Research design

• An industrial survey with 133 completed projects from 127 companies in Norway, Italy, and Germany

• 28 follow-up telephone interviews.

• Focused on process improvement and risk management
Development with OTS components: actors and activities
Factor 1: development process

- Companies use traditional processes enriched with OTS-specific activities to integrate OTS components.
  - Waterfall and evolutionary process are not suitable?
  - 75% chose their main development processes before they thought about using OTS-components
  - Why do not companies adapt the development process?
  - If companies adapt processes, how do they do so?
  - Insights: Familiarity is important
Factor 2: component selection

- Integrators select OTS components informally. They rarely use formal selection procedures.
  - Selected components in an ad-hoc manner, using in-house expertise and/or web-based search engines
  - Why do not companies use formal selection processes?
  - If a formal selection process was applied, what was done?
  - Insights: cost effectiveness
Factor 3: component selection (cont’)

- There is no specific phase of the development process in which integrators select OTS components. Selecting components in early phases has both benefits and challenges.
  - Most integrators selected OTS components in the early phases - prestudy (38%), requirements (30%), overall design (16%)
  - Reasons for and issues pertaining to select OTS in the prestudy phase
  - Reasons for and issues pertaining to select OTS in requirement/design phase
  - Insights: tradeoff between advantages and disadvantages
Factor 4: component integration

- **Component integration**: Estimators use personal experience when they estimate the effort required to integrate components and most of the time they do not estimate accurately. Stakeholder-related factors will affect dramatically the accuracy of estimates.

  - Reasons for inaccurate effort estimation
  - Insights: provider and clients issues must be considered
Factor 5: quality of the integrated system

- **Quality of the integrated system**: Negative effects of OTS components on the quality of the overall system are rare.
  - Reasons for positive feedback on the quality of OTS components
  - Insights: quality assurance effort of the integrator must be counted
Factor 6: OSS and COTS components

- **OSS and COTS components:** Integrators usually used OSS components in the same way as commercial components, i.e. without modification.
  - Reasons for changing the source code
  - Reasons for not changing the source code
  - Insights: commercial vs. non-commercial, long-term application vs. short term application
Factor 7: locating defects

• **Locating defects is difficult:** Although problems with OTS components are rare, the cost of locating (i.e. within or outside OTS components) and debugging defects in OTS-based systems is substantial.

  – Reasons for inefficient defect location
  – Insights: make the defect reproducible
Factor 8: relationship with the provider

• **Relationship with the provider:** The relationship with the OTS component provider involves much more than defect fixing during the maintenance phase.
  
  – Issues related to component providers
    • Selection
    • Integration
    • Maintenance
  – Insights: know the right person
Factor 9: relationship with clients

• **Relationship with the client:** Involving clients in OTS component decisions is rare and sometimes unfeasible

  – Reasons for not involving clients
  – Insights: clarify clients’ interests and technical capabilities
Factor 10: knowledge management

- **Knowledge management**: Knowledge that goes beyond the functional features of OTS components must be managed.
  - Which knowledge needs to be kept and shared?
    - Component itself
    - How to facilitate the integration
    - Stakeholders
  - Which knowledge management mechanisms to choose?
    - Repository, seminars, Wiki, yellow pages
  - Insights: external knowledge share is rare
Conclusions

• Gap between theories and practices
• Issues to be addressed
  – How can providers and integrators share knowledge of OTS components on a global scale?
  
  – How can people working on the field establish the “who to contact” yellow pages for each OSS project to facilitate support from OSS communities?
Presentation of the article:

Experiences on Product Development with Open Source Software
by Ari Jaksi (2007)

Presenter: Ketil Sandanger Velle
Agenda

1. Introduction
2. Software Architecture
3. Community collaboration
4. Benefits of open source
5. Issues and challenges
6. Summary
Introduction

- Nokia 770 & N800 Internet Tablets
  - WLAN with internet use cases like:
    - Voice & video calls
    - Web browsing
    - Messaging
    - Media consumption
  
  These are all built using Linux and other open source components

- [www.maemo.org](http://www.maemo.org) – web site that supports Internet Tablet development
Software Architecture

- 428 source code packets
- 25% unmodified OSS
- 50% modified OSS
- 25% COTS & Nokia

EU report (Nokia 770):
- 15 000 000 lines of code
- 200 000 by Nokia
- 1.5% additional investment
Community collaboration [1/2]

- Selecting core components:
  - Technical suitability of all components and subsystems
  - Fit Requirements and hw specifications
  - Good quality
  - “Mature enough” for consumer products
  - License
  - Use GTK+ for graphic environment
Community collaboration [2/2]

• Work tightly with the community:
  Several parts of the code on N800 released before the tablet
Benefits of open source

- Efficiency
- Quality
- Flexibility
- Software licensing
- Future and roadmaps
- Open source and confidentiality
Issues and challenges

• Hacking vs. Stabilizing
• Architecture management
• Community alignment vs. Backwards capability
• Community participation in product integration
• Investing in community work
Summary

• OSS offers time and cost savings in form of:
  – Readily available components and subsystems
  – Available developers
  – Effective development model
• However: The quality of the final product is Nokia’s own responsibility, so some in house development must be done as well