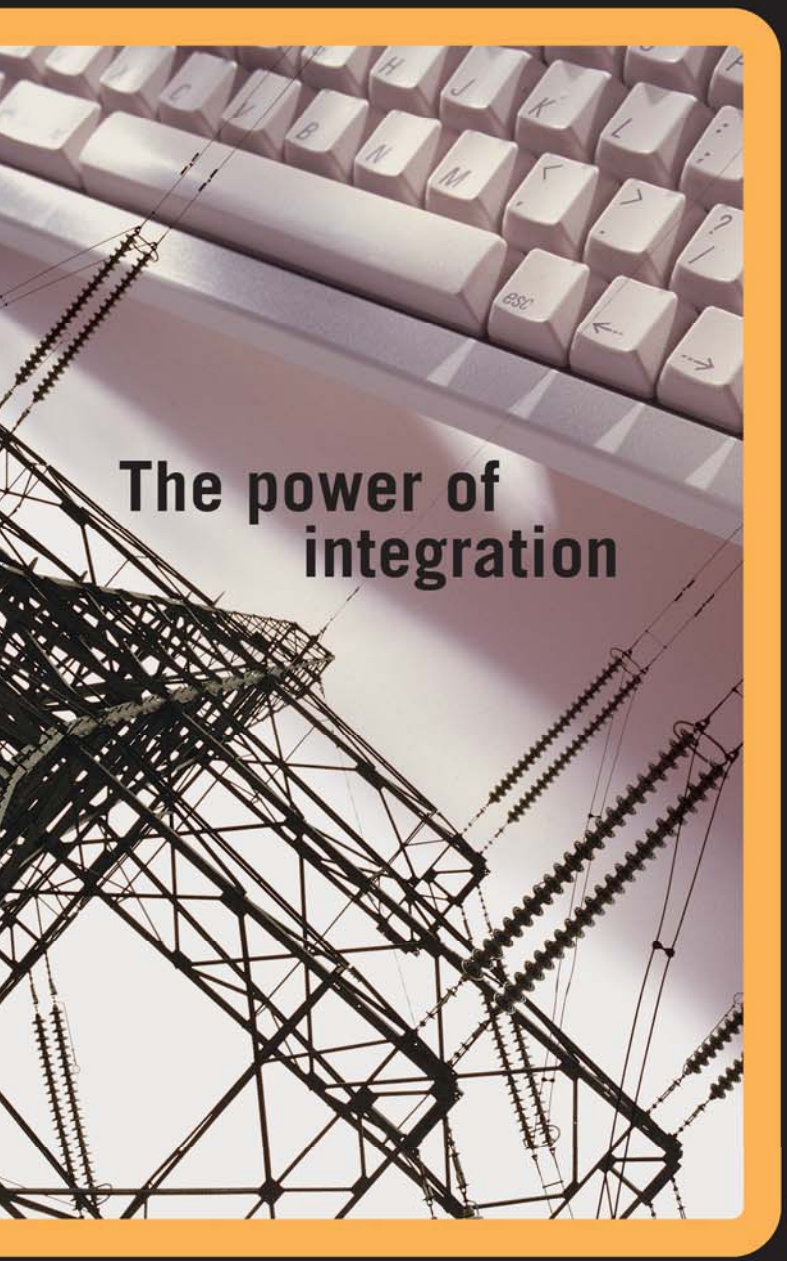

UISOL

Utility Integration Solutions, Inc.

TC57 Use of XML Schema

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Introduction

- The purpose of this presentation is to respond to an action item from the last WG14 meeting regarding the use of XML Schema by WG14 and more broadly within TC57
- The audience for this presentation includes WG13, WG14, WG16, WG19 and the CIM User Group
- This was a discussed at the recent WG19 meeting

Issues

- WG14 specifications are defined using XML Schema
- There are many ways to generate XML Schemas type definitions from the UML model
- There are many ways to construct a message from XML Schema type definitions
- The most significant concern is the realization of relationships in XML

Note: XML Schema does not eliminate the need for RDF

Requirements

- Need to generate XML Schema (XSD) for use in message and WSDL definitions with tools such as XML Spy, XML Authority, etc.
- Need to generate XML Schemas that are consistent with other standards and industry (e.g. integration) tools
- End users must be able to view/extend/use the CIM and XML Schemas with tools other than Rational Rose

Generating CIM Types from MDL

- Define basic data types using <simpleType>
- Define classes using <complexType>
- Use <element>, <sequence>, <extension>, <annotation>, <documentation> tags as needed
- Use <enumeration> and <restriction> as appropriate
- Use of <choice>, <all>, <list>, <simpleContent>, <attribute>, <group>, <attributeGroup> should be rare (if ever)
- No need for mixed content
- Can consider definition of keys within Naming class

Approach to Message Creation

- When defining a message, select only those relationships that are appropriate for the message as opposed to pulling in all relationships by default
- Use hierarchical containment for relationships in XML schemas, where child objects would be nested under parent objects
- Where many to many relationships are needed (should be rare when defining messages), can chose to use key/keyref or XLink

Note: This approach has been approved by WG19

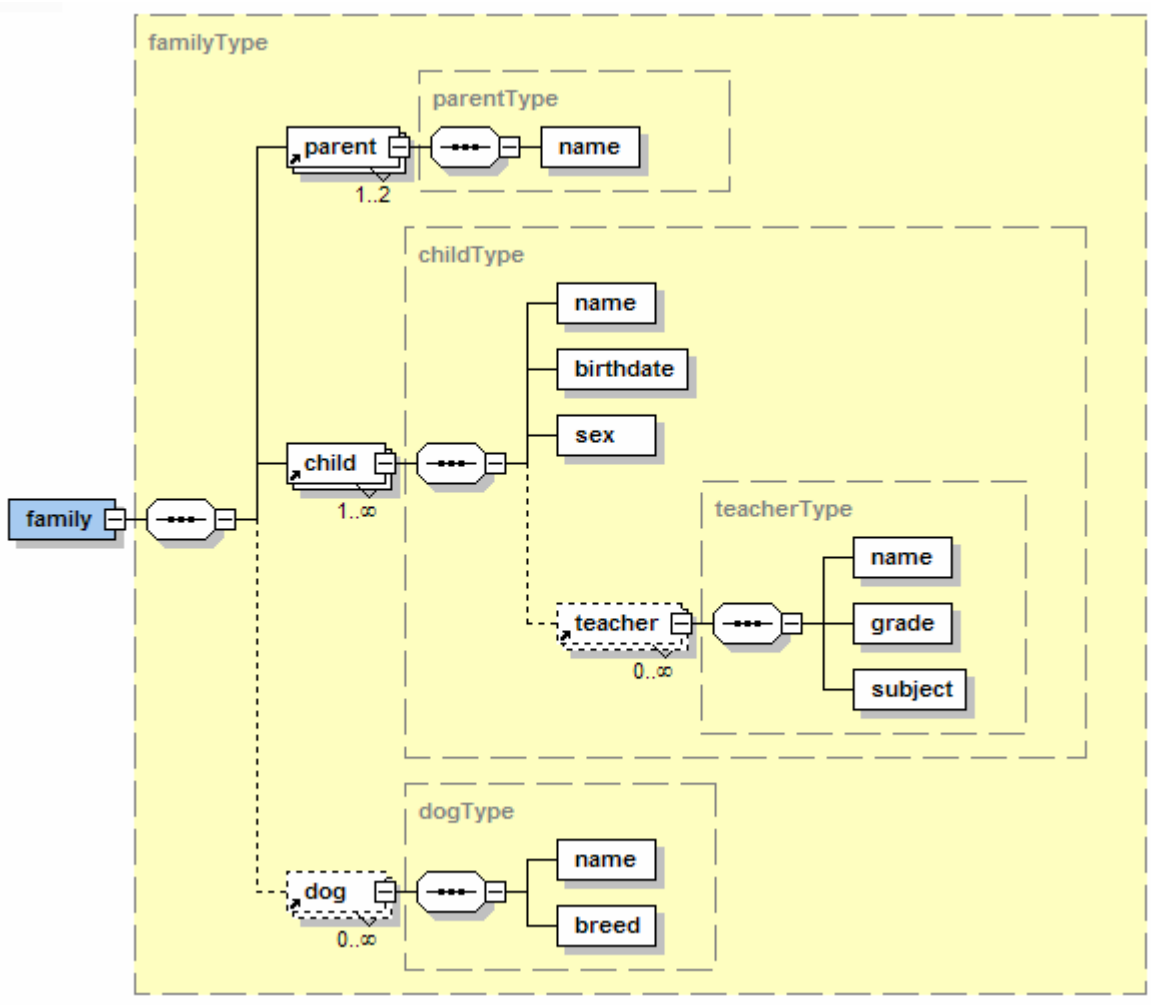
Hierarchical Containment

```
<?xml version="1.0" encoding="UTF-8"?>
<family xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:noNamespaceSchemaLocation="C:\Documents and Settings\san\My Documents\work\IEC\family.xsd">
        <parent>
                <name>Scott</name>
        </parent>
        <parent>
                <name>Mary</name>
        </parent>
        <child>
                <name>Melissa</name>
                <birthdate>3/26/1992</birthdate>
                <sex>F</sex>
        </child>
        <child>
                <name>Emily</name>
                <birthdate>9/10/1996</birthdate>
                <sex>F</sex>
        </child>
        <dog>
                <name>Rosie</name>
                <breed>Schnoodle</breed>
        </dog>
</family>
```

Hierarchical Containment

```
<?xml version="1.0" encoding="UTF-8"?>
<family xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="C:\Documents and Settings\san\My
    Documents\work\IEC\family.xsd">
    <parent>
        <name>Scott</name>
    </parent>
    <parent>
        <name>Mary</name>
    </parent>
    <child>
        <name>Melissa</name>
        <birthdate>3/26/1992</birthdate>
        <sex>F</sex>
        <teacher>
            <name>Reischman</name>
            <grade>8</grade>
            <subject>Science</subject>
        </teacher>
        <teacher>
            <name>Jones</name>
            <grade>8</grade>
            <subject>Math</subject>
        </teacher>
    </child>
    <child>
        <name>Emily</name>
        <birthdate>9/10/1996</birthdate>
        <sex>F</sex>
        <teacher>
            <name>Ward</name>
            <grade>3</grade>
        </teacher>
    </child>
    <dog>
        <name>Rosie</name>
        <breed>Schnoodle</breed>
    </dog>
</family>
```

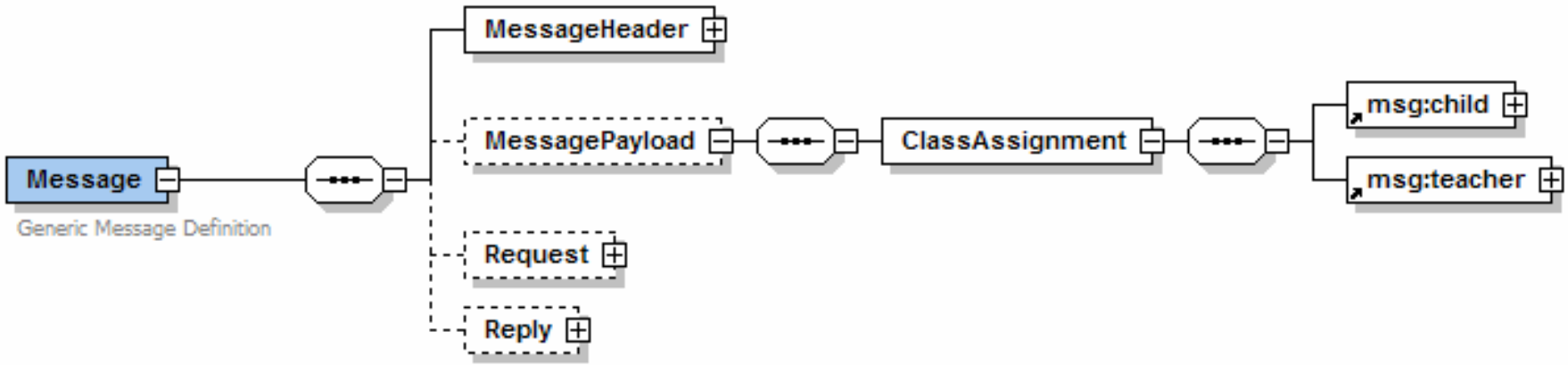
XML Example (XML Spy)



Example XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified" attributeFormDefault="unqualified">
	<xs:complexType name="parentType">
		<xs:sequence>
			<xs:element name="name"/>
		</xs:sequence>
	</xs:complexType>
	<xs:complexType name="childType">
		<xs:sequence>
			<xs:element name="name"/>
			<xs:element name="birthdate"/>
			<xs:element name="sex"/>
			<xs:element ref="teacher" minOccurs="0" maxOccurs="unbounded"/>
		</xs:sequence>
	</xs:complexType>
	<xs:complexType name="familyType">
		<xs:sequence>
			<xs:element ref="parent" maxOccurs="2"/>
			<xs:element ref="child" maxOccurs="unbounded"/>
			<xs:element ref="dog" minOccurs="0" maxOccurs="unbounded"/>
		</xs:sequence>
	</xs:complexType>
	<xs:complexType name="dogType">
		<xs:sequence>
			<xs:element name="name"/>
			<xs:element name="breed"/>
		</xs:sequence>
	</xs:complexType>
	<xs:element name="child" type="childType"/>
	<xs:element name="parent" type="parentType"/>
	<xs:element name="dog" type="dogType"/>
	<xs:element name="family" type="familyType"/>
	<xs:complexType name="teacherType">
		<xs:sequence>
			<xs:element name="name"/>
			<xs:element name="grade"/>
			<xs:element name="subject"/>
		</xs:sequence>
	</xs:complexType>
	<xs:element name="teacher" type="teacherType"/>
</xs:schema>
```

Example Message Definition



Example Message XML

```
<?xml version="1.0" encoding="UTF-8"?>
<Message xmlns="msg" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="msg
C:\DOCUME~1\san\MYDOCU~1\work\IEC\ExMessage.xsd">
	<MessageHeader>
		<Verb>create</Verb>
		<Noun>ClassAssignment</Noun>
		<Revision>001</Revision>
	</MessageHeader>
	<MessagePayload>
		<ClassAssignment>
			<child>
				<name>Melissa Neumann</name>
			</child>
			<teacher>
				<name>Mrs. Warren</name>
				<grade>8</grade>
				<subject>History</subject>
			</teacher>
		</ClassAssignment>
	</MessagePayload>
</Message>
```

Next Steps

- Remove all references to XML schema message approach from parts 3-10 of 61968 (need an MCR for part 3)
- Describe definition of messages in 61968-1 as an MCR
- Need to be sure that sufficient documentation is available for all vendors that would be participating in interoperability testing