A Case Study on Causes & Effects of Communication Gaps in Large-Scale Requirements Engineering
Communication is vital
Communication of software requirements…

- The Unmanageable Monster [Flemming, 1978]
  - Problems w requirements snowball into later phases
  - Result in overly complex & badly functioning systems
Related work

- Various studies on challenges of Requirement Engineering
- Communication paths & models [Marczak, Al-Ani]
- Tools & methods for improving communication [Niinimaki, Fricker]

Our work

- Empirically investigate
  - RQ1: What causes communication gaps in RE?
  - RQ2: What are the effects of these gaps?
- Consolidated results on causes & consequences
Our case study

- Investigate causes & consequences of RE challenges
  - Communication gaps
  - Overscoping, Keeping SRS Updated, Monitoring Dev Work, Manual Reqs Selection for Products
- Interview study w 9 people throughout life cycle
- Validation
  - Within group of researchers
  - With practitioners
Main findings

- Four main factors causing communication gaps
- Several consequences of gaps in RE communication
- Connections to other RE challenges
Case Company: Large-Scale Market-Driven SW Dev

Consumer market

Requirements Unit (Reqs Teams)

Software Platform Unit (Design Teams) ~1000

Product Unit (System test of products)

5000 employees

Product Line

2-3 main release projects ongoing in parallel

Products
**Case Company: Large-Scale Market-Driven SW Dev**

**Consumer market**

**Per functional area:**

- **Requirements Team**
  - gathers and defines scope + requirements

- **Design Team**
  - designs, plans & develops software

- **System Test**
  - verifies system requirements in products
Cause 1: Complex Product & Large Organization

- Size increases the difficulty in
  - agreeing on requirements
  - communicating agreed reqs incl changes
- Lack of complete requirements overview
Cause 2: Low Understanding of each others roles

- Low mutual understanding bt different units
  - Reqs vs SW ➤ SRS not updated, unknown req coverage
  - Testing vs reqs ➤ unverifiable requirements
  - System test vs reqs & SW ➤ lower quality

Root causes
- Complexity & size
- Separate sub-processes for reqs, test, design etc
Cause 3: Gaps between Roles over Time

- Missed continuity around hand-over points ▶
  - Uncertain requirements coverage
  - Un-updated SRS
  - Rework

**Root causes**
- Complexity & size
- MS2 hand-over point
  - Low Design/Req team involvmnt bf/after MS2
  - Detailed SRS produced upfront
- MS4 hand-over point
  - Gaps bt SW roles around MS4
Cause 4: Unclear Vision of Overall Goal

- Lack of common goals → power struggles
- Overall goals for quality & system-level aspect missing
Effects of Communication Gaps

Problems with end product
- Customer expectations not always met
- Quality issues with resulting software

Problems with SRS
- Low quality, unstable
- Communication of incorrect requirements
- Unclear requirements coverage
- Test scope mismatch
- SW unit controls scope
More… Effects of Communication Gaps

➢ Wasted time & effort
➢ Low motivation for requirements work

Other RE challenges
➢ Keep SRS updated
➢ Overscoping
➢ Implementation not monitored from reqs perspective

Costly & time consuming. And, very frustrating!
Next steps…

- Widen to include more cases
- Impact for
  - different organisational structure
  - agile development model
- Methods & tools for
  - identifying communication gaps
  - bridging / closing gaps
Conclusions

Communication is vital for successful software development

- 4 factors: Size, Common views, Temporal aspects, Decision structures

- Be aware of the RE communication flow
  - Consider communication channels throughout
  - Watch out for hand-over points
  - Don’t rely merely on documentation
  - Common goals & understanding of ‘Big picture’
Requirements are Slipping Through the Gaps
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