

WellnessRules: The Activity Rule Responder

Taylor Osmun
Harold Boley
Benjamin Craig

Institute for Information Technology
National Research Council, Canada
Fredericton, NB, Canada

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Outline

- WellnessRules Overview
- WellnessRules as a Rule Responder
- WellnessRules Architecture
- WellnessRules Agent Implementation & Role Assignment Matrix
- Activity Scenario: Example Queries with Live Demo
- Proof of Interoperation

WellnessRules Overview

- WellnessRules supports an online-interactive wellness community.

This rule-supported community has the ability to:

- **Create profiles** about themselves containing their preferences for activities and nutrition, their event days, and their fitness levels
- **Compare and collaborate with others** in the community to track progress and schedule group wellness events
- Rules about wellness opportunities are
 - created by participants in rule languages such as Prolog and N3
 - interoperated within a wellness community using RuleML/XML



WellnessRules as a Rule Responder

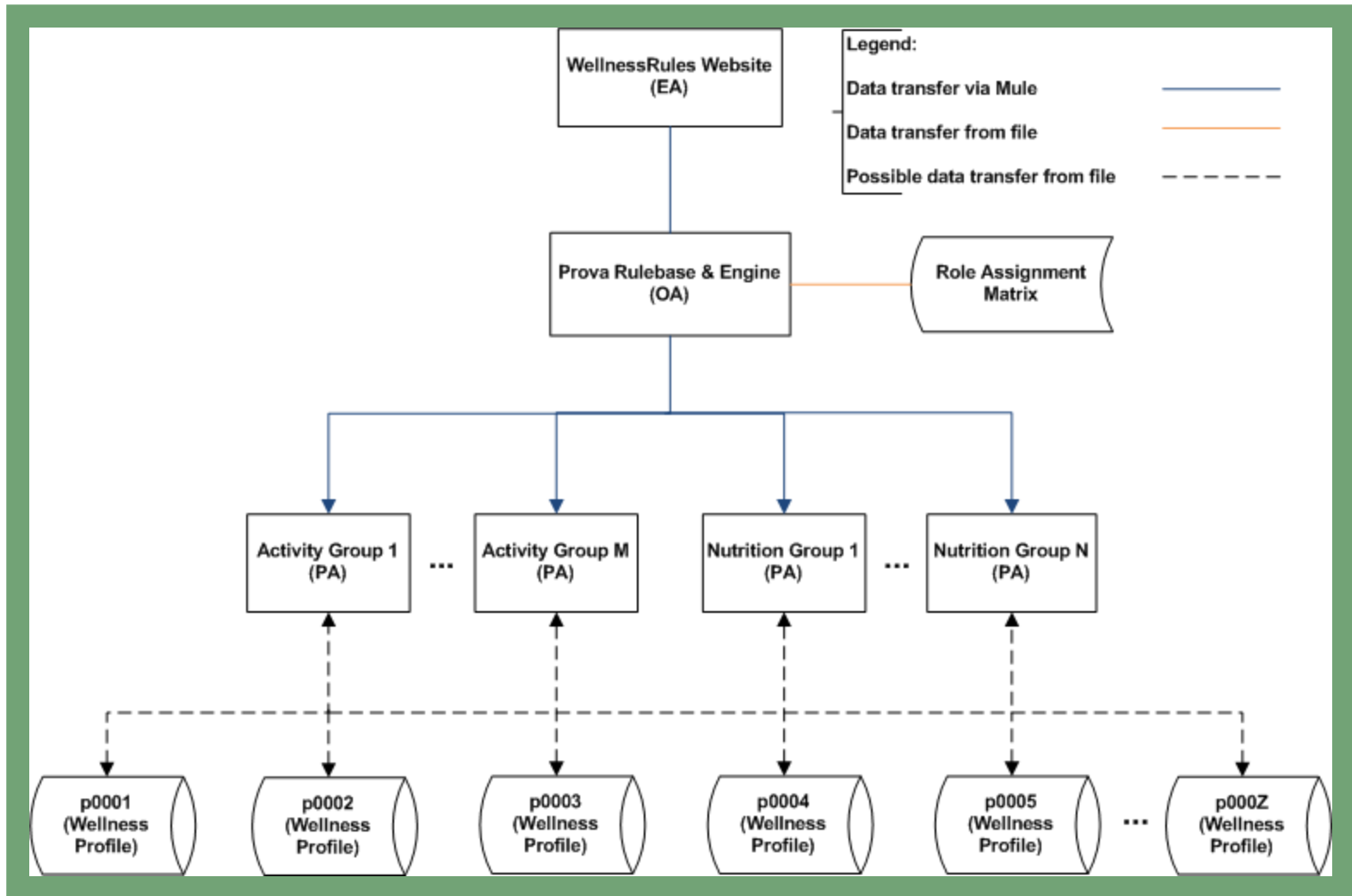
- Rule Responder is an intelligent multi-agent infrastructure for **collaborative** teams and **virtual communities**

- Each Rule Responder instantiation uses three different kinds of agents:
 - **Organizational Agent (OA)**
 - **Personal Agents (PAs)**
 - PAs also select relevant profiles of participants
 - **External Agents (EAs)**

- WellnessRules uses the OA, PAs, and EAs for **communication** and **query delegation** to create an **online-interactive wellness community**



WellnessRules Architecture



Rule Responder Agents (OA, PAs, EAs)

- External Agent (EA):
 - The WellnessRules website (shown later)

- Organizational Agent (OA):
 - Contains a **Prova** knowledge base which is used to handle the incoming queries and **direct** them to **appropriate PAs** using the **Role Assignment Matrix**

- Personal Agent with Profiles (PA):
 - Consists of a Java servlet, and using the two embedded engines, **OO jDREW** and **Euler**, forwards the query to **POSL** and **N3** Profile knowledge bases, respectively
 - It only has **access** to Profiles which contain **relevant information** for its **responsible activity** by using the **Role Assignment Matrix**



Role Assignment Matrix

- Composed of the **Activity Responsibility Matrix (ARM)** and **Profile Responsibility Matrix (PRM)**
- The **ARM** contains information about PA **Activity responsibility**, written as an OWL light ontology.
It defines which PA is best suited for certain queries
- The **PRM** contains information about PA **Profile responsibility**, as well of the format of each Profile knowledge base





WR Website (EA)

- Used to **issue queries** to the WellnessRules **OA**
- Query is placed in the text box, in **RuleML** format
- The Send Message will issue the query to the OA
- A new screen containing a list of **answers** in **RuleML** will be presented
- **Query examples** are provided with their subsequent English descriptions. Can be modified to suit your query



Navigation

[WellnessRules Home](#)

[Rule Responder](#)

WellnessRules - The Activity Rule Responder

Use below box to send a query in [Reaction RuleML format](#) to the *WellnessRules Organizational Agent*:

Latest News

```

<RuleML xmlns=
"http://www.ruleml.org/0.91/xsd"
xmlns:xsi=
"http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation=
"http://www.ruleml.org/0.91/xsd
http://ibis.in.tum.de/research/
ReactionRuleML/0.2/tr.xsd"
xmlns:ruleml2007=
"http://ibis.in.tum.de/projects/paw#">
<Message mode="outbound"
directive="query-sync">
<oid>
<Ind>WellnessRules</Ind>
</oid>
<protocol>
<Ind>esb</Ind>
</protocol>
<sender>
<Ind>User</Ind>
</sender>
<Atom>
<Rel>myActivity</Rel>
<Var>ProfileID</Var>
<Ind>Running</Ind>
<Var>InOut</Var>
<Ind type="integer">1</Ind>
<Ind type="integer">5</Ind>
<Var>StartTime</Var>
<Var>EndTime</Var>
<Var>Location</Var>
<Var>Duration</Var>
<Var>FitnessLevel</Var>
</Atom>

```

Query Selection:

The drop-down boxes show sample queries you -- as an External Agent -- can send to the WellnessRules Organizational Agent. These examples can also act as initial templates that you can edit to create your own queries.

English Description:

Is anyone interested in general Running (indoors or outdoors), with one to five people, for any (start and end) time, location, duration, and fitness level?

October 15th, 2009

Call for profiles: If you are interested in assisting the WellnessRules initiative, please write your own profiles (in either POSL or NB) and submit to the webmaster.

October 14th, 2009

WellnessRules fully implemented into Rule Responder. Support for both Euler and OOJDREW engines.

September 14th, 2009

Full Rule Responder implementation of WellnessRules begins.

August 25th, 2009

WellnessRules website updated to provide navigation and latest news.

August 14th, 2009

WellnessRules website launched. Basic Rule Responder implementation provided.

Sources Used by WellnessRules:

Activity Scenario: Structured English

Introduction:

- In this scenario a participant of WellnessRules, Peter, uses the system to find one or more partners for Running some time in the near future

Query 1:

- Peter first asks the community if anyone at all is interested in running with two to six people. Assessing the answer to this, he finds that there are far too many possibilities on the list and decides to narrow down his question

Query 2:

- He feels that he will continue to have a fitness level of 5 for Running, and so asks a refined question wanting only Level-5 activities. In the answer list he notices p0001 (John), who is someone he has previously performed cycling with. He finds John's fitness level of 5 for running surprising, as he did not realize he was also a good Runner

Query 3:

Now he wishes to run with John (perhaps in a race?) and so specifies p0001 and that he prefers Joe's Gym as the location. Peter now receives a single, final answer on the list, from which he takes the type of running, time, and duration, to contact



Example Query 1

Peter would like to go for a run at some point in time.
He poses the following question:

```
...  
<Atom>  
  <Rel>myActivity</Rel>  
  <Var>ProfileID</Var>  
  <Ind>Running</Ind>  
  <Var>InOut</Var>  
  <Ind type="integer">2</Ind>  
  <Ind type="integer">6</Ind>  
  <Var>StartTime</Var>  
  <Var>EndTime</Var>  
  <Var>Location</Var>  
  <Var>Duration</Var>  
  <Var>FitnessLevel</Var>  
</Atom>  
...
```

Green designates a
relation name

□ English Description:

Is **anyone** interested in
general **Running**
(**indoors** or **outdoors**),
with **two**
to **six** people,
for any (**start**
and **end**) time,
location,
duration,
and **fitness level**?

Blue
designates a
constant.
More will get
blue
as we progress.

Orange designates
a variable



Example Query 1 – POSL & N3

RuleML

```
...  
<Atom>  
  <Rel>myActivity</Rel>  
  <Var>ProfileID</Var>  
  <Ind>Running</Ind>  
  <Var>InOut</Var>  
  <Ind type="integer">2</Ind>  
  <Ind type="integer">6</Ind>  
  <Var>StartTime</Var>  
  <Var>EndTime</Var>  
  <Var>Location</Var>  
  <Var>Duration</Var>  
  <Var>FitnessLevel</Var>  
</Atom>  
...
```

N3

```
_:myActivity  
  rdf:type          :MyActivity;  
  :profileID       ?ProfileID;  
  :activity        :Running;  
  :inOut           ?InOut;  
  :minRSVP         2;  
  :maxRSVP         6;  
  :startTime       ?StartTime;  
  :endTime         ?EndTime;  
  :location        ?Location;  
  :duration        ?Duration;  
  :fitnessLevel    ?FitnessLevel.
```

POSL

```
myActivity(?ProfileID,Running,?InOut,2:integer,6:integer,  
           ?StartTime,?EndTime,?Location,?Duration,?FitnessLevel).
```



Example Query 2

Peter feels that he will continue to have a fitness level of 5 for Running. He poses the following question:

```
...  
<Atom>  
  <Rel>myActivity</Rel>  
  <Var>ProfileID</Var>  
  <Ind>Running</Ind>  
  <Var>InOut</Var>  
  <Ind type="integer">2</Ind>  
  <Ind type="integer">6</Ind>  
  <Var>StartTime</Var>  
  <Var>EndTime</Var>  
  <Var>Location</Var>  
  <Var>Duration</Var>  
  <Ind type="integer">5</Ind>  
</Atom>  
...
```

□ English Description:

Is **anyone** interested in general **Running** (**indoors** or **outdoors**), with **two** to **six** people, for any (**start** and **end**) time, **location**, and **duration**, at a fitness level of **5**?



Example Query 3

Now he wishes to run with John, and so specifies p0001 and that he prefers Joe's Gym as the location. He poses the following question:

```
...
<Atom>
  <Rel>myActivity</Rel>
  <Ind>p0001</Ind>
  <Ind>Running</Ind>
  <Var>InOut</Var>
  <Ind type="integer">2</Ind>
  <Ind type="integer">6</Ind>
  <Var>StartTime</Var>
  <Var>EndTime</Var>
  <Ind>joesGym</Var>
  <Var>Duration</Var>
  <Ind type="integer">5</Ind>
</Atom>
...
```

□ English Description:

Is p0001 interested in general Running (indoors or outdoors), with two to six people, for any (start and end) time, at Joe's Gym, for any duration, at a fitness level of 5?



Answer to Query 3

WellnessRules has returned the answer seen below. This gives Peter all of the information he needs to contact John about scheduling this event.

```
...
<Atom>
  <Rel>myActivity</Rel>
  <Ind>p0001</Ind>
  <Ind>Running</Ind>
  <Ind>in</Ind>
  <Ind type="integer">2</Ind>
  <Ind type="integer">6</Ind>
  <Ind>2009-06-15T10:15:00</Ind>
  <Ind>2009-06-15T11:15:00</Ind>
  <Ind>joesGym</Ind>
  <Ind>P60M</Ind>
  <Ind type="integer">5</Ind>
</Atom>
...
```

□ English Description:

p0001 is interested in Running Indoors, with two to six people, between 10:15AM and 11:15AM on June 15th, 2009, at Joe's Gym, for 60 minutes, at a fitness level of 5.



Profile Responsibility Matrix (PRM)

- According to the PRM, p0001 has a format of N3

```
<WellnessRules>
  <Activity>
    <Walking>
      <ResponsibleProfile name="p0001" format="n3"/>
      <ResponsibleProfile name="p0002" format="posl"/>
      <ResponsibleProfile name="p0003" format="posl"/>
    </Walking>

    <Running>
      <ResponsibleProfile name="p0001" format="n3"/>
      <ResponsibleProfile name="p0002" format="posl"/>
      <ResponsibleProfile name="p0003" format="posl"/>
    </Running>
    ...
  </Activity>
</WellnessRules>
```



- Since p0001 is also available in POSL, we can change the format

```
<WellnessRules>
  <Activity>
    <Walking>
      <ResponsibleProfile name="p0001" format="posl"/>
      <ResponsibleProfile name="p0002" format="posl"/>
      <ResponsibleProfile name="p0003" format="posl"/>
    </Walking>

    <Running>
      <ResponsibleProfile name="p0001" format="posl"/>
      <ResponsibleProfile name="p0002" format="posl"/>
      <ResponsibleProfile name="p0003" format="posl"/>
    </Running>
    ...
  </Activity>
</WellnessRules>
```



Wrap Up

- The WellnessRules case study:
 - Creates an **online-interactive wellness community** through the WellnessRules Rule Responder system
 - Creates a **new Rule Responder architecture**, adding the **Profile level** underneath the PAs
 - *In our next presentation:*
Provides **Profile interoperation** through **transformation** techniques in the context of WellnessRules **between** these knowledge representation **formats**