Rights Markup Extensions for the Protection of Indigenous Knowledge

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Abstract

Indigenous cultures have experienced a renaissance over the past 5-10 years as indigenous communities have recognized the importance of documenting and sharing their cultural heritage and history. This has coincided with the explosion of the internet and the widespread application of multimedia technologies to the construction of large online cultural collections. Together these developments have triggered a demand for copyright protection mechanisms. A number of XML-based markup languages (XrML, ODRL) have been developed to support the expression of rights asssociated with the intellectual property of resources. The MPEG-21 Multimedia Framework standard being developed by the Moving Picture Experts Group (MPEG) aims to standardize such a language to enable the management and protection of intellectual property associated with multimedia content.

However it has been widely recognized that modern intellectual property laws, which are rapidly assuming global uniformity, fail to protect indigenous knowledge adequately or to support traditional or customary laws governing rights over indigenous knowledge. This paper considers some of the requirements for the protection of indigenous knowledge and the enforcement of tribal customary laws associated with knowledge, which have been expressed by Australian Aboriginal and Torres Strait Islander communities. It assesses the ability of the two major XML-based rights markup languages (XrML and ODRL) to satisfy these requirements and suggests extensions to these languages to improve their support for indigenous knowledge protection. The aim of this paper is to provide a starting point which will encourage input, feedback and suggestions from indigenous communities. This will enable a clearer understanding of their diverse requirements with respect to the protection of intellectual property and traditional knowledge and the development of a satisfactory solution through future collaboration and consultation.

Given a standardized machine-understandable representation of rights information, the utopian dream of *trusted systems* - automated rights enforcement and secure transactions involving both indigenous and non-indigenous resources - moves one step closer. But more importantly, the recognition of customary law and the rights of indigenous cultures within such systems, will lead to greater cross-cultural understanding, respect and tolerance and the promotion of indigenous social, cultural and economic development.

Keywords: Indigenous, Rights, Protection, XML, Language

1. Introduction

Indigenous communities seek and achieve empowerment and self-determination through the preservation, protection and revitalisation of their traditional cultures which have been eroded by colonization, western culture and more recently by globalization. Using multimedia technologies, indigenous groups have been able to record and preserve significant aspects of their cultures including languages, ceremonies, dances, songs, stories, symbols, design, artwork, tools, costumes, historical photographs, film, videos and audio tapes. Documentation of indigenous knowledge has become an extremely important tool to ensure the survival and self-sustainability of indigenous tribes and cultures, and to support claims of original ownership. Although the Internet is ideal for sharing, exchanging, educating and raising public awareness of indigenous cultures, it also creates ample opportunities for illicit access to and misuse of traditional knowledge. It is essential that traditional owners are able to define and control the rights and access to their resources, in order to: uphold tribal customary laws; prevent the misuse of indigenous heritage in culturally inappropriate or insensitive ways; and receive proper compensation for their cultural and intellectual property.

Two XML-based rights markup languages, XrML [1] and ODRL [2] provide vocabularies (semantics and syntax) for expressing the rights, terms and conditions associated with digital resources. In July 2001, MPEG-21 (Multimedia Framework) [3] released a Call for Proposals (CfP) [4] for a Rights Expression Language (REL)and Rights Data Dictionary (RDD), in an effort to develop a standardized vocabulary. However all of these rights management technologies are based on modern intellectual property law regimes - which are designed to enable economic exploitation and are built on notions of individual property ownership which are alien and detrimental to indigenous cultures. They do not support the specific requirements expressed by indigenous communities which are needed to protect indigenous knowledge or enforce tribal customary laws.

Hence the goals of this work are to develop machine-understandable Rights Expression Language components (expressed in XML) which will:

- enable indigenous peoples to define what constitutes indigenous intellectual and cultural property and to control the accessibility, dissemination, and usage of this property;
- ensure full and proper attribution of indigenous intellectual and cultural property to the traditional owners;
- support the specification and maintenance of traditional customary practices and sanctions;
- protect against the debasement or misuse of culturally significant items in inappropriate ways or the unauthorized access to sacred/secret material or objects;
- ensure commercialization of indigenous culture occurs in culturally appropriate ways and that economic benefits accrue directly to the traditional owners.

The customary laws and intellectual property needs of traditional knowledge holders vary enormously among indigenous communities throughout the world. In this paper we restrict our scope to the needs of Australian Aboriginal and Torres Strait Islander traditional knowledge holders. Even within this region, there exists enormous heterogeneity between the customary laws, beliefs and rituals of different indigenous groups. Quite often the views within a single clan can vary significantly and they may also vary over time. However the goal of this paper is to determine some of the common notions associated with Australian Aboriginal and Torres Strait Islander customary laws and to ascertain how these rules might be supported/described through extensions to existing Rights Expression Languages.

We firstly describe related work - MPEG-21 and the two existing rights expression languages (XrML, ODRL). We then consider some of the unique requirements associated with the expression of Aboriginal tribal customary laws pertaining to access to secret/sacred knowledge and objects and ascertain how these requirements differ from modern copyright laws. We then suggest extensions to XrML and ODRL which would satisfy some of the additional requirements specific to indigenous resources. Finally we illustrate using examples, how these extensions would be applied to describe and protect the rights associated with indigenous resources in a museum or online collection application.

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2. Related Work

2.1 MPEG-21

MPEG, the Moving Picture Experts working group in ISO/IEC, is currently working on MPEG-21, the 'Multimedia Framework' standard [3]. MPEG-21 seeks to provide the infrastructure for the delivery and consumption of all content types by different categories of users in multiple application domains. Although elements of the infrastructure already exist, there is no 'big picture' to describe how these elements, either in existence or under development, relate to each other. The aim of MPEG-21 is to describe how these various elements fit together and to determine where gaps exist and new standards are required. ISO/IEC JTC 1/SC 29/WG 11 (MPEG) will then develop new standards as appropriate while other relevant standards may be developed by other bodies. These specifications will be integrated into the multimedia framework through collaboration between MPEG and these bodies.

In March 2001, MPEG published a Proposed Draft Technical Report (ISO/IEC PDTR 21000-1) [6] which documents the multimedia framework, its architectural elements and a definition of the requirements for their interaction. One of the key elements identified within the PDTR is the need for a Rights Expression Language and a Rights Data Dictionary to describe the conditions of access to content and the rights of users.

To achieve the goal of automated rights management, it is necessary to have a single standardized machine-readable language for describing the rights in intellectual property across a wide range of different transaction types and application domains. Given machine understanding of the original rights granted, permissions for actions such as print, copy, render, play, etc., can then be meaningfully implemented across the networked environment. Unless a standard language is developed, rights management systems will have to interpret contractual expressions from different origins describing the same types of rights in different terms - a virtually impossible task. In addition the language must satisfy the requirements of all parties involved in the exchange or transfer of content - the needs of end users, creators, publishers, producers, aggregators, editors and distributors must all be addressed.

MPEG has defined the requirements for a Rights Data Dictionary (RDD) and a Rights Expression Language (REL) based on input from a wide variety of interested parties [5]. A Call for Proposals [4] was released in July 2001, inviting submissions that fulfil some or all of these requirements. The submissions were evaluated at the 58th MPEG meeting in Thailand in December and XrML [1] was selected over ODRL [2] for inclusion in the MPEG-21 specification.

2.2 XrML

The eXtensible rights Markup Language [1] is an XML language designed by ContentGuard (a spinoff company of Xerox) for specifying the rights, fees and conditions for using digital content, together with message integrity and entity authentication within these specifications. It provides a set of structural and semantic tags for specifying metadata of XrML-enabled content, validating the integrity of XrML and digital contents, encrypting and decrypting digital contents and authoring XrML documents, such as vouchers and licenses. It also supports the specification of conditions for usage terms and tracking of content movement. XrML currently uses XML DTDs to define the XrML grammar but an XML Schema definition is under development.

Below is a simple example of an XrML description. It describes a video called "Stories from Dreamtime" owned by the indigenous community group, Jagara Council. Home viewing of the video is permitted at a cost of $AUD5.00, per use, which must be paid into the specified account.

```
<?xml version="1.0"?>
<!DOCTYPE XrML SYSTEM "xrml.dtd">
<XrML>
  <BODY type="WORK" version="2.0">
    <WORK>
          <OBJECT type="video">
                <ID type="DOI">345.6789</ID>
                <NAME>Stories from Dreamtime</NAME>
          </OBJECT>
          <OWNER>
                <OBJECT type="Organisation">
                  <NAME>Jagara Council</NAME>
                  <ADDRESS>PO Box 2189, Brisbane, Qld 4101</ADDRESS>
                  <PHONE>(617) 3844 5413</PHONE>
                </OBJECT>
          </OWNER>
          <RIGHTSGROUP name="HomeViewer">
                <RIGHTSLIST>
                  <PLAY>
                        <FEE><MONETARY>
                                <PERUSE value="5">
                                  <CURRENCY iso-code="AUD"/>
                                </PERUSE>
                                <ACCOUNT>
                                        <ACCOUNTTO id="1122344"/>
                                </ACCOUNT>
                        </MONETARY></FEE>
                  </PLAY>
                </RIGHTSLIST>
          </RIGHTSGROUP>
    </WORK>
  </BODY>
</XrML>
```

2.3 ODRL

The Open Digital Rights Language (ODRL) [2] is a digital rights management language recently developed by IPR Systems. Its objectives are almost identical to XrML - "The ODRL is a vocabulary for the expression of terms and conditions over digital content including permissions, constraints, obligations, and agreements with rights holders." [2]. The grammar of the ODRL language is defined using XML Schema Language. Below is the same example described above, expressed in ODRL.

```
<?xml version="1.0"?>
<o-ex:rights xmlns:o-ex="http://odrl.net/0.9/ODRL-EX"
                xmlns:o-dd="http://odrl.net/0.9/ODRL-DD"
                xmlns:onix="http://www.editeur.org/onix/ReferenceNames"
                xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
                xsi:schemaLocation="http://odrl.net/0.9/ODRL-DD
                http://odrl.net/0.9/ODRL-DD-09.xsd
                http://odrl.net/0.9/ODRL-EX
                http://odrl.net/0.9/ODRL-EX-09.xsd">

        <o-ex:asset>
            <o-ex:context>
                  <o-dd:uid o-dd:idscheme="DOI">345.6789</o-dd:uid>
                  <o-dd:name>Stories from Dreamtime</o-dd:name>
            </o-ex:context>
        </o-ex:asset>

        <o-ex:rightsholder>
                <o-ex:party>
                        <o-ex:context>
                            <o-dd:name>Jagara Council</o-dd:name>
                            <o-dd:address>PO Box 2189, Brisbane, Qld 4101
                            </o-dd:address>
                            <o-dd:phone>(617) 3844 5413</o-dd:phone>
                        </o-ex:context>
                        <o-dd:percentage>100.0</o-dd:percentage>
                </o-ex:party>
        </o-ex:rightsholder>

        <o-ex:permission>
                <o-dd:play>
                    <o-ex:requirement>
                          <o-dd:peruse>
                                <o-dd:payment>
                                        <o-dd:amount o-dd:currency="AUD">
                                            5.0
                                        </o-dd:amount>
                                </o-dd:payment>
                          </o-dd:peruse>
                    </o-ex:requirement>
                </o-dd:play>
        </o-ex:permission>
<o-ex:rights>
```

Both languages provide vocabularies for describing: works/assets; rightsholders/owners; agreements between the rightsholders and users which grant the user permission to use the asset in certain ways, provided they satisfy certain constraints and obligations (e.g., payments).

2.4 Limitations of Existing RELs when applied to Indigenous Knowledge

The rights languages described above have been designed and based on current, modern copyright regimes which fail to adequately protect indigenous knowledge. Githaiga [7] and Janke [8] have identified the reasons below, from an Australian indigenous perpective, for why Australian copyright laws fail to fully accomodate and protect indigenous knowledge. Similar inadequacies are believed to exist within the national copyright laws of many other countries:

- Ownership and authorship - whilst eurocentric or western copyright laws are based on the identification of an individual owner or creator and their entitlement to economic reward for their creativity, the indigenous view is one of community or collective custodianship (rather than individual ownership) and intellectual content which aims at maintaining and developing indigenous cultural identity. Often no single individual can be identified as the author of a work since it is based on cultural traditions which have been handed down over many generations.

- Originality - by their very nature, most indigenous works are based on stories, traditions, symbols, designs or techniques which are replicated over time. Hence the requirement of modern copyright law for originality which reflects the "distinctive individual creative style" of the author, does not exist for indigenous works.
- Material form - indigenous folkloric knowledge tends to be transmitted orally or visually rather than manifested in written documents. Hence the condition of fixation in material form, excludes many indigenous works or knowledge from protection under current copyright laws.
- Duration - national copyright laws generally limit the duration of copyright to the creator's life plus a specific time period (e.g., 50 years in Australia, 70 years in the US) - after which the resources become freely available. However this limited duration law is inadequate for indigenous works for which community ownership exists in perpetuity.
- Rights in Derivative Works - copyright laws recognise derivative works as original creations in themselves which require their own copyright. However if traditional owners are not recognized as the legal owners, they do not have legal control over an object's reproduction, use or adaptation. Consequently it becomes possible for non-indigenous people to adapt and exploit indigenous works (such as traditional designs) in inappropriate ways.
- Customary Law - finally and most importantly, modern copyright laws do not support the unique concepts and rules governing access and rights to indigenous knowledge, which are already provided by traditional or customary law. These traditional rules were designed to maintain harmony within the society and between the natural, animal and human worlds and are based on holistic spiritual beliefs largely incongruent with western laws. They are carefully taught by one generation to the next and enforced by daily instruction, observation and expectations of proper behaviour. Senior members of the tribal group deal with offences and determine what punishment should be inflicted in the case of failure to comply with customary laws. Punishment varies from public shaming or shunning and banishment to spearing or death in extreme cases.

Hence a Rights Expression Language which is capable of protecting indigenous knowledge must be capable of expressing the following concepts: communal/collective ownership, perpetuity of rights, the payment of copyright fees or royalties to the immediate descendants of the tribal owners and support for the customary laws of the traditional owners.

In the next section we consider in more detail exactly what is required to express customary laws.

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3. Aboriginal Indigenous Knowledge and Tribal Law

Indigenous knowledge exists in many forms. The UNESCO's World Intellectual Property Organisation's definition of cultural heritage [10] includes:

- Literary, performing and artistic works (including music, dance, song, ceremonies, symbols and designs);
- Languages;
- Scientific, agricultural, technical and ecological knowledge (including medicines and sustainable use of flora and fauna);
- All items of movable cultural property including burial artefacts;
- Indigenous ancestral remains;
- Indigenous human genetic material (including DNA and tissues);
- Cultural environmental resources (including minerals and species);

- Immovable cultural property (including indigenous sites of significance, sacred sites and burials);
- Documentation of indigenous peoples' heritage in all forms of media (including scientific, ethnographic research reports, papers and books, films, and sound recordings).

Within the scope of this research we seek to protect the rights of indigenous groups as traditional owners of cultural heritage, as described above - existing in either analog or digital form.

Multimedia is particularly applicable to the preservation and documentation of indigenous cultures because they tend to be very oral and visual, rather than literary i.e., they are passed down between generations by word of mouth rather than written record. However if multimedia is to be applied to indigenous resources, then one of the key issues which needs to be considered is how customary laws and protocols translate from the real world to the digital domain - particularly with respect to culturally sensitive, sacred or secret objects or knowledge. For example, if a particular place is sacred and out of bounds to specific groups or individuals then is a digital photograph of this place also forbidden to be viewed by these groups or individuals? If two people are forbidden to communicate directly then is it also not permissable for them to view video interviews of each other?

Another significant problem is that the definitions of indigenous cultural and intellectual property and the tribal laws which affect their use may differ from group to group and may change over time. When white man first arrived in Australia there were as many as 600 different Aboriginal language groups [11]. Although this has been greatly reduced, there is still enormous heterogeneity between Aboriginal and Torres Strait Islander groups. The customary laws, beliefs and rituals of each group vary enormously depending on the area from which they originate, the extent to which western culture has impacted and the politics within the clan. Quite often the views within a single clan can vary significantly. Any assumption that there exists a generic form of indigenous IPRs ignores the fine complexities and enormous diversity of traditional customary systems for protecting traditional knowledge. However the goal of this paper is firstly to try to determine some of the common notions which exist across customary laws of Australian Aboriginal and Torres Strait Islander groups and secondly to determine how these rules might be supported/described through extensions to existing Rights Expression Languages.

An additional problem associated with trying to protect traditional knowledge and preserve customary laws is that both the knowledge and the customary laws may be dynamic and subject to a continuous process of verification, adaptation and creation, altering their form and content in response to changing environmental and social circumstances. Hence the rights policies associated with particular indigenous collections, or the models underlying the rights policies, may not be fixed.

Despite these acknowledged difficulties, in the remainder of this paper, we have developed an approach, based on XML descriptions, for defining and supporting some of the key customary laws which, literature suggests, exist across many Australian Aboriginal and Torres Strait Islander language groups [15]. In addition, we provide XML Schema [12,13,14] definitions corresponding to different rules, which could easily be incorporated as extensions to either XrML or ODRL.

This section aims to provide a preliminary proposal - rather than a final solution. Consultation with and feedback from indigenous communities is sought to verify or correct our interpretation of these customary laws, particularly within the digital domain.

3.1 Restricting Access to Secret/Sacred Knowledge

Within Aboriginal clans, knowledge and control of certain special religious rites, mythology and songs and possession of sacred objects is vested in a few men of each local group. This authority is not inherited. The men are chosen from initiated men, not necessarily medicine-men or sourcerers, and their knowledge of folklore and religious ritual increases with age. This special knowledge of religious matters is kept secret from all uninitiated persons which includes other men in the tribe, women and children.Women, children and uninitiated persons commit an offence against sacred law if they (even unintentionally) see objects forbidden to them such as sacred objects, sacred places or sacred ceremonies or dances.

Both secret knowledge and more general knowledge pertaining to initiation and other rites and ceremonies is also not disclosed to outsiders. If a person privy to knowledge or custody of sacred matters were to disclose them to a person not entitled to that information, he or she would be guilty of a breach against the law which is taken very seriously. Punishment varies from public shaming and shunning to banishment or even spearing or death, in extreme cases.

An analysis of tribal laws across Aboriginal communities [15] has revealed that there are a certain number of common factors or variables which determine access to traditional knowledge. These include:

- the user's membership of a particular clan or tribe;
- the user's status within the tribe;
- the user's role within the tribe;
- the user's gender;
- the relationship of the user to people, animals or objects depicted in the resource;
- the death of people recorded in a resource;
- the context in which the resource will be reused or reproduced.

In the following sections we describe these dependencies in more detail and how they can be expressed using XML, XML Schema language and XPath [16] and implemented as extensions to XrML, ODRL or the MPEG-21 REL and RDD.

We do this by providing an additional permission constraint to XrML and ODRL - the *customary* constraint which must be processed before a particular right can be exercised. The *customary* constraint element has three possible attributes associated with it:

- a *test* attribute - this is a logical expression that evaluates to a boolean value and which is made up of logical operators and XPath references. The value of the *test* expression must be true in order for the customary constraint to be satisfied and a view of the object to be delivered to the user.
- a *request* attribute - this is a statement/request by the traditional owners describing what they consider to be appropriate use of the object.
- a *warning* attribute - this is a message which is presented to users prior to the delivery of the object warning that the content may upset or offend some viewers.

Below is an XML Schema definition of the customary constraint:

```
    <xsd:element name="customary">
          <xsd:complexType>
                <xsd:attribute name="test" type="xsd:string"/>
                <xsd:attribute name="request" type="xsd:string"/>
                <xsd:attribute name="warning" type="xsd:string"/>
          <xsd:complexType>
    </xsd:element>
```

3.2 Rights based on Tribal Unit Membership

The term *tribe* is often loosely used to describe the basic social indigenous group. Generally a *tribe* is associated with a particular tribal area, speaks a particular language, follows their own religious beliefs, ceremonies and customs and usually marrys within that territory. Tribes usually consist of a number of smaller units called *bands* which are the effective political and economic units. Bands consist of 50 or fewer people, who move together across the country hunting and food-gathering and performing religious ceremonies. The basic and smallest unit of society is the *family*, which consists of a man and his wife (or wives) and their children. Groups of families make up a band.

Another important unit is the *clan*, or descent group. Every person's clan membership is determined at birth. Descent is either patrilineal (affiliated with father's male line) or matrlineal (affiliated with mother's female line). A person's clan establishes further rules about what is expected from that person and what knowledge they have access to.

Each person's membership of a particular tribe, band, clan or family establishes certain rules about behaviour, expectations and rights to knowledge. Associated with each unit will be certain distinguishing properties which include name, language and territory or area.

Below is the XML Schema definition of the tribalUnit element:

```
<xsd:element name="tribalUnit">
    <xsd:complexType>
        <xsd:sequence>
                <xsd:element name="name" type="xsd:string"/>
                <xsd:element name="language" type="xsd:string"/>
                <xsd:element name="territory" type="xsd:string"/>
        </xsd:sequence>
        <xsd:attribute name="type">
                <xsd:simpleType>
                        <xsd:restriction base="xsd:NMTOKEN">
                                <xsd:enumeration value="tribe"/>
                                <xsd:enumeration value="clan"/>
                                <xsd:enumeration value="band"/>
                                <xsd:enumeration value="family"/>
                        </xsd:restriction>
                </xsd:simpleType>
        </xsd:attribute>
    </xsd:complexType>
</xsd:element>
```

The specification of tribalUnit can be used to describe collective rights ownership or rights grantship - alternatively it can be associated with an individual as a property denoting the person's membership of a tribalUnit. Below is an example of how a customary constraint on access to a resource which is accessible only to members of the Nunukal clan, might be expressed. People can belong to multiple tribalUnits.

```
    <permission>
```

```
        <display>
            <constraint>
                    <customary test="(user/tribalUnit@type==’clan’) &&
                                        (user/tribalUnit/name== ’Nunukal’)"/>
            </constraint>
        </display>
    </permission>
```

3.3 Status-based rights

One of the primary requirements of the rights markup language is the ability to express access rights based on the status of the user within the tribe. For example, elders are granted special permissions as a result of their esteemed position within the tribe. Other possible status values are *initiate*, *uninitiated* and *child*.

```
<xsd:element name="status">
     <xsd:simpleType>
                <restriction base="xsd:NMTOKEN">
                        <xsd:enumeration value="uninitiated"/>
                        <xsd:enumeration value="initiated"/>
                        <xsd:enumeration value="elder"/>
                        <xsd:enumeration value="child"/>
                </xsd:restriction>
        </xsd:simpleType>
</xsd:element>
```

Below is an example of how one would express a customary constraint which restricts display rights to a resource to initiated men only:

```
    <permission>
        <display>
            <constraint>
                    <customary test="(user/status==’initiated’) &&
                                        (user/gender==’male’)"/>
            </constraint>
        </display>
    </permission>
```

3.4 Role-based rights

In many indigenous communities, rights to knowledge depend on the individual’s role within the tribal group. For example under Aboriginal law, the rights in artistic works are owned collectively. However only certain artists are permitted within a tribe to depict certain designs, with such rights being based on statutes within a tribe. Painting techniques and the use of totemic and other images and symbols (particularly when related to important creation stories) are strictly controlled by Aboriginal law and custom. However the right to depict a design does not mean that the artist may permit reproduction of the design. The right to reproduce or re-depict would depend on permission being granted by the tribal owners of the rights in the design.

Similarly among certain North American tribes, the ownership of "medicine bundles" is associated with the exclusive right to practice certain medical practices and to hold certain medicinal knowledge.

```
<xsd:element name="role">
    <xsd:simpleType>
          <restriction base="xsd:NMTOKEN">
                <xsd:enumeration value="artist"/>
                <xsd:enumeration value="musician"/>
                <xsd:enumeration value="dancer"/>
                <xsd:enumeration value="medicineMan"/>
                <xsd:enumeration value="midwife"/>
                <xsd:enumeration value="hunter"/>
                ....
          </xsd:restriction>
    </xsd:simpleType>
 </xsd:element>
```

Below is an example of a customary constraint which restricts access to certain indigenous knowledge only to midwives.

```
   <permission>
         <display>
               <constraint>
                       <customary test="user/role == 'midwife'"/>
               </constraint>
         </display>
   </permission>
```

3.5 Gender-based rights

In many Aboriginal communities there is a definite separation in duties, rituals and even communication between the sexes. Women have their own secret/sacred religious knowledge and ritual which is complementary to that of the men. Hence an important requirement of the rights markup language is the ability to restrict access to knowledge based on the gender of the user.

```
<xsd:element name="gender">
    <xsd:simpleType>
          <restriction base="xsd:NMTOKEN">
                <xsd:enumeration value="female"/>
                <xsd:enumeration value="male"/>
          </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
```

Below is an example of a customary constraint which restricts access to females only:

```
   <permission>
       <display>
           <constraint>
               <customary test="user/gender == 'female'"/>
           </constraint>
       </display>
   </permission>
```

3.6 Kinship-based rules

One of the most important concepts within Aboriginal society is that of kinship. This extends beyond the western concept of the nuclear family but is a complex classificatory system which essentially uses terms which primarily apply to lineal relatives to refer to persons who are collateral relatives. Thus, a father's brother is classified with and called a *father*. The mother's sister is classified with and called a *mother*. *Uncle* is only used to refer to the mother's brother not the father's brother. *Aunt* is the father's but not the mother's sister. Since the father's brother is a 'father' then his children (cousins on the

father's side) are classified as *brothers* and *sisters*. Kinships can be very complex and extend beyond familial blood ties [15].

Kin relationships govern a person's behaviour in all aspects of life. Kinship rules stipulate what a person should or shouldn't do with respect to everyone in their social realm and in all social situations - including birth, initiation, marriage, sickness, death, quarrels and fights. Kinship rules also affect behaviour in such matters as food gathering, sharing, and distribution, gift-giving, trading and educational roles and responsibilities. Breaches of kinship rules could provoke anything from minor disapproval to punishment by spearing.

One aspect of kinship rules which is of particular importance in the rights context is *kinship avoidance* - rules whereby certain relatives must be avoided. These rules specify how an individual relates to relatives. For example, he/she can speak to freely and joke with certain relatives but on no account with others. He/she may refer to the names or totems of some but not others. For example, after childhood, brothers and sisters must not converse freely. When talking to each other, they must face different directions. Brothers-in-law adopt a formal attitude to each other, sitting a distance part and speaking quietly. The strongest and most widely known prohibition, observed throughout all Australian Aboriginal tribes, is that between a man and his mother-in-law(s). They may not utter each other's names or have face-to-face contact or any prolonged or familiar association. In some tribes, there may be a ban on speech between them and they may have to use an intermediary or sign language to communicate. In some tribes a woman must hide or turn away when her daughter's husband approached [15].

Kinship constraints may be extremely difficult to enforce unless each user's profile includes such information as their direct blood relatives (mother, father, brothers, sisters, wife/husband, children). Using this information, plus the unique name or ID of any people depicted or recorded in photographs, videos or audio tapes and any kinship avoidance constraints which apply to the collection, it would be possible to warn a viewer that the person in the selected resource may be a relative to be avoided.

```
<xsd:element name="person">
    <xsd:complexType>
        <xsd:sequence>
                <xsd:element name="name" type="xsd:string"/&
                <xsd:element name="tribalName" type="xsd:string"/>
                <xsd:element name="tribalUnit" type="xsd:string"/>
                <xsd:element name="birthPlace" type="xsd:string"/>
                <xsd:element name="birthDate" type="xsd:string"/>
                <xsd:element name="deathDate" type="xsd:string"/>
                <xsd:element name="gender" type="xsd:string"/>
                <xsd:element name="status" type="xsd:string"/>
                <xsd:element name="role" type="xsd:string"/>
                <xsd:element name="mother" type="xsd:string"/>
                <xsd:element name="father" type="xsd:string"/>
                <xsd:element name="spouse" type="xsd:string"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
```

Below is an example of a customary law which specifies that users who are 'mother-in-laws' to the person depicted or recorded in a resource, should not be permitted access.

```
    <permission>
        <display>
            <constraint>
                <customary test="relation(user, asset/context/subject/person)
```

```
                                != 'mother-in-law'"/>
        </constraint>
    </display>
</permission>
```

3.7 Ritual-dependent access

Most indigenous tribes have certain ritualistic laws relating to life-events such as birthing, naming, marriage and death events. A common tribal law within Aboriginal indigenous groups relates to deceased persons and is referred to as *sorry business*. The following customary laws typically apply:

- images, video or audio files of a deceased person should not be displayed or replayed for a certain time period after the person's death;
- the deceased person's name should not be used or displayed for a time after the person's death;
- artwork by a deceased person should not be displayed for a certain time after the person's death.

The period of mourning varies between clans but is typically between 1 and 5 years. Hence the Rights Expression Language should be capable of specifying customary laws such as those referred to as *sorry business.*

```
<permission>
    <display>
        <constraint>
            <customary test="((context/subject/person/deathDate != null)
               &&(currentDate !> (context/subject/person/deathDate + 5))"/>
        </constraint>
    </display>
</permission>
```

In certain situations, this approach may prove too difficult to implement. The alternative is to make use of the *warning* attribute provided on the customary constraint element.

```
<permission>
    <copy>
        <constraint>
            <customary warning="Indigenous viewers should be aware that the
                following program may contain culturally sensitive material
                - including images of people who have since died."/>
        </constraint>
    </copy>
</permission>
```

3.8 Contextual Constraints

It is also often extremely important that indigenous cultural or intellectual property is not reproduced in ways which are considered denigrating or inappropriate to the traditional owners. A precise definition of denigratory or inappropriate use may prove very difficult or even impossible and it may only be realistic to make decisions on a case-by-case basis. For this reason, the *request* attribute has been provided.

For example, although a party may be granted reproduction rights to an indigenous image (e.g., a painting) it would be considered inappropriate for the image to be reproduced or reused in advertising or mercenary or demeaning contexts (such as certain clothing or household goods).

```
<permission>
    <copy>
        <constraint>
            <customary request="Not to be reproduced in a context which is
```

```
            demeaning, offensive, or insulting to the traditional owners."/>
        </constraint>
    </copy>
</permission>
```

---

4. An Implementation Example

4.1 An Example

Below is a typical example of a composite resource from an indigenous collection which has different levels of access and rights associated with it. The rights information can be used to customize the presentation view or interpretation which is delivered to the user. For example, it may be permissable within customary law to display sacred objects without violating the confidential nature of their sacred meaning by displaying it in a particular context.

Consider an image of an Aboriginal painting of a Dreaming story, entitled "Fire Snake":

- Non-Aboriginals can get a low res view and the textual metadata record for free.
- Non-Aboriginals can get a high res view, the textual metadata and an audio recording of the dreaming story depicted in the painting, narrated by a tribal elder, for $5.
- Aboriginals not from the artist's clan, can get a high res view, the textual metadata plus an audio recording of the dreaming story depicted in the painting, narrated by a tribal elder, for free.
- Aboriginals from the artist's clan get the high res view, the textual metadata, the dream time story audio recording, and a video of the artist describing the technique and symbolic meanings.

Our plan is to use the rights information (customary access rules) along with other metadata associated with each digital object, and priority weightings associated with the alternative components of a digital item to dynamically generate different, user-appropriate, views of the object in synchronized SMIL [17] presentations or interpretations which combine text, images, video, audio and hyperlinks to related information. Figure 1 below illustrates how this would work for the example above. The arrows between the users and the digital objects, represent permitted access.

4.2 System Architecture

Our proposed system architecture is based on the same flexible, scalable, fine-grained digital object approach to policy enforcement proposed by Erickson [18] and Payette [19]. Policy rules can be attached at either the repository, object-group or the individual object level. This approach is particularly relevant to indigenous resources for which the presented view and contextual information may depend on each particular user's or a userGroup's rights and needs. When required, policy rules can be specified at the individual object or individual user level but otherwise, default policies can apply to large-scale object groups or user groups.

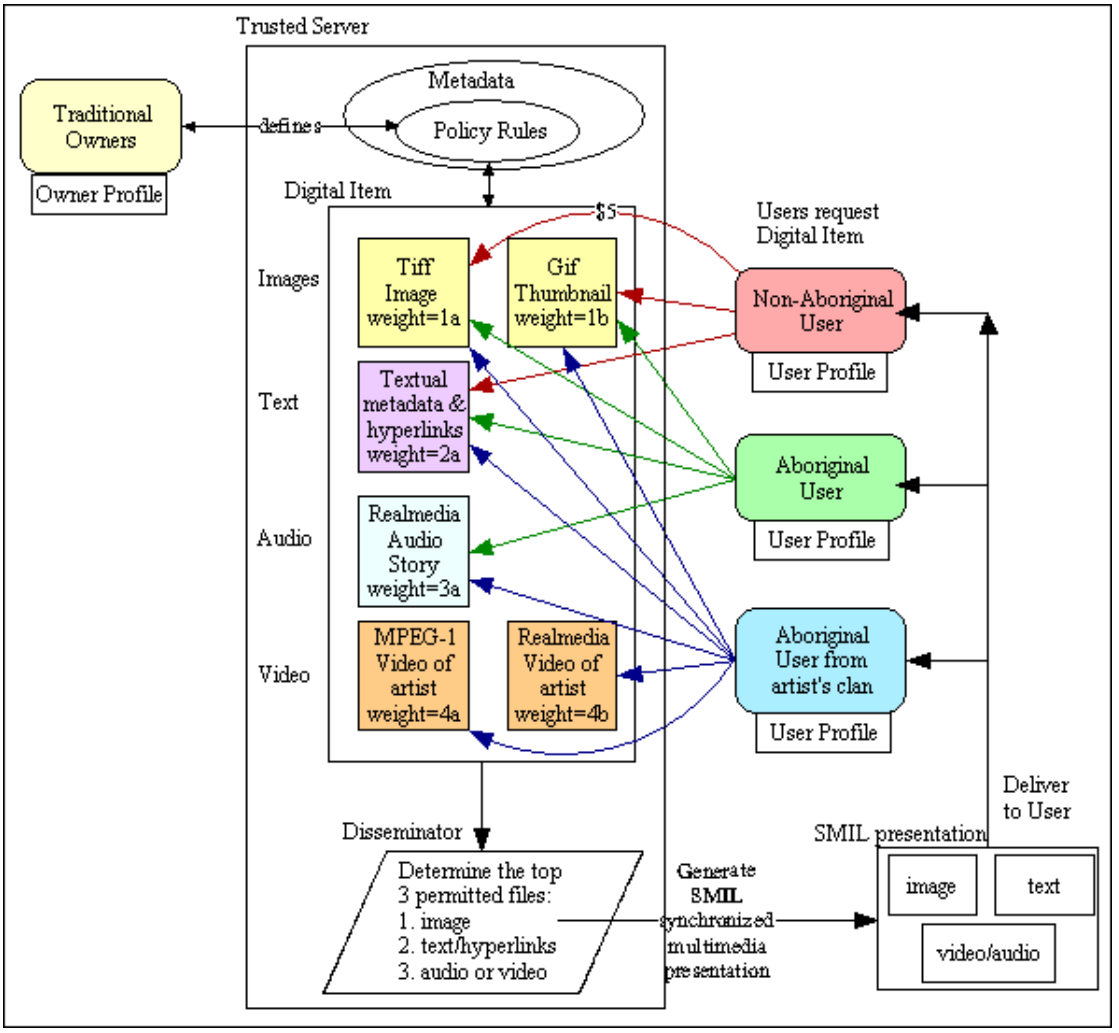

Figure 1: Proposed System Architecture

The steps associated with a Digital Item request and delivery are as follows:

1. A user logs onto the system using a secure password. Associated with each user is an authenticated user profile which includes information such as tribal/clan membership, gender, status, role, etc.;
2. The user performs a search and browse and requests a particular item;
3. The disseminator then checks the permission constraints against the user's profile and the objects's metadata to determine for each component:
   a) if the user is permitted access and
   b) the weighting for each component and the given userType. Weightings indicate importance and will depend on factors including the content and media typeof the component, user's background and display capabilities etc.,
4. Using the weightings of the permitted components, a customized presentation is dynamically generated (using SMIL) and delivered to the user.

The plan is to investigate and employ existing and developing XML security mechanisms such as XML Signature [20], XML Encryption [21] and the Security Assertion Markup Language (SAML) [22] for

the actual enforcement of the access constraints defined using the extensions described here.

5. Conclusions and Future Work

5.1 Conclusions

In this paper, we have described XML markup extensions to enable the protection of traditional knowledge and to support many of the customary laws regarding access to knowledge, belonging to Aboriginal indigenous groups. We have designed these extensions so as to maximize interoperability and compatibility with existing Rights Markup languages, metadata vocabularies and XML security mechanisms, such as XML Signature [20], XML Encryption [21] and SAML [22].

Existing rights expression languages such as XrML and ODRL fail to provide the fine-grained user-dependent and content-dependent constraints which may need to be checked for each individual object and user. In order to satisfy the needs of indigenous communities, the following types of customary constraints should be provided:

- User-dependent conditions - gender, status, tribe/clan, role, birthDate, birthplace, deathDate, relationship to subject (of the user);
- Subject-dependent conditions - secrecy, sanctity, death, relationship to user (of the subject/person depicted or recorded);
- Logical combinations of the above (including the NOT, AND, OR operators);
- Request constraints - a request by the traditional owners' describing appropriate use/reuse of an object;
- Warning constraints - statements which are displayed to viewers warning them that the object they have requested may contain culturally sensitive content which could upset or offend them.

The MPEG-21 Requirements for a RDD and REL v1.0 document currently does not include specific requirements for satisfying the unique intellectual property needs of traditional knowledge holders - in particular the customary laws which affect access and rights. We believe that a requirement for the support of the types of customary constraints described in this paper should be added to [5].

5.2 Future Work

Within the scope of this paper we have only considered the customary laws of Australian Aboriginal and Torres Strait Islander groups. Other indigenous communities (for example, Native Americans and Maoris), will need to assess the extensions proposed here to determine whether they satisfy their specific cultural needs and practices.

A common language for expressing rights is only the first step towards the development of trusted rights management systems for indigenous collections. In order to properly evaluate the proposed extensions, they need to be fully assessed within the context of a real application. Consequently the next steps are to:

- Form a collaboration with a particular indigenous community or custodial organisation which has a collection of culturally-sensitive resources which they would like to preserve and protect;
- Work with members of the indigenous community to determine the customary laws and protocols

which apply to these resources and how these laws translate to the digital domain;
- Develop tools to enable indigenous groups or custodians to define the rights, control usage and access.
- Build a Web-based search and retrieval interface to the collection which restricts access and presents a view of the resources, in accordance with the tribal laws and the user's status;
- Implement and enforce the customary tribal laws and protocols regarding access to indigenous folklore and knowledge, using international open standards in metadata and IT security mechanisms (encryption, authentication, digital signatures).

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Vitae

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