QCDML
summary of discussion
proposed solution

Chris Maynard
University of Edinburgh

What do we want XML for?

- ILDG MDWG strategy
- Extensible
  - to new types of gauge configuration
  - to other lattice data
- Use XML tools to handle XML

Do the tools actually exist?

Some but they are all

What do we want XML for II?

- SciDAC strategy
- Standard metadata
  - Easy to search
  - Easy to create – low burden on user
- SciDAC tools for metadata I/O

What about extensiblity?

Merging expectations

- ILDG and SciDAC requirements are
  - not the same
  - not mutually incompatible
- Different categories of XML
  - Ensemble XML
  - Configuration XML
  - Glossary XML

```
- <sw_fermi_plaquette_gauge_action>
  - <plaquette_operator>
    - <gauge_field>
        <group>su(3)</group>
        <representation_text>fundamental</representation_text>
      </gauge_field>
    - <coupling>
        <coupling_name>beta</coupling_name>
        <coupling_value>5.2</coupling_value>
      </coupling>
    </plaquette_operator>
  - <wilson_fermi_operator>
    - <gauge_field>
        <group>su(3)</group>
        <representation_text>fundamental</representation_text>
      </gauge_field>
    - <fermi_field>
        <normalisation>sqrt 2 kappa</normalisation>
      </fermi_field>
    - <coupling>
        <coupling_name>kappa</coupling_name>
        <coupling_value>0.1350</coupling_value>
      </coupling>
    </wilson_fermi_operator>
  - <sw_fermi_operator>
    - <gauge_field>
        <group>su(3)</group>
        <representation_text>fundamental</representation_text>
      </gauge_field>
    - <fermi_field>
        <normalisation>sqrt 2 kappa</normalisation>
      </fermi_field>
    - <coupling>
        <coupling_name>c_sw</coupling_name>
        <coupling_value>2.02</coupling_value>
      </coupling>
    </sw_fermi_operator>
</sw_fermi_plaquette_gauge_action>
```

ILDG

ILDG ID

Hierarchical structure for extensibility

SciDAC criticism: commonly searched information (couplings) at bottom of tree

SciDAC proposal

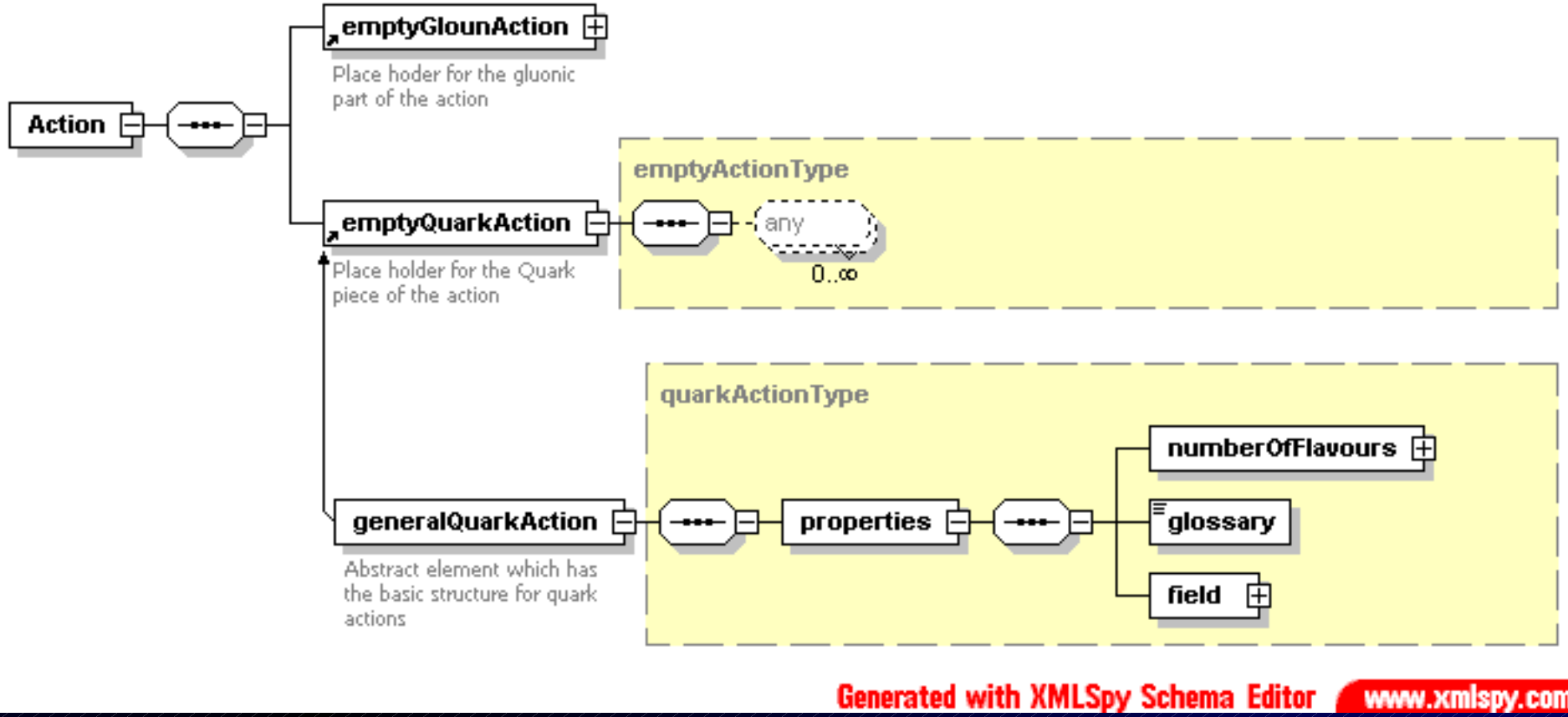
```
- <gluon>
    <glossary> SymanzikGaugeAction.xml </glossary>
   - <parameters>
        <beta>5.2</beta>
        <u0>0.8356</u0>
        <c0>1.66667</c0>
        <c1>-0.10994</c1>
    </parameters>
  </gluon>
```

cmm critique - Not strongly typed
Not easy to extend
information stuck text strings in glossary

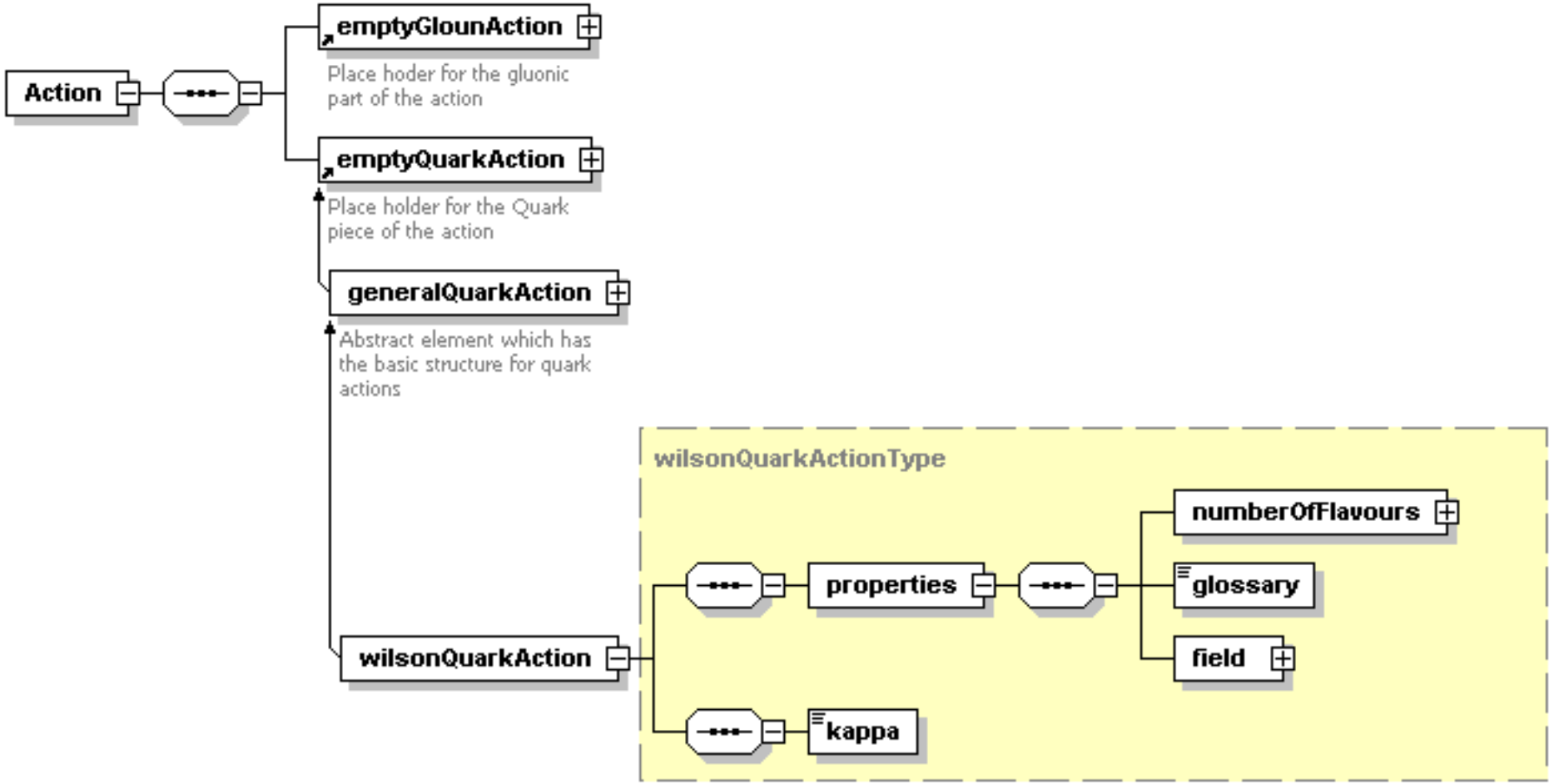
Suggested solution

- Change the way inheritance and extension are handled
- Old way
  - Inherit from *action* add another *operator*
- New way
  - Inheritance tree from *action classes*
- Example Wilson quark actions

General Action



Wilson Quark Action

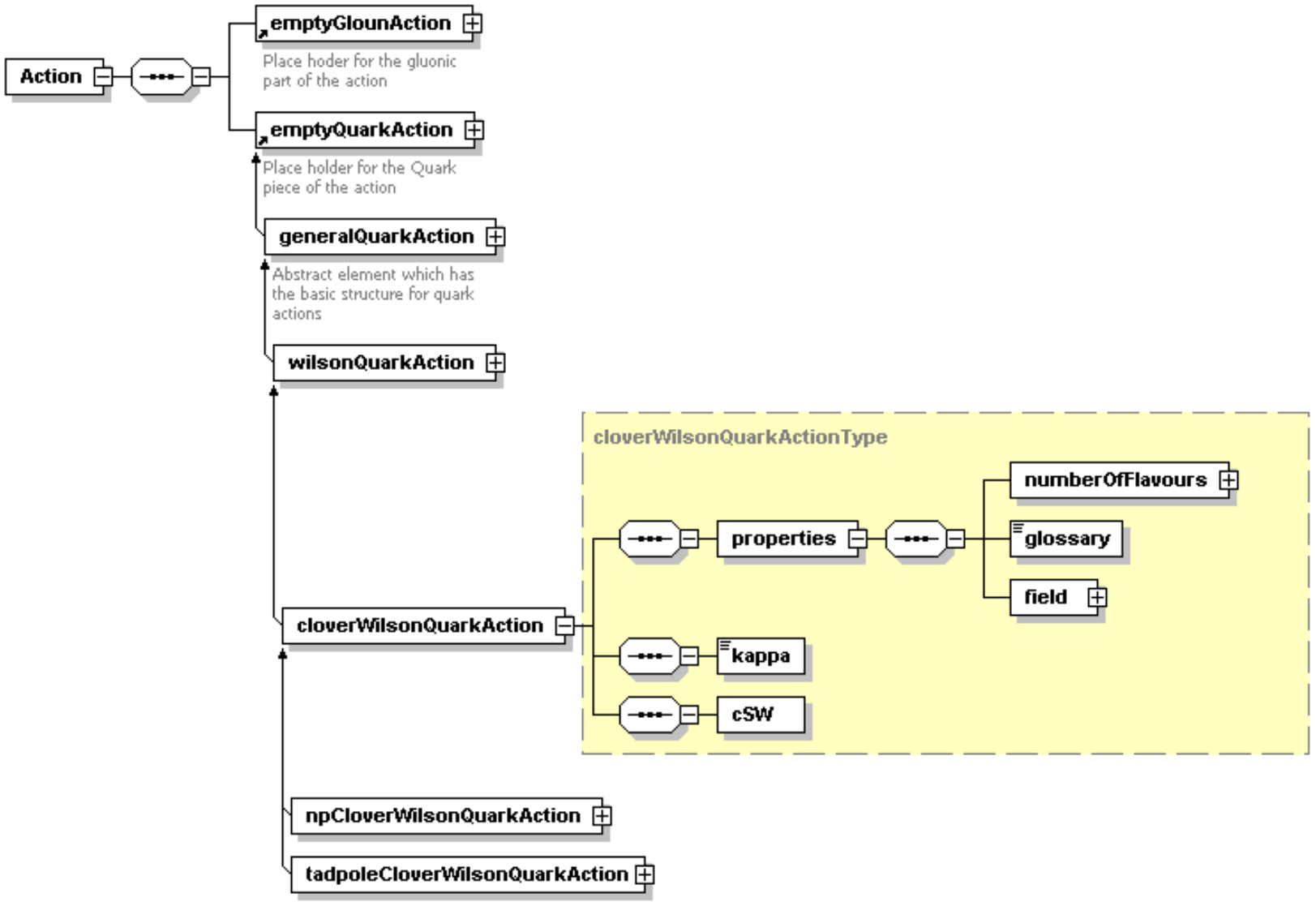


Generated with XMLSpy Schema Editor www.xmlspy.com

Wilson Quark Action

```
- <wilsonQuarkAction xsi:noNamespaceSchemaLocation="http://v
  - <properties>
    - <numberOfFlavours>
        <elem>2</elem>
      </numberOfFlavours>
      <glossary>http://www.lqcd.org/ildg/wilson.xml</glossary>
    - <field>
      - <quarkField>
          <normalisation>sqrt2kappa</normalisation>
        - <boundaryConditions>
            <elem>periodic</elem>
            <elem>periodic</elem>
            <elem>periodic</elem>
            <elem>antiperiodic</elem>
          </boundaryConditions>
        </quarkField>
      </field>
    </properties>
    <kappa>0.13525</kappa>
  </wilsonQuarkAction>
```

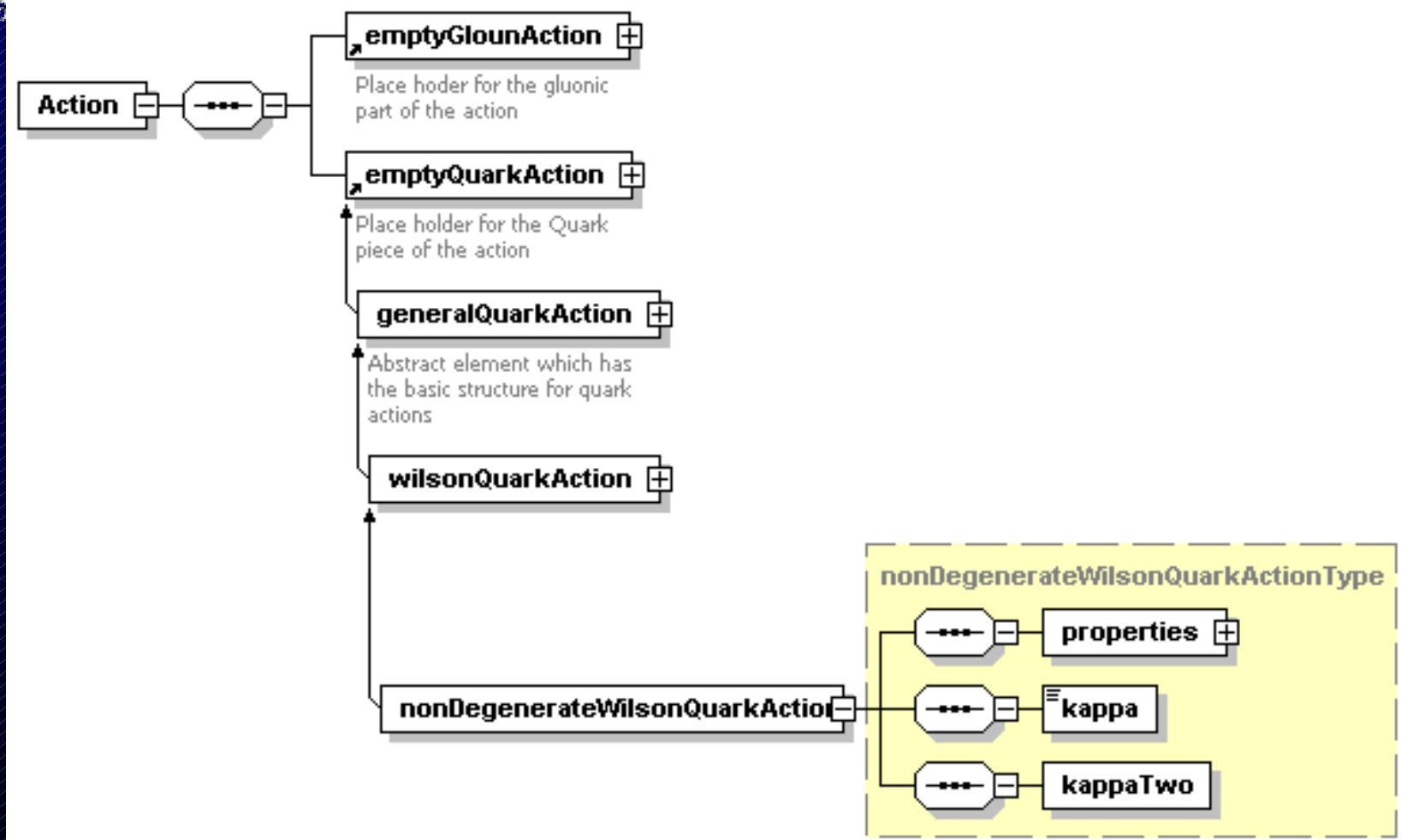
Clover Wilson Action



Non-perturbative Clover

```
<npCloverWilsonQuarkAction xsi:noNamespaceSchemaLocatio
 - <properties>
   - <numberOfFlavours>
       <elem>2</elem>
     </numberOfFlavours>
     <glossary>http://www.lqcd.org/ildg/npClover.xml</glossary>
   - <field>
     - <quarkField>
         <normalisation>sqrt2kappa</normalisation>
       - <boundaryConditions>
           <elem>periodic</elem>
           <elem>periodic</elem>
           <elem>periodic</elem>
           <elem>antiperiodic</elem>
         </boundaryConditions>
       </quarkField>
     </field>
  </properties>
  <kappa>0.13562</kappa>
  <cSW>1.8752</cSW>
</npCloverWilsonQuarkAction>
```

2+1 flavours schema



2+1 flavours

```
- <nonDegenerateWilsonQuarkAction xsi:noNamespaceSchemaLocation=
  - <properties>
    - <numberOfFlavours>
        <elem>2</elem>
        <elem>1</elem>
      </numberOfFlavours>
      <glossary>http://www.lqcd.org/ildg/nonDegWilson.xml</glossary>
    - <field>
      - <quarkField>
          <normalisation>sqrt2kappa</normalisation>
        - <boundaryConditions>
            <elem>periodic</elem>
            <elem>periodic</elem>
            <elem>periodic</elem>
            <elem>periodic</elem>
          </boundaryConditions>
        </quarkField>
      </field>
    </properties>
    <kappa>0.13514</kappa>
    <kappaTwo>0.13281</kappaTwo>
</nonDegenerateWilsonQuarkAction>
```

Some Comments

- Xpath/Xquery doesn't know about substitution groups
  - Version 2 Does. Final call close Feb 04
  - Meantime strong naming conventions
- XSLT can render web pages from XML
  - Determine mathematical expressions
- Glossary document has text strings
  - References, expressions etc

Remaining issues

- Arrays
  - cmm happy to use SciDAC/SOAP
- File Format
  - 2x3 or 3x3 seems to be real issue
- BinX tool solves the problem
  - BinX XML is short, ensemble metadata
  - External not internal use

BinX example

binx.xml