Development and Validation of Strategies to Test for Interoperability of Virtual Patients

Andrzej A. KONONOWICZ\textsuperscript{a}, Jörn HEID\textsuperscript{b}, Jeroen DONKERS\textsuperscript{c}, Inga HEGE\textsuperscript{d}, Luke WOODHAM\textsuperscript{e} and Nabil ZARY\textsuperscript{f}

\textsuperscript{a} Jagiellonian University, Kraków, Poland
\textsuperscript{b} University Clinic of Heidelberg, Germany
\textsuperscript{c} Maastricht University, The Netherlands
\textsuperscript{d} University of Munich (LMU), Germany
\textsuperscript{e} St. George’s University of London, UK
\textsuperscript{f} Karolinska Institutet, Stockholm, Sweden
**Virtual Patients**

**Definition**

**Virtual Patient**  
An interactive computer simulation of real-life clinical scenarios for the purpose of medical training, education, or assessment  

[Ellaway 2006]

**Example: VP Systems of the eViP project**

- CAMPUS
- CASUS
- OpenLabyrinth
- Web-SP
**VPD**: provides the personal and clinical data relevant to the clinical scenario being simulated.

**Media Resources**: all of the images, animations, videos, audio files and any other digital objects

**DAM**: expresses the aggregation of VPD and MR elements for exposure through the AM.

**AM**: encodes what the learner can do and how they engage with the virtual patient.
Premises

• **Application Profile** – optimises one or more specification for the purpose of a given application
  – focus: eViP Profile of MVP

• **Conformance testing**
  – focus: content-level conformance testing
    • interoperable data exchange among applications deployed across collaborating, yet independent enterprises

• eViP conformance levels

• eViP conformance testing suite
Four Levels of Conformance: 1&2

- **First level** - Package
  - Does the package:
    - have the right directory structure?
      - yes
    - contain mandatory files?
- **Second level** – XML/XSD
  - Are the XML files in the packages:
    - well-formed?
      - yes
    - valid?
      - yes
    - containing valid ids as references?
• Third level - **Import**

  • an author obtains a clear benefit from importing the package into the system in comparison with copying the content manually.
  • enough data must be available to enable the author to start working on the case in the new system.
  • The main sections of the VP package are recognized by the target VP system
  • The package should not contain non-referenced items.
Four Levels of Conformance: 4

• Third level - **Runtime**

• No case-related data is lost while importing the package.
• The way the data is displayed, reflects the main path as it was presented in the original system. The storyline of the case remains consistent.
• The educational value is retained.
• The learning objectives planned for the case in the original system are also achievable in the target system.
Conformance testing suite #1

- **App#1:** by Heidelberg University (HD)
  - XSLT conformance suite
  - currently 20 tests implemented
  - XML or HTML interface
  - JRE 1.6+ required
  - LGPL licence
  - Available at

```
DAMNodeItem with wrong references in ItemPath
DAMNode-ID: DAM_node_21965#164 (wrong id: VPD_biochemistry_results)
```
Conformance testing suite #2

- App#2: by Karolinska Institutet (KI)
  - HTML interface, JRE required
  - Open source licence
  - Available at http://code.google.com/p/mvptools_
Conclusions

- eViP conformance suite:
  - four successive validation levels
  - testing of the first two levels was automated by two conformance suites
  - remaining two levels could not be realized without human intervention, due to a high semantic level
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