Understanding Change

Where do we look at?
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Benevol 2005
which change operations (and sequences) are applied?

➢ Many changes
  - Which ones are relevant?

➢ Relevant changes
  - Changes to remove design problems
  - Changes that influence the evolution
  - Refactorings
Approaches

- **Problem-up**
  - Focus a change when it removes a problem
- **Evolution-up**
  - Focus a change when its evolution changes
- **Rationale-up**
  - Focus a change when the developer tags it
Problem–up

Experimented with other code smells as well.
Problem-up experiences

• Manual validation
  – Time intensive
  – Need for a high level representation
  ® Can graphs help us out?

• Change rationale
  • Why is not always as obvious
  • Link with additional info! Developers!
Evolution-up

Date

23 Mar 2004
04 Aug 2003
16 Dec 2002
28 Apr 2002
09 Sep 2001
02 Jan 2001
03 Jun 2000
15 Oct 1999
26 Feb 1999

File
Evolution-up experiences

- Can we put it in a number?
  - Change rate?
  - Patterns?
- Suitable to study the effect of ...
  - A change?
  - A code smell/problem?
- Links to the rationale
  - Learns us more about the why!
- Still have to study actual changes
  - High-level change representation!
Rationale-up

**Changes**

- Refactor
- Changes
- Move
- Changes

**Quality**
1. Easier
2. Move
3. Refactor
4. Clean

**Amount**
1. Move
2. Improve
3. Refactor
4. Clean

**Tomcat:**
- Refactor dependencies
- Move & Update

<table>
<thead>
<tr>
<th>project</th>
<th>MRs</th>
<th>refactorMRs</th>
<th>percentage</th>
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<td>ArgoUML</td>
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Rationale-up Experiences

- Differences in CVSquality
  - Quick assessment of messages
- Branching is a problem
- High level change view!
- Rationale!
Conclusion