NR71  FRENAG  13/11  6h 15'm

Funding NOKOBIT.

Strategy

AR/PSR - NOKOBIT.

Reinforce AR, PSR.

SPI  AR/PSR

Vendor

lab
Action Research and Design
Science Research - More similar than dissimilar

Petter Øgland, Department of Informatics, University of Oslo
NOKOBIT, Nov 23.-25. 2009

SPI-AR ignores technical issues,
SPI-DSR ignores social issues

<table>
<thead>
<tr>
<th></th>
<th>Social</th>
<th>Technical</th>
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</thead>
<tbody>
<tr>
<td>Action research</td>
<td>Börjesson (2006)</td>
<td>-</td>
</tr>
<tr>
<td>Design science research</td>
<td>-</td>
<td>Paulk (1998)</td>
</tr>
</tbody>
</table>

Software Process Improvement
Research questions

• RQ1: As social issues and technical issues are intertwined in SPI, why not address both problems at the same time, mixing AR with DSR?
• RQ2: As the logic of SPI (IDEAL, Scrum, PDCA, etc) is similar to AR and DSR, why not use the SPI methodology as research methodology rather than applying versions of AR or DSR that has developed independently of SPI?

The current AR/DSR debate

• AR and DSR are similar, and DSR can be used for improving AR practice (e.g. Järvinen, 2007)
• AR and DSR are structurally similar but philosophically different (e.g. livari & Venable, 2009)

• My position: I think I understand livari & Venable, but nevertheless I think Järvinen is correct.
• SPI relevance: CMMI could be used as AR framework
1. From DSR to Natural Science

Van Frassen (1980): Science is concerned with designing models, not "understanding" reality

Simon (1969): There are two types of science in the world

Science of the artificial (purpose):
RQ: Find the optimal design

Natural science (no purpose):
RQ: Find the laws of nature
2. Natural science to humanities

Creager (2007): Narratives, case studies, exemplars etc can be seen as models

CP Snow (1959): Two cultures

Humanities:
RQ: Interpretation & meaning

Natural science:
RQ: Find the laws of nature

3. Humanities to social science

Creager (2007): Narratives, case studies, exemplars etc can be seen as models

Lewin (1943)

Humanities:
RQ: Interpretation & meaning

Social science (action research):
RQ: Find ways to support action
4. All science is DSR

Van Frassen (1980): Science is concerned with designing models, not "understanding" reality

If we theoretically accept there is only ONE science, what does it mean in practice?

Ivari & Venable (2009)
Method

- 1991-98 I worked as a SE practitioner, trying to write all SE documentation using the IMRAD format, and handed the work in for PhD evaluation
- 1999-present I have been working as a SPI practitioner, trying to write all SPI documentation using the IMRAD format, and plan to hand in the results for PhD evaluation

Results

![Graph showing data over time]
Current method ("V-model"; Novak & Gowin, 1984) runs SPI projects along IMRAD structure

Validation of method (sample successful publications)

<table>
<thead>
<tr>
<th>Sample paper</th>
<th>Hypothesis (applying or challenging &quot;common knowledge&quot; in SPI literature)</th>
<th>Adjusted model when confronted with organizational reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>What gets measured gets done (motivation theory)</td>
<td>Case study showing how power and complexity plays an important part in the validity of the statement</td>
</tr>
<tr>
<td>2009a</td>
<td>SPI is concerned with facts and evidence based decision making</td>
<td>Case study showing the unavoidability of &quot;fake quality&quot; (unmerited beliefs rather than facts and evidence) on the way towards &quot;real quality&quot;</td>
</tr>
<tr>
<td>2009b</td>
<td>Management commitment is the single most important SPI success factor</td>
<td>Case study showing how managers and SPI people represent different interests and can sometimes be thought of as &quot;natural enemies&quot;</td>
</tr>
</tbody>
</table>
Discussion

- By using the functionalist assumptions of conventional SPI (e.g. CMMI) as hypotheses for designing improvement interventions, failure of such designs result in the development of narrative models (exemplary case studies).
- Järvinen’s idea about applying DSR for improving AR designs seems to work fine when doing SPI according to suggested model.

Conclusion

- Response to RQ1: Viewing the nature of science from the perspective of van Frassen (and others), the mixing of AR and DSR is philosophically unproblematic because all science is DSR.
- Response to RQ2: Using the SPI logic for designing AR/DSR is empirically illustrated to be an effective way of testing the assumptions of the given SPI standard
The game of software process improvement: Some reflections on players, strategies and payoff

Petter Øgland, Department of Informatics, University of Oslo

NOKOBIT, Nov 23.-25. 2009

70% failure rate in SPI projects (SEI, 2002)
SPI fails due to poor understanding of the technical aspects of SPI or lack of alignment with management style.

1. SPI fails because the standard is technically ill-suited for the organization (Seddon, 1997)
2. SPI fails because the organization does not commit to the standard (Legge, 2002)

Research questions

- RQ1: Is it possible to find SPI standards that represent an optimum (equilibrium) in terms of being technically sound and fitting with the culture of the organization?
- RQ2: If such a strategy exists, does it lead to success?
Theory of strategy development = Game Theory (Morgenstern & von Neumann, 1949)

The politics of SPI—hard and soft game theory

<table>
<thead>
<tr>
<th>Software Engineer</th>
<th>Quality Auditor</th>
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<tbody>
<tr>
<td>Ignore</td>
<td>G(1)</td>
</tr>
<tr>
<td>Comply</td>
<td>(1, 0)</td>
</tr>
</tbody>
</table>

Game theory
Stable equilibrium
"audit-comply" (k=1) if software engineers believe managers care whether they comply or not, otherwise "ignore-ignore" (k=0)

Drama theory
Stable equilibrium if Q&A can predict management and adjust audits and SPI standards accordingly
Method (case study)

- During the period 1999-2005 I worked as a quality manager (SPI auditor) working on technical SPI design while trying to understand organizational culture.
- Applying the methodology of Drama Theory (Howard, 2004), I choose to describe the events in the language of a play, in this case "Hamlet".

Act II – Scene 2

Claudius (IT director) wondering whether SPI standards like ISO 9000 and CMM might be useful for making the organization look more impressive, thus making him more powerful.

Polonius (IT staff, head of IT security) talking about his strategies, policies and standards of information security standards, recommending that the SPI framework should be built around his standards rather than international standards like CMM or ISO 9000.
Act V – Scene 1

Hamlet (quality auditor)
contemplating the past
joys of implementing
SPI in less political
environments and
trying to figure out
ways to implement
ISO 9000 in a way
that aligns with current
management

Yorik (software
engineer)
not wanting to follow SPI
standards unless forced to
do so by management

Act V – Scene 2

Claudius
(IT director)

Laertes
(project director)

Hamlet
(quality auditor)
Discussion

• It is not necessary to have a perfect match between the narrative and the case in order to make sense (Weick, 1979)
• The “Hamlet” narrative is open for many interpretations, and in this case it proved useful for describing short-term SPI tactics versus long-term SPI strategy
• The long-term aspect might have been better if we used “evolutionary drama theory” (interpretation through cycles of “Hamlet” plays) as in Evolutionary Game Theory trying to learn as each drama unfolds (i.e. searching the Evolutionary Stable Strategies, ESS)

Conclusion

<table>
<thead>
<tr>
<th>Research question</th>
<th>Response</th>
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<tbody>
<tr>
<td>RQ1 Is it possible to find SPI standards that represent an optimum (equilibrium) in terms of being technically sound and fitting with the culture of the organization?</td>
<td>The case study is presented as an exemplary case of a political SPI strategy (trying to align with management style while also focusing on the technicalities of SPI).</td>
</tr>
<tr>
<td>RQ2 If such a strategy exists, does it lead to success?</td>
<td>As the case was dramatized as a tragedy, the question remains unanswered. It was hinted, however, that the introduction of a new concept “Evolutionary Drama Theory” might be helpful for writing about long-term success based on repeated short-term failure.</td>
</tr>
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