MAKING MEANS-END-MAPS WORKABLE FOR RECOMMENDING TEACHING METHODS

Michael Koch, Dieter Landes
Outline

❖ Motivation
❖ Means-End-Maps
   ❖ Short Overview
   ❖ Modifications
❖ Summary and Future Work
Motivation (1)

Hmm, what can I do to foster SE-related competencies of students effectively and efficiently?

How can I benefit of others’ experiences (and let others take advantage of mine)?
Motivation (2)

I need a way to describe learning settings...

Goals

- Target competencies

Methods / Tasks

- Didactical methods

Course settings

Experiences made

Constraints / Restrictions

Outcomes

Goals

- Target competencies

Methods / Tasks

- Didactical methods

Course settings

Experiences made

Constraints / Restrictions

Outcomes
Motivation (3)

- Modeling must be
  - quick and easy
  - distributed, i.e. shareable with colleagues
  - basis for recommendations

Goal-oriented modeling
Motivation (4)

doable,

but …

no perfect match to the modeling problem

complex models [Koch / Landes 2014]

Means-End-Maps [Wang et al. 2014]?

Reich’s Pool of Constructivist Methods as a trial
# Means-End Maps

<table>
<thead>
<tr>
<th>Element</th>
<th>Know-how mapping based on i* [1]</th>
<th>Know-how mapping based on the ME-map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node</td>
<td><strong>Goal</strong> (usually, plays the role of a problem)</td>
<td><strong>Task</strong> (unifies both problem and solution perspectives)</td>
</tr>
<tr>
<td></td>
<td><strong>Task</strong> (usually, plays the role of a solution)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Softgoal</strong></td>
<td><strong>Quality</strong></td>
</tr>
<tr>
<td>Link</td>
<td><strong>means-ends</strong> link</td>
<td><strong>achieved-by</strong> link</td>
</tr>
<tr>
<td></td>
<td><strong>decomposition</strong> link (refers to softgoals or tasks)</td>
<td><strong>consists-of</strong> link (refers to tasks)</td>
</tr>
<tr>
<td></td>
<td><strong>association</strong> link (refers to qualities)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>contribution</strong> links (make, some+, help, unknown, break, some-, hurt)</td>
<td><strong>contribution</strong> links (+, -)</td>
</tr>
<tr>
<td>Attribute</td>
<td>[not exist]</td>
<td><strong>Context</strong> (can be assigned to nodes and links) is applicable condition</td>
</tr>
<tr>
<td></td>
<td>[not exist]</td>
<td><strong>Reference</strong> (can be assigned to nodes and links)</td>
</tr>
</tbody>
</table>

\[Wang et al. 2014\]

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## Modified Means-End Maps (1)

<table>
<thead>
<tr>
<th>Element</th>
<th>Means-End Maps</th>
<th>Modified Means-End Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Node</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Task (what needs to be done)</td>
<td>Method (how something needs to be done)</td>
</tr>
<tr>
<td>Quality</td>
<td>Soft Goal (intended outcome or avoidance goal)</td>
<td>Quality (constraint, prerequisite)</td>
</tr>
<tr>
<td><strong>Link</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>consists-of</td>
<td>consistsOf (complete aggregation)</td>
<td>contains (incomplete aggregation)</td>
</tr>
<tr>
<td>achieved-by</td>
<td>achievedBy</td>
<td></td>
</tr>
<tr>
<td>association</td>
<td>requires (prerequisite)</td>
<td></td>
</tr>
<tr>
<td>+, -</td>
<td>+(, - (positive, negative contributions)</td>
<td></td>
</tr>
</tbody>
</table>
Modified Means-End Maps (2)

- **Avoidance Goal**: comprehensive reconstructive working
- **Goal**: improved constructive acting and deciding
- **Quality**: prioritize and coordinate tasks
- **Task**: carry out an in-tray exercise as teamwork
- **Method**: carry out an in-tray exercise

- **positive**:
  - higher self-reliance
  - improved analytic abilities
  - justify decisions
  - improved ability to conduct a dialogue
  - improved ability to manage conflicts
  - improved ability to work in a team
  - improved social skills
- **negative**:
  - comprehensive reconstructive working

**participants**: small number of participants
**timeframe**: medium

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Summary

- Adaptation of Means-End Maps, driven by
  - specific modeling problem, i.e. documentation of learning settings
  - specific domain, i.e. software engineering education

- distinguish
  - tasks and methods
  - goals and qualities
  - incomplete and comprehensive aggregations
Summary

- Compromise between simplicity and expressive power
- Leaner than i*, yet not so lean as Means-End Maps
- Potentially generalizable to other domains
Future Work

- Development of a graphical editor for Modified Means-End Maps

- Goal models as a basis for an automated recommendation engine

- “With similar goals as you have, others tried…”
Thank you for your attention!

Questions?

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