect of zone management, including Access Control, Security, etc.