

KF Modified Linked Data Research Project

A Report to the CALL/ACBD Committee to Promote Research / F. Tim Knight & Sarah Sutherland

May 5, 2016

This research project set out to explore the possibility of developing and publishing the KF Modified classification scheme as linked data. From a high level perspective this project involved:

- An analysis of the Library of Congress Classification linked data initiative for Class K¹
- Establishing a suitable data model to represent the KF Modified classification scheme
- Formulating an appropriate data conversion process
- Coding the classification data as linked data.

The intention was to provide a linked data version of KF Modified that will play a role in the organization of Canadian and common law legal resources on the “Web of Data” while contributing to the emerging legal linked data environment. In addition, a linked data version of KF Modified will facilitate the presentation of a web-based version of KF Modified. This format will make it easier to manage and edit the schedule, easier for law cataloguers to access and use, and make the classification scheme a more attractive option for common law libraries working outside of Canada to consider.

And we hoped to contribute a useful methodology for creating, using and publishing linked data that could benefit other technically minded librarians interested in developing their own linked data projects.

Our original timeline proved to be quite an ambitious one. The project phases took longer to complete than our initial estimates had suggested. It *seemed* like a manageable project that could be done in a reasonable amount of time, however logistical and technical challenges, as well as competing professional demands on our time, contributed to inevitable delays which forced us to reassess the outcomes of the project. While some facets of the project had to be temporarily abandoned it still offered many opportunities to learn more about the technology and processes involved in creating linked data.

Project Phases

These were the main development phases of our project:

- Develop an XML schema appropriate for KF Modified classification
- Convert the print version of KF Modified to XML
- Review and consider the Library of Congress Classification linked data service and their use of SKOS
- Convert the XML version of KF Modified to HTML and RDF using XSLT
- Extract, convert and reconcile a MARC record set using the linked data version of KF Modified
- Make the project publicly available and report on our findings.

¹ See <http://id.loc.gov/authorities/classification/K.html>.

1. The XML Schema

The first thing we *had* to do was to get KF Modified out of the legacy word processing software it had been managed in for years and into something more flexible like XML. Once in an XML format the possibility of converting to a variety of other formats becomes possible, for example maintaining versions in print, HTML, or RDF².

However, developing an XML schema able to accommodate *all* of the quirky print conventions that cataloguers take for granted was a challenge. When human readers see something on a page they are easily able to interpret and understand what is intended in the classification scheme. Translating these nuances into an actionable structure that a machine can easily parse was a very interesting problem.

Take for example, this excerpt from the original print version shown in figure 1 below. This is an internal table used for specific aspects of particular professions. There are actually two tables here: Table 'A' is for single classification numbers and Table 'B' is applied to individual subject Cutter numbers. If the profession is represented by a classification number you would add **.3** for resources dealing with malpractice. If the profession is represented by a subject Cutter you would add **3** to the Cutter.

Regulation of industry, trade, and commerce. Occupational law	
The professions	
Particular professions - Continued	
2920	Economic and financial advisers Accountants, Auditors (Table A) For accounting law see KF1357
2921	Financial planners (Table A) Investment advisers see KF1072 Tax consultants see KF6320 Lawyers see KF297, KF8795
2925	Engineering and construction Architects (Table A)
2928	Engineers (Table A)
2930	Other, A-Z .I54-543 Industrial designers (Table B) .I58-583 Interior decorators (Table B) .S67-673 Sprinkler irrigation contractors (Table B) Surveyors see KF2940.S87+
	Performing artists

Figure 1

So malpractice of engineers would be classed at KF 2928.3 and dental malpractice would be classed at KF 2910 D33.

² Resource Description Framework is the data standard used to represent linked data.

Representing Table B in XML might look something like the code shown in figure 2:

```
<KFClassNumber>
  <KFNumber GD="false" form="false">
    <noClass />
    <classNumberCaption>Particular professions</classNumberCaption>
  </KFNumber>
</KFClassNumber>
<KFTable>
  <tableName>Table B, Cutter number</tableName>
  <tableCutter>
    <cutterNumber>.x</cutterNumber>
    <cutterCaption>General</cutterCaption>
    <cutterForm>VII</cutterForm>
  </tableCutter>
  <tableCutter>
    <cutterNumber>.x1</cutterNumber>
    <cutterCaption>Licensing. Certification</cutterCaption>
    <cutterForm>VII</cutterForm>
  </tableCutter>
  <tableCutter>
    <cutterNumber>.x2</cutterNumber>
    <cutterCaption>Professional ethics</cutterCaption>
    <cutterForm>VII</cutterForm>
  </tableCutter>
  <tableCutter>
    <cutterNumber>.x3</cutterNumber>
    <cutterCaption>Malpractice. Liability</cutterCaption>
    <cutterForm>VII</cutterForm>
  </tableCutter>
</tableCutter>
</KFTable>
```

Figure 2

After a lot of testing, sample coding and trial and error, we settled on an XML schema we could use.^{3, 4}

The main data elements consist of the <KFModified> root element which holds the <KFClassification> element containing the <KFConcept> and the <KFClassGroup> elements. The <KFClassGroup> is where the elements for the <KFClassNumber> are found: the <KFNumber>, <KFTable> and <KFCutter> elements.⁵

³ See Appendix A for the XML Schema.

⁴ A graphic representation of the elements of the XML schema is found in Appendix B.

⁵ See Appendix C for XML coding notes.

2. Converting KF Modified to XML

With the XML schema in place the next step was to convert the legacy print file and encode the data in XML.

The original plan was to do this conversion using the magic of “regular expressions.”⁶ Unfortunately, our early experiments were not nearly as fruitful as we had hoped. Ultimately, because of the variability found in the original print version, we ended up coding a portion of the KF Modified XML manually. Through the judicious use of a collection of macros in NotePad++⁷ the process of expressing the various XML elements was greatly improved. However, in the end we were only able to fully code a short excerpt of the KF Modified schedule representing the range of classification numbers from KF 4480 to KF 8200.⁸

3. The Road to RDF/XML

The next thing to be done, on our way toward expressing the KF Modified classification in standard RDF/XML language of linked data, was to review the work done at the Library of Congress Classification linked data service.

This was certainly a logical place to explore but we soon discovered that their linked data implementation was a little more complex than we thought we would likely need. LC references their own authority databases through MADS and MODS.⁹ We would of course like to take advantage of their work and those connections, but we thought we could harness that by mapping our KF Modified data elements to their use of SKOS. So after considering the LC’s implementation we began mapping our XML data elements to SKOS.¹⁰

In order to accomplish the planned conversions, the next phase of the project required a better understanding of XSLT.¹¹ HTML is one format that could be offered to cataloguers as an alternative to KF Modified in print so that seemed a logical starting point.

After some more trial and error and a number of coding experiments, we settled on an XSLT script that successfully transformed a small excerpt of the KF Modified XML into HTML.¹² Writing a script that could transform the encoded XML into a standard RDF/XML representation of SKOS was much more challenging.

⁶ For an overview of this pattern matching operation see https://en.wikipedia.org/wiki/Regular_expression.

⁷ Notepad++ is a free source code editor, see <https://notepad-plus-plus.org/>.

⁸ See completed XML coding in Appendix D.

⁹ “Metadata Authority Description Schema” and “Metadata Object Description Schema” respectively.

¹⁰ See the table found in Appendix E.

¹¹ I recommend Jeni Tennison’s book, ‘Beginner XSLT 2.0’ as a good resource to learn XSLT (<http://www.apress.com/9781590593240>).

¹² See Appendix F for the XSLT script and an example of the resulting HTML.

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We did have some success using scripts Eric Hanson had shared for a project he was involved with at North Carolina State University Libraries.¹³ We recommend his article, “A Beginner’s Guide to Creating Library Linked Data,” that outlines the steps and best practices they used to create their organization name linked data project.¹⁴

4. Converting MARC to XML

In anticipation of a test reconciliation against our KF Modified linked data service a sample MARC record set of about 100 records was extracted from the Osgoode Hall Law School Library catalogue.

Part of that process includes the conversion of MARC records to RDF using Terry Reese’s MarcEdit¹⁵ to convert MARC data first to MarcXML and then using a couple of XSLT stylesheets available from the Library of Congress.

These are the steps for that conversion:

- Step 1: extract MARC records from ILS
- Step 2: clean and remove unwanted local tags, e.g. XX9, 596, etc.
- Step 3: convert to MarcXML using MarcEdit (it’s a good idea to run the resulting file through an XML validator, e.g. http://www.w3schools.com/xml/xml_validator.asp)
- Step 4: retrieve LC XSLT style sheets from <http://www.loc.gov/standards/marcxml/>
You’ll need: MARC21slim2RDFDC.xsl which also requires MARC21slimUtils.xls
<http://www.loc.gov/standards/marcxml/xslt/MARC21slim2RDFDC.xsl>
<http://www.loc.gov/standards/marcxml/xslt/MARC21slimUtils.xsl>
- Step 5: put all files into the same directory (note assuming use of Ubuntu here)
- Step 6: process file using style sheets with one of the following two commands:
`xsltproc MARC21slim2RDFDC.xsl conversionTestFile-cleaned.xml | cat > test.rdf`
`xsltproc MARC21slim2RDFDC.xsl conversionTestFile-cleaned.xml -o test-file-1.rdf`

5. Still More To Do

We still have a ways to go. We need to complete the conversion of KF Modified to XML and then work out the best way to convert that to RDF/XML using SKOS. Then we need to publish the classification scheme as linked data and reconcile that against our data and against other datasets that are available on the web.

¹³ See <http://www.lib.ncsu.edu/ld/onld/>.

¹⁴ Hanson, Eric M. 2014. ‘A Beginner’s Guide to Creating Library Linked Data: Lessons from NCSU’s Organization Name Linked Data Project’. *Serials Review* 40 (4): 251–58. doi:10.1080/00987913.2014.975887.

¹⁵ Terry Reese’s free MARC editing software <http://marcedit.reeset.net/>.

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Appendix A: XML Schema

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns="http://www.w3schools.com"
targetNamespace="http://www.w3schools.com" elementFormDefault="qualified">
<!--_*****
***** KF Modified XML schema draft ver. 0.9.8 23Mar2015 FTK *****
*****_-->
<!--this section contains both elements and elements that reference the complexTypes-->
<xs:element name="KFModified">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="KFClassification" maxOccurs="unbounded">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="KFConcept" type="conceptHierarchy"/>
            <xs:element name="KFClassGroup" minOccurs="1">
              <xs:complexType>
                <xs:sequence>
                  <xs:element name="KFClassNumber" maxOccurs="unbounded">
                    <xs:complexType>
                      <xs:sequence>
                        <xs:element name="KFNumber" type="classification"/>
                        <xs:element name="KFTable" type="table" minOccurs="0" maxOccurs="3"/>
                        <xs:element name="KFCutter" minOccurs="0" maxOccurs="unbounded">
                          <xs:complexType>
                            <xs:sequence>
                              <xs:element name="cutterHeader" minOccurs="0" maxOccurs="1"/>
                              <xs:element name="cutterHeaderNote" minOccurs="0" maxOccurs="3"/>
                              <xs:choice>
                                <xs:element name="xCutter" type="cutter" minOccurs="0" maxOccurs="unbounded"/>
                                <xs:element name="primaryCutter" type="cutter" minOccurs="0" maxOccurs="unbounded"/>
                                <xs:element name="secondaryCutter" type="cutter" minOccurs="0" maxOccurs="unbounded"/>
                                <xs:element name="tertiaryCutter" type="cutter" minOccurs="0" maxOccurs="unbounded"/>
                              </xs:choice>
                            </xs:sequence>
                          </xs:complexType>
                        </xs:element>
                      </xs:sequence>
                    </xs:complexType>
                  </xs:element>
                </xs:sequence>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
</xs:schema>
```

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Appendix A: XML Schema

```
        </xs:complexType>
    </xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<!-- *****
    ***** this section contains the complexTypes *****
    *****-->
<!-- classification:
-attributes indicate either G.D. or Form or neither;
-it`s either a single number or a range followed by an optional scope note-->
<xs:complexType name="conceptHierarchy">
    <xs:sequence>
        <xs:element name="primaryConcept">
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute name="indentUnit" type="xs:nonNegativeInteger" use="required"/>
<!-- added to keep track of indentation -->
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
        <xs:element name="secondaryConcept" minOccurs="0" maxOccurs="15">
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute name="indentUnit" type="xs:nonNegativeInteger" use="required"/>
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
```

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Appendix A: XML Schema

```
<xs:complexType name="classification">
  <xs:sequence>
    <xs:choice>
      <xs:element name="classNumber" type="xs:decimal"/>
      <xs:element name="classNumberRange"/>
      <xs:element name="noClass"/>
<!--for notes independent of specific classNumber, e.g. 'Fixtures' cross-ref under KF709-->
<!--can also contain obsolete class numbers, e.g. KF3105.8-->
    </xs:choice>
    <xs:element name="classNumberCaption" maxOccurs="1" minOccurs="0"/>
    <xs:element name="classNumberForm" maxOccurs="1" minOccurs="0"/>
    <xs:element name="classNumberGD" maxOccurs="1" minOccurs="0"/>
    <xs:element name="classNumberRefNote" maxOccurs="1" minOccurs="0"/>
    <xs:element name="classNumberCrossRef" maxOccurs="5" minOccurs="0"/>
    <xs:element name="classExample" maxOccurs="3" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="form" type="xs:boolean" use="required"/>
  <xs:attribute name="GD" type="xs:boolean" use="required"/>
  <xs:attribute name="dateAdded" type="xs:gYearMonth"/>
  <xs:attribute name="dateRevised" type="xs:gYearMonth"/>
</xs:complexType>
<!-- for internal tables, e.g. KF2905 or KF5900 -->
<xs:complexType name="table">
  <xs:sequence>
    <xs:element name="tableHeader" minOccurs="0"/>
    <xs:element name="tableRefNote" minOccurs="0"/>
    <xs:element name="tableName" minOccurs="0"/>
    <xs:element name="tableCutter" type="cutter" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<!--cutterNumber: choice between using a cutter number or cross-reference to another cutter number-->
<xs:complexType name="cutter">
  <xs:choice>
    <xs:sequence>
      <xs:element name="cutterNumber"/>
      <xs:element name="cutterCaption"/>
      <xs:element name="cutterForm" minOccurs="0" maxOccurs="1"/>
      <xs:element name="cutterRefNote" minOccurs="0" maxOccurs="3"/>
      <xs:element name="cutterCrossRef" minOccurs="0" maxOccurs="3"/>
    </xs:sequence>
  </xs:choice>
</xs:complexType>
```

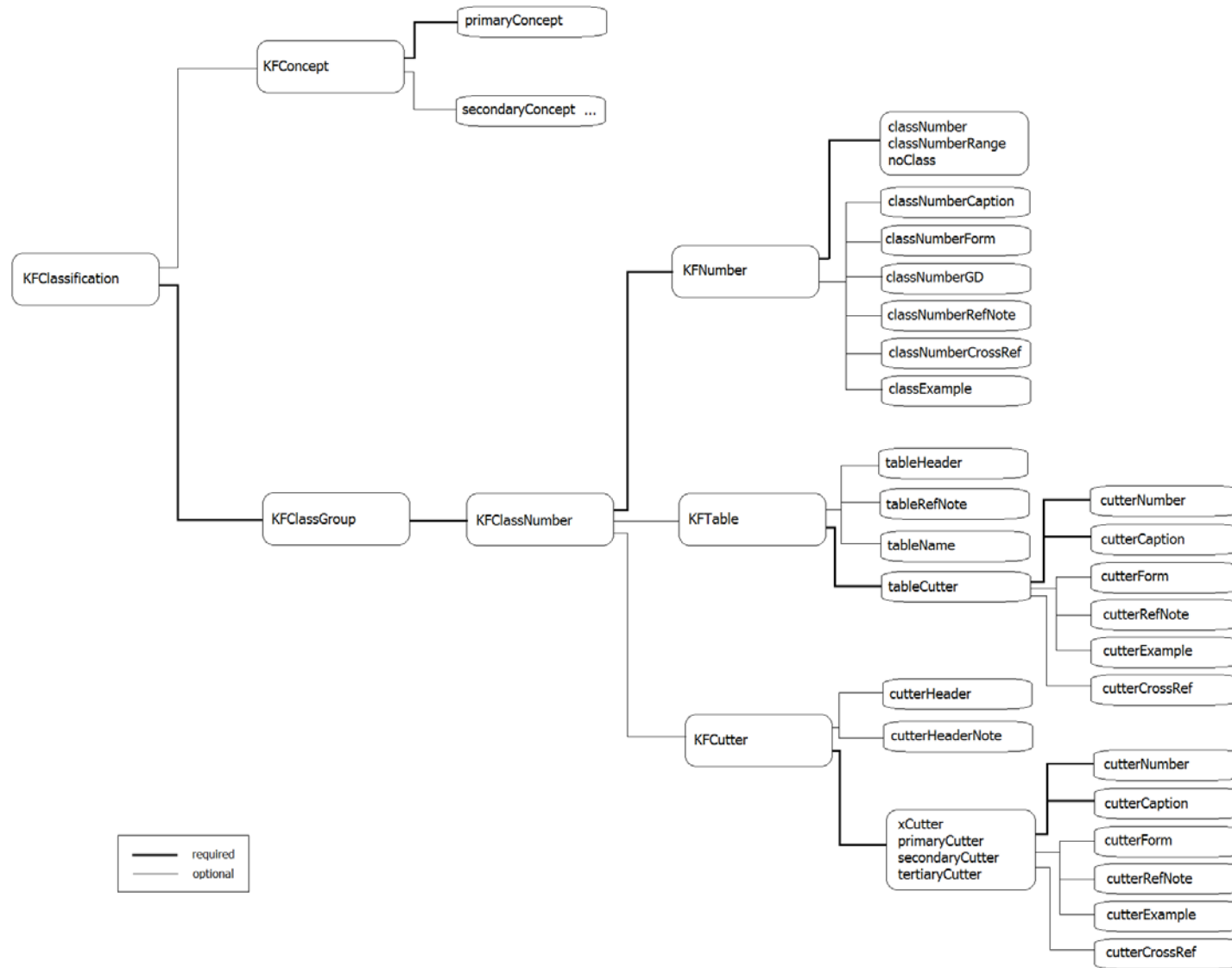

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Appendix A: XML Schema

```
<xs:element name="cutterExample" minOccurs="0" maxOccurs="3"/>
</xs:sequence>
<xs:element name="cutterCrossRef"/>
</xs:choice>
<xs:attribute name="dateAdded" type="xs:gYearMonth"/>
<xs:attribute name="dateRevised" type="xs:gYearMonth"/>
</xs:complexType>
</xs:schema>
```

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Appendix B: Graphic Representation of the XML Schema



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Appendix C: XML Schema Notes

<KFClassNumber>

The <KFClassNumber> contains the 3 parts that make up a KF classification number: <KFNumber>, <KFTable> and <KFCutter>.

<KFNumber>

The <KFNumber> element (via the <classification> type) has 4 attributes **GD**, **form**, **dateAdded** and **dateRevised**. The first element within the <KFNumber> begins with a choice between either a single class number <classNumber>, a range of class numbers <classNumberRange>, or no class number at all <noClass> (used to provide notes and references independent of a classification number). The remaining elements of <KFNumber> are: <classNumberScope>, <classNumberForm>, <classNumberGD>, <classNumberRefNote>, <classNumberCrossRef> and <classExample>. All of these elements are optional with the exception of <classNumberScope> which must be used when either <classNumber> or <classNumberRange> are selected.

Example

```
<KFClassification>
  <KFConcept>
    ...
  </KFConcept>
  <KFClassGroup>
    <KFClassNumber>
      <KFNumber GD="false" form="true">
        <classNumber>3450</classNumber>
        <classNumberScope>Other, A-Z</classNumberScope>
      </KFNumber>
    </KFClassNumber>
  </KFClassGroup>
  ...
</KFClassification>
```

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Appendix C: XML Schema Notes

<KFTable>

The next element is the [<KFTable>](#) element. This is an optional element used for tables that are internal to the KF Modified schedule, for example Tables A and B at KF2905. It contains 3 elements: [<tableHeader>](#) (optional), [<tableName>](#) and [<tableCutter>](#) (see [<KFCutter>](#) below).

Example

```
<KFClassification>
  <KFConcept>
    ...
  </KFConcept>
  <KFClassGroup>
    <KFClassNumber>
      <KFNumber GD="false" form="false">
        <noClass />
        <classNumberScope>Particular professions</classNumberScope>
      </KFNumber>
      <KFTable>
        <tableHeader>Under each:</tableHeader>
        <tableName>Table A, One number</tableName>
        <tableCutter>
          <cutterNumber>(0)</cutterNumber>
          <cutterCaption>General</cutterCaption>
          <cutterForm>VI</cutterForm>
        </tableCutter>
      </KFClassNumber>
    </KFClassGroup>
  </KFClassification>
```

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Appendix C: XML Schema Notes

<KFCutter>

Not all class numbers have cutter numbers so the <KFCutter> subelement is optional. The <KFCutter> begins with an optional <cutterHeader> (used primarily with <secondaryCutter>), <cutterHeaderNote> (used with <cutterHeader>) elements followed by a choice between <xCutter>, <primaryCutter>, or <secondaryCutter>. Each of these reference the <cutter> type and may contain these subelements: <cutterNumber>, <cutterCaption>, <cutterForm>, <cutterRefNote>, <cutterExample> and <cutterCrossRef>.

Example

```
<KFClassification>
  <KFConcept>
    ...
  </KFConcept>
  <KFClassGroup>
    <KFClassNumber>
      <KFNumber GD="false" form="false">
        <classNumber>2907</classNumber>
        <classNumberScope>Special topics, A-Z</classNumberScope>
        <classNumberForm>VII</classNumberForm>
      </KFNumber>
      <KFCutter>
        <primaryCutter>
          <cutterCrossRef>Certification see KF2907.L53</cutterCrossRef>
        </primaryCutter>
        <primaryCutter>
          <cutterNumber>E3</cutterNumber>
          <cutterCaption>Medical education</cutterCaption>
        </primaryCutter>
      </KFCutter>
    </KFClassNumber>
  </KFClassGroup>
  ...
</KFClassification>
```

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Appendix C: XML Schema Notes

Element Definitions

Elements	Subelements	Type	Use	Repeatable	Notes
<KFModified>			root	n/a	
<KFClassification>			R	Y	
	<KFConcept>	conceptHierarchy	R	N	references complexTypes below
	<KFClassGroup>	n/a	R	N	container for classification elements
	<KFClassNumber>	n/a	R	Y	container for class number elements
	<KFNumber>	classification	R	N	references complexTypes below
	<KFTable>	table	O	3x	
	<KFCutter>	n/a	O	3x	container for cutter elements
	<cutterHeader>	string	M	N	mainly for secondary cutter headings, e.g. KF3775.A3
	<cutterHeaderNote>	string	M	N	note for above header
	<xCutter>	cutter	M	N	references complexTypes below
	<primaryCutter>	cutter	M	N	references complexTypes below
	<secondaryCutter>	cutter	M	N	references complexTypes below

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Appendix C: XML Schema Notes

Complex Types Definitions

ComplexTypes	Subelements/Attributes	Type	Use	Repeatable	Notes
<conceptHierarchy>			R	N	
	<primaryConcept> [indentLevel]	string nonNegativeInteger	R	N	
	<secondaryConcept> [indentLevel]	string nonNegativeInteger	M	Y	
<class>					
	<tableHeader>	string	O	N	
	<tableName>	string	R	N	
	<tableCutter>	cutter	R	Y	
<classification>	GD form dateAdded dateRevised	boolean boolean gYearMonth gYearMonth	R	Y	
	<classNumber>	decimal	M	N	choose from one of these three
	<classNumberRange>	regex pattern?	M	N	
	<noClass>	string	M	N	
	<classNumberGD>	string	M	N	contains the GD statement
	<classNumberScope>	string	M	N	required for <classNumber> and <classNumberRange>
	<classNumberForm>	string	M	N	
	<classNumberRefNote>	string	M	N	
	<classNumberCrossRef>	string	M	Y	
	<classExample>	string	M	Y	i.e. bibliographic examples

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Appendix C: XML Schema Notes

ComplexTypes Table ... continued

<cutter>	dateAdded dateRevised	gYearMonth gYearMonth	O	N	
	<cutterNumber>	string	R	N	
	<cutterCaption>	string	R	N	
	<cutterForm>	string	M	N	table number for cutter numbers
	<cutterRefNote>	string	M	Y	
	<cutterExample>	string	M	Y	i.e. bibliographic examples
	<cutterCrossRef>	String	M	N	used independent of cutter, i.e. choose either cutter or cutterCrossRef

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Appendix D: XML Coding Excerpt

```
<KFModified xmlns="http://www.w3schools.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="kfmod-final.xsd">
  <KFClassification>
    <KFConcept>
      <primaryConcept indentUnit="0">Constitutional law - History</primaryConcept>
    </KFConcept>
    <KFClassGroup>
      <KFClassNumber>
        <KFNumber GD="false" form="false">
          <noClass/>
          <classNumberRefNote>Here are classed works on the constitutional law and constitutional history of Commonwealth
countries and other common law countries, Cf. JL, JN, JO
          </classNumberRefNote>
          <classNumberCrossRef>For U.S. (Federal and state) see KF4501-51 30</classNumberCrossRef>
        </KFNumber>
      </KFClassNumber>
      <KFClassNumber>
        <KFNumber GD="false" form="false">
          <classNumber>4480</classNumber>
          <classNumberCaption>General and comparative constitutional law and constitutional history (common law system only)
          </classNumberCaption>
        </KFNumber>
      </KFClassNumber>
    </KFClassGroup>
  </KFClassification>
  <KFClassification>
    <KFConcept>
      <primaryConcept indentUnit="0">Constitutional law - History</primaryConcept>
      <secondaryConcept indentUnit="1">Canada</secondaryConcept>
    </KFConcept>
    <KFClassGroup>
      <KFClassNumber>
        <KFNumber GD="false" form="false">
          <classNumber>4481</classNumber>
          <classNumberCaption>Documents, sources, etc.</classNumberCaption>
        </KFNumber>
      <KFCutter>
        <primaryCutter>
          <cutterNumber>A1A-Z</cutterNumber>
          <cutterCaption>Bibliography</cutterCaption>
        </primaryCutter>
      </KFCutter>
    </KFClassGroup>
  </KFClassification>
</KFModified>
```

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Appendix D: XML Coding Excerpt

```
</KFCutter>
<KFCutter>
  <primaryCutter>
    <cutterNumber>A2A-Z</cutterNumber>
    <cutterCaption>Collection</cutterCaption>
  </primaryCutter>
</KFCutter>
<KFCutter>
  <primaryCutter>
    <cutterNumber>A3A-Z</cutterNumber>
    <cutterCaption>Sources other than the Constitution (e.g. The Quebec Act)</cutterCaption>
  </primaryCutter>
</KFCutter>
<KFCutter>
  <cutterHeader>Texts of the Constitution</cutterHeader>
  <primaryCutter>
    <cutterNumber>A5</cutterNumber>
    <cutterCaption>Unannotated by date of publication unless content date differs by more than 1 year from
publication date in which case use content date</cutterCaption>
  </primaryCutter>
</KFCutter>
<KFCutter>
  <primaryCutter>
    <cutterNumber>A5A-Z</cutterNumber>
    <cutterCaption>Annotated (includes commentaries) by annotator, editor, etc.</cutterCaption>
  </primaryCutter>
</KFCutter>
<KFCutter>
  <primaryCutter>
    <cutterCrossRef>Amendments see KF4483A4</cutterCrossRef>
  </primaryCutter>
</KFCutter>
</KFClassNumber>
<KFClassNumber>
  <KFNumber GD="false" form="false">
    <classNumber>4482</classNumber>
    <classNumberCaption>General works</classNumberCaption>
  </KFNumber>
<KFCutter>
  <primaryCutter>
    <cutterNumber>A1A-Z</cutterNumber>
```

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Appendix D: XML Coding Excerpt

```
        <cutterCaption>Casebooks (for new libraries to the co-operative scheme – an alternate no. for casebooks only)
    </cutterCaption>
    </primaryCutter>
</KFCutter>
<KFCutter>
    <primaryCutter>
        <cutterNumber>A2</cutterNumber>
        <cutterCaption>Federal-provincial conferences (General and Constitutional). By date, Imperial Conferences in the
case of Great Britain</cutterCaption>
    </primaryCutter>
</KFCutter>
<KFCutter>
    <primaryCutter>
        <cutterNumber>A3-Z</cutterNumber>
        <cutterCaption>Treatises</cutterCaption>
    </primaryCutter>
</KFCutter>
</KFClassNumber>

...

    </KFClassGroup>
</KFClassification>
</KFModified>
```

KF Modified Linked Data Research Project

Appendix E: XML Elements Mapped to SKOS

Elements/Types	Subelements	SKOS	XSLT Notes
KFModified			
KFClassification			
	KFConcept		
<i>conceptHierarchy</i>	primaryConcept	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist
	secondaryConcept	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	KFClassGroup		
	KFClassNumber		
	KFNumber		
	classNumber	rdf:Description about; skos:notation	if exists statement
<i>classification</i>	classNumberCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	classNumberForm		
	classNumberGD		kfmod ns?
	classNumberRefNote	skos:scopeNote	
	classNumberCrossRef	skos:related	
	classExample	skos:example	
	classNumberRange	rdf:Description about; skos:notation	
<i>classification</i>	classNumberCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	classNumberForm		
	classNumberGD		kfmod ns?
	classNumberRefNote	skos:scopeNote	
	classNumberCrossRef	skos:related	

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Appendix E: XML Elements Mapped to SKOS

	classExample	skos:example	
	noClass	rdf:Description about; skos:notation?	
<i>classification</i>	classNumberCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	classNumberForm		
	classNumberGD		kfmod ns?
	classNumberRefNote	skos:scopeNote	
	classNumberCrossRef	skos:related	
	classExample	skos:example	
	KFTable		
<i>Table</i>	tableHeader		
	tableRefNote	skos:scopeNote	
	tableName	skos:prefLabel; rdfs:label	
	tableCutter	skos:notation	
<i>Cutter</i>	cutterNumber	rdf:Description about; skos:notation	
	cutterCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	cutterForm		
	cutterRefNote	skos:scopeNote	
	cutterCrossRef	skos:related	
	cutterExample	skos:example	
	cutterCrossRef	skos:related	
	KFCutter		
	cutterHeader		
	cutterHeaderNote		
	xCutter		

KF Modified Linked Data Research Project

Appendix E: XML Elements Mapped to SKOS

<i>Cutter</i>	cutterNumber	rdf:Description about; skos:notation	
	cutterCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	cutterForm		
	cutterRefNote	skos:scopeNote	
	cutterCrossRef	skos:related	
	cutterExample	skos:example	
	cutterCrossRef	skos:related	
	primaryCutter		
<i>Cutter</i>	cutterNumber	rdf:Description about; skos:notation	
	cutterCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	cutterForm		
	cutterRefNote	skos:scopeNote	
	cutterCrossRef	skos:related	
	cutterExample	skos:example	
	cutterCrossRef	skos:related	
	secondaryCutter		
<i>Cutter</i>	cutterNumber	rdf:Description about; skos:notation	
	cutterCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	cutterForm		
	cutterRefNote	skos:scopeNote	
	cutterCrossRef	skos:related	
	cutterExample	skos:example	
	cutterCrossRef	skos:related	

KF Modified Linked Data Research Project

Appendix E: XML Elements Mapped to SKOS

	tertiaryCutter		
<i>Cutter</i>	cutterNumber	rdf:Description about; skos:notation	
	cutterCaption	skos:prefLabel; skos:altLabel; rdfs:label	skos:prefLabel if below don't exist; concatenated if statement
	cutterForm		
	cutterRefNote	skos:scopeNote	
	cutterCrossRef	skos:related	
	cutterExample	skos:example	
	cutterCrossRef	skos:related	

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

XSLT Script

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<xsl:stylesheet version="2.0"
xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
<xsl:template match="/">
  <html>
    <head>
      <title>KF Modified</title>
      <link rel="stylesheet" href="kfmod.css" />
    </head>
    <body>
      <h1>KF Modified</h1>
      <xsl:apply-templates select="/KFModified/KFClassification" />
    </body>
  </html>
</xsl:template>

<xsl:template match="/KFModified/KFClassification">
  <xsl:apply-templates select="KFConcept" />
  <xsl:apply-templates select="KFClassGroup/KFClassNumber" />
</xsl:template>

<xsl:template match="KFConcept">
  <p><span class="concept"><xsl:value-of select="primaryConcept" /></span>
    <xsl:for-each select="secondaryConcept">
      <span class="concept"><xsl:text> -- </xsl:text><xsl:value-of select="." /></span>
    </xsl:for-each>
  </p>
</xsl:template>
```


KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

XSLT Script

```
<xsl:template match="KFClassGroup/KFClassNumber" >
  <xsl:choose>
    <xsl:when test="KFNumber/classNumber">
      <p><span class="classNumber"><xsl:value-of select="KFNumber/classNumber" />
      </span><span class="caption"><xsl:value-of select="KFNumber/classNumberCaption" />
        <xsl:if test="KFNumber/classNumberForm" > (<xsl:value-of select="KFNumber/classNumberForm" />)
        </xsl:if></span></p>
      <p><xsl:if test="KFNumber/classNumberRefNote" ><span class="refNote">
      <xsl:value-of select="KFNumber/classNumberRefNote" /></span></xsl:if></p>
      <p><xsl:if test="KFNumber/classNumberCrossRef" ><span class="crossRef">
      <xsl:value-of select="KFNumber/classNumberCrossRef" /></span></xsl:if></p>
    </xsl:when>
    <xsl:when test="KFNumber/classNumberRange">
      <p><span class="classNumber"><xsl:value-of select="KFNumber/classNumberRange" />
      </span><span class="caption"><xsl:value-of select="KFNumber/classNumberCaption" />
        <xsl:if test="KFNumber/classNumberForm" > (<xsl:value-of select="KFNumber/classNumberForm" />)
        </xsl:if></span></p>
      <p><xsl:if test="KFNumber/classNumberRefNote" ><span class="refNote">
      <xsl:value-of select="KFNumber/classNumberRefNote" /></span></xsl:if></p>
      <p><xsl:if test="KFNumber/classNumberCrossRef" ><span class="crossRef">
      <xsl:value-of select="KFNumber/classNumberCrossRef" /></span></xsl:if></p>
    </xsl:when>
    <xsl:otherwise>
      <p><xsl:if test="KFNumber/classNumberRefNote" ><span class="refNote">
      <xsl:value-of select="KFNumber/classNumberRefNote" /></span></xsl:if></p>
      <p><xsl:if test="KFNumber/classNumberCrossRef" ><span class="crossRef">
      <xsl:value-of select="KFNumber/classNumberCrossRef" /></span></xsl:if></p>
    </xsl:otherwise>
  </xsl:choose>
  <xsl:if test="KFCutter">
    <xsl:apply-templates select="KFCutter" />
  </xsl:if>
</xsl:template>
```

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

XSLT Script

```
<xsl:template match="KFCutter">
  <xsl:if test="cutterHeader"><span class="header"><xsl:value-of select="cutterHeader" />
</span><br />
</xsl:if>
<xsl:choose>
  <xsl:when test="primaryCutter">
    <p><span class="cutterNumber"><xsl:value-of select="primaryCutter/cutterNumber" /></span>
    <span class="cutterCaption">
      <xsl:value-of select="primaryCutter/cutterCaption" /></span></p>
  </xsl:when>
  <xsl:otherwise>
    <p><span class="crossRef"><xsl:value-of select="primaryCutter/cutterCrossRef" /></span></p>
  </xsl:otherwise>
</xsl:choose>
</xsl:template>
</xsl:stylesheet>
```

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

CSS Script

```
body {
    font-family: Verdana, sans-serif;
    font-size: 8pt;
}
h1 {
    background: #C00;
    color: yellow;
    padding: 0 0.2em;
    margin: 0;
    font-size: 2em;
}
h2 {
    background: #C00;
    color: white;
    padding: 0 0.2em;
    margin: 0;
    font-size: 1.8em;
}
div
.test {
    color: green;
}
.normal {
    color: black;
}
.classNumber {
    font-weight: bold;
}
.classCaption {
    position: relative;
    left: 1%;
}
.cutterNumber {
    font-weight: bold;
    position: relative;
    left: 50px;
}
```

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

CSS Script

```
.cutterCaption {
    position: absolute;
    left: 210px;
    color: blue;
}
.concept {
    color: red;
    position: relative;
    left: 140px;
}
.header {
    color: blue;
    position: absolute;
    left: 190px;
}
.caption {
    color: blue;
    position: absolute;
    left: 180px;
}
.refNote {
    color: black;
    position: relative;
    left: 200px;
}
.crossRef {
    color: black;
    position: relative;
    left: 220px;
}
```

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

```
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title>KF Modified</title>
    <link rel="stylesheet" href="kfmod.css">
  </head>
  <body>
    <h1>KF Modified</h1>
    <p><span class="concept">Public property. Public restraints on private property</span></p>
    <p><span class="classNumber">5500</span><span class="caption">General (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> --
General</span></p>
    <p><span class="classNumber">5501</span><span class="caption">Department of the Interior (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> -- Conservation of
natural resources</span></p>
    <p><span class="refNote">Includes environmental planning (Y)</span></p>
    <p></p>
    <p><span class="classNumber">5505</span><span class="caption">General (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="classNumber">5508</span><span class="caption">Mineral resources (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="classNumber">5510</span><span class="caption">Recycling of waste (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> --
Roads</span></p>
    <p><span class="classNumber">5521-5525</span><span class="caption">General. Highway law (IV)</span></p>
    <p></p>
    <p></p>
    <p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> --
Roads</span><span class="concept"> -- General. Highway law</span></p>
    <p><span class="classNumber">5528</span><span class="caption">Highway finance (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> --
Roads</span></p>
    <p><span class="classNumber">5530</span><span class="caption">Express highways. Parkways (VI)</span></p>
    <p></p>
    <p></p>
    <p><span class="classNumber">5532</span><span class="caption">Roadside protection. Rights of way (VI)</span></p>
```

HTML: Code

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

```
<p><span class="refNote">Including restrictions on signboards, advertising, etc.</span></p>
<p><span class="crossRef">Cf. KF5710, Structures other than buildings</span></p>
<p><span class="classNumber">5534</span><span class="caption">Foot trails (VI)</span></p>
<p></p>
<p></p>
<p><span class="classNumber">5535</span><span class="caption">Pedestrian areas (VI)</span></p>
<p></p>
<p></p>
<p><span class="classNumber">5536</span><span class="caption">Particular roads, A-Z (VII)</span></p>
<p></p>
<p></p>
<p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> --
Bridges</span></p>
<p><span class="classNumber">5540</span><span class="caption">General (VI)</span></p>
<p></p>
<p></p>
<p><span class="classNumber">5541</span><span class="caption">Particular bridges, A-Z (VII)</span></p>
<p></p>
<p></p>
<p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> -- Water
resources. Watersheds. Rivers. Lakes. Water courses</span></p>
<p><span class="classNumber">5551-5570</span><span class="caption">General. Conservation. Water resources development
(I)</span></p>
<p><span class="refNote">Including water power development</span></p>
<p><span class="crossRef">Federal Power Commission see KF2120.1</span></p>
<p><span class="classNumber">5571</span><span class="caption">Special aspects</span></p>
<p></p>
<p></p>
<p><span class="concept">Public property. Public restraints on private property</span><span class="concept"> -- Water
resources. Watersheds. Rivers. Lakes. Water courses</span><span class="concept"> -- Special aspects</span></p>
<p><span class="classNumber">5575</span><span class="caption">State water rights (VI, modified)</span></p>
<p><span class="refNote">Including provincial and inter-provincial water rights (Y)</span></p>
<p></p><span class="header">Decisions</span><br><p><span class="cutterNumber">.A5A-Z</span><span
class="cutterCaption">Digests</span></p>
<p><span class="cutterNumber">.A55A-Z</span><span class="cutterCaption">Particular cases. By plaintiff</span></p>
<p><span class="cutterNumber"></span><span class="cutterCaption"></span></p>
<p><span class="cutterNumber"></span><span class="cutterCaption"></span></p>
</body>
</html>
```

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

HTML: Browser View



file:///C:/Users/tknight/Documents/xslt/kfmodTests/kfmod14.html

Apps U U old U eRes Search QuickLink Osgoode York PStuff Email Local pin coding OBS ODC PB CCC Wiki Spread! Earth

KF Modified

Public property. Public restraints on private property

5500 [General \(VI\)](#)

Public property. Public restraints on private property -- General

5501 [Department of the Interior \(VI\)](#)

Public property. Public restraints on private property -- Conservation of natural resources

Includes environmental planning (Y)

5505 [General \(VI\)](#)

5508 [Mineral resources \(VI\)](#)

5510 [Recycling of waste \(VI\)](#)

Public property. Public restraints on private property -- Roads

5521-5525 [General. Highway law \(IV\)](#)

Public property. Public restraints on private property -- Roads -- General. Highway law

5528 [Highway finance \(VI\)](#)

Public property. Public restraints on private property -- Roads

5530 [Express highways. Parkways \(VI\)](#)

5532 [Roadside protection. Rights of way \(VI\)](#)

Including restrictions on signboards, advertising, etc.

Cf. KF5710, Structures other than buildings

5534 [Foot trails \(VI\)](#)

KF Modified Linked Data Research Project

Appendix F: XSLT Script, CSS Script and Sample HTML Transformation

HTML: Browser View

5535	Pedestrian areas (VI)
5536	Particular roads, A-Z (VII) Public property. Public restraints on private property -- Bridges
5540	General (VI)
5541	Particular bridges, A-Z (VII) Public property. Public restraints on private property -- Water resources. Watersheds. Rivers. Lakes. Water courses
5551-5570	General. Conservation. Water resources development (I) Including water power development Federal Power Commission see KF2120.1
5571	Special aspects Public property. Public restraints on private property -- Water resources. Watersheds. Rivers. Lakes. Water courses -- Special aspects
5575	State water rights (VI, modified) Including provincial and inter-provincial water rights (Y) Decisions
.A5A-Z	Digests
.A55A-Z	Particular cases. By plaintiff