Mark-up based analysis of narrative guidelines with the Stepper tool

Marek RŮŽIČKA and Vojtěch SVÁTEK
University of Economics, Prague (UEP)
and EuroMISE Centre – Cardio, Prague

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Structure of the presentation

• Step-by-step mark-up based formalisation of narrative guidelines
• Stepper tool UI & formalisation example
• Transformation process diagram
• Comparison of existing GL mark-up tools
• Future work
Step-by-step mark-up based formalisation of narrative guidelines (1)

• **Bottom-up**, document-centric approach to formalisation vs. top-down methods relying on a flowchart-like model

• Advantages of bottom-up approaches
  – lower risk of information loss
  – lower risk of implicite subjectivisation

• Disadvantages of bottom-up approaches
  – might be tedious
  – large syntactical and semantic gap between marked-up text and operational model
Step-by-step mark-up based formalisation of narrative guidelines (2)

- Central ideas of the Stepper tool:
  - An ‘intelligent’ mark-up editor and transformation processor might make the formalisation easier
  - Explicit separation of formalisation levels might help to bridge the mentioned gap
Step-by-step mark-up based formalisation of narrative guidelines (3)

- Stepper offers
  - initial text mark-up
  - rule-based transformation between different levels of formalisation or different models
  - retrieval of corresponding knowledge elements (and text) across formalisation levels

- Used technology
  - standards: XML, XLink, XSLT
  - original XKBT (‘…knowledge base transformation’) language defining interactive parts of transformation
Step-by-step mark-up based formalisation of narrative guidelines (4)

- Experiments
  - WHO 1999 Hypertension Guidelines
    - tentative formalisation of selected parts
    - through all levels of formalisation
    - result: automatically generated demo-application
  - Czech Unstable Angina Guidelines
    - Testing formalisation of the whole document
  - Breast Cancer Guidelines (at VU Amsterdam)
    - preparation of ASBRU language implementation
Stepper tool UI (1)

- Initial mark-up of source document
  1. Selecting text in source level
  2. Picking one of offered rules
  3. Creation of new successor in destination level (in automatic way)
Typical work with Stepper: **XML-to-XML transformation**

1. Selecting fragment(s) in source level
2. Picking one of offered rules
3. Creation of new successor in destination level
4. Editing successors sub-structure

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• Example of creation of asbru plan from several parts in previous level
• Transformation rule types:
  – Aggregation
  – Decomposition
  – One-to-one relation
• All transformation rules are prepared in included editor
Transformation process diagram (1)

• Multiple step approach disadvantages
  – With increasing number of levels whole process is getting unbearably complicated
  – UI for only two levels at the same time is insufficient

• Possible solution
  – Each new successor is enriched with links to all its ancestors (using Xlink technology)
  – Links allows finding all text fragments in source document for any part of any level

Visualization tool for links  Cross-level diagram

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Transformation process diagram (2)

All text fragments in source document

Rules used during transformation process e.g. aggregation

Pointing on any element shows his sub-structure

Selected element in last level of target ontology

Cross-level diagram

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Comparison of existing GL mark-up tools (1)

- Existing tools:
  - GEM-Cutter
    - Developed at YCMI
    - Supports only GEM format
  - Graphic Mark-Up Tool (GMT)
    - Developed at VUT
    - Supports Asbru language
  - Uruz
    - Part of DeGeL project
    - Supports both GEM and Asbru (possible extension to other ontologies)
Comparison of existing GL mark-up tools (2)

GEM-Cutter

Source document
*.txt
*.rtf

Gem-Cutter mark-up

Output – GEM format
no links

Stepper

Source document
*.xhtml

Stepper one-step mark-up

GEM format including XLink

XSLT

Pure GEM format

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Comparison of existing GL mark-up tools (3)

**GMT**

- Source document: *.html
- GMT one-step mark-up
- Output: Asbru XML format including links to source text via special attributes

**Stepper**

- Source document: *.xhtml
- Stepper mark-up & multiple level transformation
- Asbru XML format including XLink
- XSLT
- Pure Asbru format

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Future Work

• Co-operation with the database group at the EuroMISE:
  – resources such as ICD-10 or ATC already part of their EHR application MUDR
  – stand-alone and web-service-based provision of terminology for Stepper envisaged

• Including other ontologies, e.g.:
  – GLIF (version 3 is already based on XML and has execution engine GLEE)
  – Arden syntax (many documents encoded in MLM)

More information at euromise.vse.cz/Stepper