Challenges of the Open Source Component Marketplace in the Industry

Claudia Ayala\textsuperscript{1,2,*}, Øyvind Hauge\textsuperscript{1}, Reidar Conradi\textsuperscript{1}, Xavier Franch\textsuperscript{2}, Jingyue Li\textsuperscript{1} and Ketil Sandanger Velle\textsuperscript{1}

\textsuperscript{1}Norwegian University of Science and Technology (NTNU)
\{oyvind.hauge, reidar.conradi, jingyue.li, ketilsan\}@idi.ntnu.no
\textsuperscript{2}Technical University of Catalunya (UPC)
\{cayala, franch\}@lsi.upc.edu

Abstract The reuse of Open Source Software components available on the Internet is playing a major role in the development of Component Based Software Systems. Nevertheless, the special nature of the OSS marketplace has taken the “classical” concept of software reuse based on centralized repositories to a completely different arena based on massive reuse over Internet. In this paper we provide an overview of the actual state of the OSS marketplace, and report preliminary findings about how companies interact with this marketplace to reuse OSS components. Such data was gathered from interviews in software companies in Spain and Norway. Based on these results we identify some challenges aimed to improve the industrial reuse of OSS components.
Introduction

Contents of this paper

- Elements of the OSS marketplace
- Current state of infrastructure
- Interaction with OSS marketplace
- Selection of OSS Components
- Study based on Interviews
Introduction

Component-Based Software Development

- Standard way of developing software systems
- Reuse of components
- Technology adoption, innovation, reducing costs and time
- (OSS) marketplace: consisting of tens of thousands of OSS components
Introduction

OSS Marketplace / Challenges

- Navigation and Selection
- Industry: considered a highly risky activity
- Large amounts of diverse and partial information
- Not always trustable
State-of-the-Art

- Software reuse -> increase productivity and quality
- Proper infrastructure should exist
- In the past: centralized, New arena: Internet
- Need for new approaches for finding and understanding components
- Proposed techniques not used in industrial practice
- Challenge: Identification and evaluation of components
OSS Marketplace

- Differs from classical reuse environment based on centralized repositories
- Self-organizing virtual place in internet

Elements

- Reuser: Developers who use OSS
- Provider: OSS communities/companies
- Search Mechanism: Google / Code search
- Promoter: Individuals/organizations who foster the OSS movement (FSF, ...)
- Intermediary: Organizations/individuals that index and/or distribute OSS components (SourceForge, ...)

DT8100 Johannes Schrimpf October 30, 2012
The Study

State of the Marketplace

- 60 related sites and search mechanisms
- Focus on factors affecting the selection of OSS components

Reusers

- Interaction with marketplace
- Selection and Evaluation of OSS components
- Problems
- Small and Medium Enterprises
- 5 companies from Spain, 3 from Norway
Scenario S1 - No Search is Required

- Experience / Recommendation
- High influence of previous experiences
Searching

Scenario S2 – Regular Monitoring of the Marketplace

- Experienced Reusers familiar with the domain
- Monitor the marketplace
- Blogs, magazines and books
- Concerns about trust and contradictory information
Searching

Scenario S3 – Open Search

- When Reusers do not have strong experience in a domain
- General search engines
- Specialized search engines as Google Code Search or Koders not mentioned
- Difficult to navigate in intermediary portals (SourceForge,...)
- Number of returned hits in search engines to large
- Many of these hits are irrelevant
- Important: Search tactics
Evaluation and Decision

Problem

- No standard for describing components.
- Different kinds of information: technical documentation, newsletters, articles, wikis, chats, blogs, and forums
Evaluation and Decision

Scenario E1 - Experience-Based Evaluation

- Problem: Not enough time to evaluate components
- Reusers tend to use components they already know
- Evaluation and decision process is not performed properly
- Biased for personal experiences
Evaluation and Decision

Scenario E2 – Searching for Information for Evaluating Components

- Documentation from the Provider important at the technical level
- Experience plays crucial role
- No personal experience -> consulting personal network
- Google
- Portals, forums or blogs
- Experience reports
- Documentation not always good
- Mature communities tend to provide better documentation
- Subjective nature of opinions
- Unstructured information
"The rapid changes and growing nature of the OSS marketplace"

- New components and technologies
- New and improved versions
- Classification of components is difficult
- Influence of previous experiences
"The lack of standards for describing OSS and huge of information diversity"

- Diverse, partial and subjective information
- Difficult to trust, evaluate and decide
- Decisions based on experience and limited knowledge
- Need for decision support mechanisms
- Real applicability of most of these proposals have resulted scarce
- Personalization and recommendation functionality in portals are desirable
Discussion of Results

"The influence of Experience on the selection process"

- Experience plays a critical role
- Need to effectively deal with the inherent subjectivity of the information
- Reputation mechanisms could be valuable
<table>
<thead>
<tr>
<th>Reuser Problem</th>
<th>Marketplace Element</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty to navigate through diversity of portals</td>
<td>Search Mechanism</td>
<td>Advanced and configurable search engines.</td>
</tr>
<tr>
<td>Difficulty to find Components</td>
<td>Intermediary</td>
<td>More flexible classification schemas able to efficiently represent and deal with volatility and growing size of the marketplace.</td>
</tr>
<tr>
<td>Poor documentation quality</td>
<td>Provider</td>
<td>To improve components documentation</td>
</tr>
<tr>
<td>Difficulty to find relevant information and deal with its subjectivity</td>
<td>Provider</td>
<td>More sophisticated knowledge portals with decision-making support</td>
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<tr>
<td></td>
<td>All</td>
<td>Need of integral efforts for improvements based on Reusers needs.</td>
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</tbody>
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Threads of Validity

- Presented results are preliminary
- More studies needed
- Companies in several domains and of different size.
- Projects are of different size and types
- Interviewees have different backgrounds
- Most companies: Developing web applications
- Web apps: Plenty of OSS components