How Interaction between Roles Shapes the Communication Structure in Requirements-Driven Collaboration

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drives downstream phases and artifacts development
REQUIREMENTS ENGINEERING

drives downstream phases and artifacts development
COLLABORATION in RE

Coordination, communication, awareness

Dependency

R. Analyst

Requirement

Tester

Developer

P. Manager

Architect

R. Analyst

Requirement

Tester

Developer

P. Manager

Architect
COLLABORATION in RE

Coordination, communication, awareness

Requirements-driven collaboration
research questions

Are there **patterns of communication** in collaboration driven by work on interdependent requirements?

How do the different **roles** interact when working on interdependent requirements?
communication patterns
communication patterns
communication patterns

members in a clique

most connected members
communication patterns

members in a clique

most connected members

critical members
communication patterns

members in a clique

most connected members

isolated members

critical members

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approach
Requirements-centric team

R1

Developer
Developer
Architect
Tester

R. Analyst

R2

Developer
Developer
Architect
Tester

Developer

R. Analyst

Tester
approach

Requirements-centric social network

R1

R. Analyst
Developer
Architect
Tester

R2

R. Analyst
Developer
Architect
Tester

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**Social network measures: e.g., degree**

Two social network diagrams are shown, labeled R1 and R2. Each diagram includes nodes representing roles such as Developer, Architect, R. Analyst, and Tester. The connections between nodes represent interactions. The diagrams illustrate different communication structures based on the interaction between roles.
industrial case study

Large distributed IT organization (US, Brazil, India)

Three-months on-site observations

Mixed-method methodology

Observation

Document inspection

Interviews

Questionnaire
industrial case study

the ‘KnowHow’ team

Maintenance of legacy systems

Team distribution (44 members)

Brazil (38), USA (5), India (1)

PM (2), Req Analyst (4), Dev Lead (5), Dev (20), Test Lead (1), Testers (7), Business Partner (5)

New to the product and as a team itself

Reverse engineering activity to identify reqts
industrial case study

20 requirements

4 sets of dependencies

well-defined team and communication structures
industrial case study

20 requirements
4 sets of dependencies
well-defined team and communication structures
10. Please provide details about your interaction with the following team members of your project team.

<table>
<thead>
<tr>
<th>Name of team member</th>
<th>Media used (Select all that apply)</th>
<th>Frequency (Indicate how frequently you contact this person)</th>
<th>Nature of interaction</th>
<th>Requirements (Indicate all requirements that apply to each interaction: R1 through R4 as in Appendix provided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team member 1</td>
<td>Chat, E-mail, Face to Face, Telephone, Voice mail, Other: _____</td>
<td>Less than once a week, Once or twice a week, 3-4 times a week, 5 or more times a week</td>
<td>Communication of changes, Coordination of activities, Implementation issues, Planning, Requirement clarification, Risk assessment, Support, Synchronization of code, Other:</td>
<td>R1, R2, R3, R4</td>
</tr>
<tr>
<td>Team member 2</td>
<td>Chat, E-mail, Face to Face, Telephone, Voice mail, Other: _____</td>
<td>Less than once a week, Once or twice a week, 3-4 times a week, 5 or more times a week</td>
<td>Communication of changes, Coordination of activities, Implementation issues, Planning, Requirement clarification, Risk assessment, Support, Synchronization of code, Other:</td>
<td>R1, R2, R3, R4</td>
</tr>
<tr>
<td>Team member 3</td>
<td>Chat, E-mail, Face to Face, Telephone, Voice mail, Other: _____</td>
<td>Less than once a week, Once or twice a week, 3-4 times a week, 5 or more times a week</td>
<td>Communication of changes, Coordination of activities, Implementation issues, Planning, Requirement clarification, Risk assessment, Support, Synchronization of code, Other:</td>
<td>R1, R2, R3, R4</td>
</tr>
<tr>
<td>Team member 4</td>
<td>Chat, E-mail, Face to Face, Telephone</td>
<td>Less than once a week, Once or twice a week, 3-4 times a week, 5 or more times a week</td>
<td>Communication of changes, Coordination of activities, Implementation issues, Planning</td>
<td>R1, R2, R3, R4</td>
</tr>
</tbody>
</table>
definition

‘Communication Patterns’ in requirements-driven collaboration

Recurring repetition of the same communication behavior across the social networks of dependent requirements
communication patterns (1/6)
communication patterns (1/6)
communication patterns (1/6)

Collaboration driven by interdependent requirements includes significant cross-functional interactions.

Diagram showing interactions between Roles:
- Requirements Analyst 1
- Requirements Analyst 2
- Requirements Analyst 3
- Developer 1
- Developer 2
- Tester 1
- Tester 2
collaboration driven by interdependent requirements includes significant cross-functional interactions
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cliques inside the networks were also cross-functional
collaboration driven by interdependent requirements includes significant cross-functional interactions

cliques inside the networks were also cross-functional
communication patterns (1/6)

collaboration driven by interdependent requirements includes significant cross-functional interactions.

cliques inside the networks were also cross-functional.
Actual communication structure showed significant backchannel communication
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Actual communication structure showed significant backchannel communication
Decentralized networks (network centralization indexes around 0.4)

Likely team members will be less affected by the absence of a colleague
Requirements clarification and Communication of changes most predominant reasons for communication
Interactions

- were initiated by testers seeking for clarifications

Requirements clarification and Communication of changes most predominant reasons for communication
communication patterns (4/6)

Core subgroups are formed by members originally assigned to work on the requirements
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(cores-periphery indexes 0.67-1)
Core subgroups are formed by members originally assigned to work on the requirements core subgroups are formed primarily by requirements analysts and testers (cores-periphery indexes 0.67-1)
The absence of some members most likely to disrupt collaboration around these requirements.
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Essential members
- mostly developers and testers, but also reqts analysts
- originally assigned to work on these requirements
- ability to point out who was working on related tasks
New hires were isolated from the rest in the requirements-driven collaboration
mostly **developers**

newcomers have difficulties in knowing how and when to ask questions

New hires were isolated from the rest in the requirements-driven collaboration
implications and future work

- Communication patterns can be identified and visualized in software projects.
- May provide support for improved awareness and project management.
- Need to investigate more complex coordination situations (larger teams, more dependencies, new development projects).
- Tool developers to integrate support for collaboration and management of cross-functional teams into existing requirements engineering tools.
Thanks for your attention

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