

Distributed Requirements Elicitation (DRE)

Philipp Huber, Michael Schneider & Appiah-Bonna Emmanuel Twumasi

Basics

- A. Relate topic to the readings**
- B. Levels for Distribution (Categorisation)**
- C. Short summary of additional reading**

Results/Answers to the assignment.

- 1. What are the challenges associated with distributed requirements elicitation?**
- 2. What categories of elicitation techniques are suitable for a distributed context?**
- 3. Which techniques are more successful?**

Appendix: Evaluate and select elicitation techniques for DRE

Distributed Requirements Elicitation (DRE)

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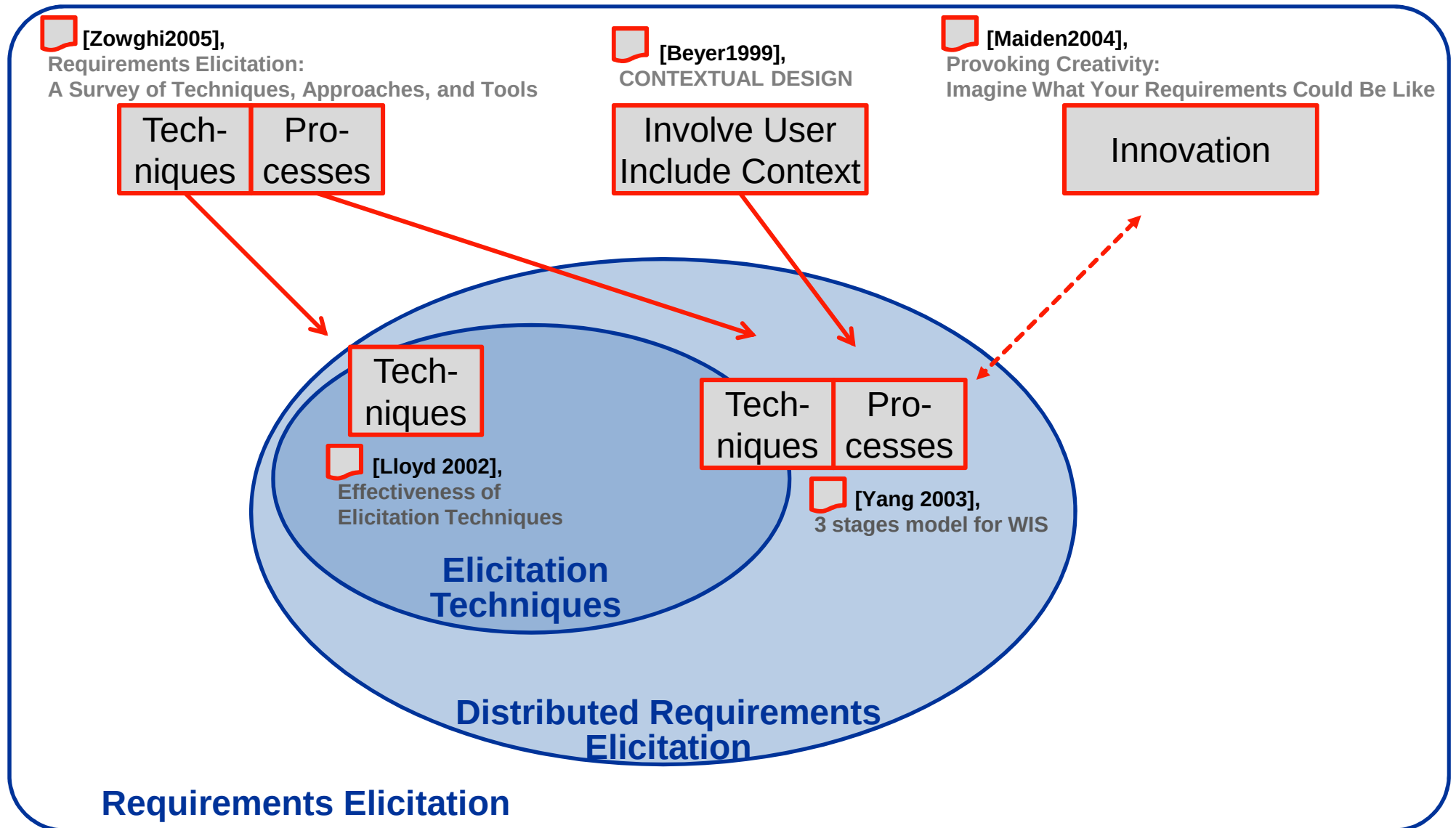
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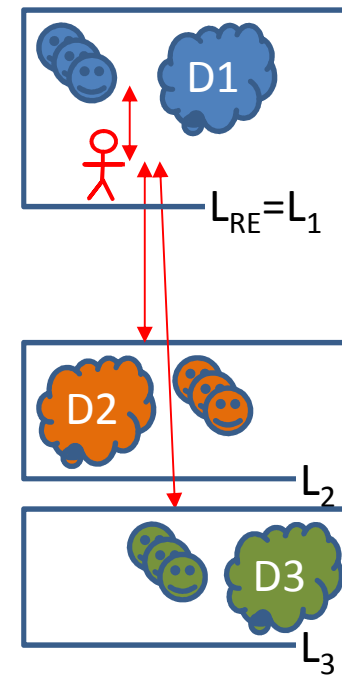
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D-level 4

Requirements engineer is located in one location, another locations exist to use the same integrated application (but with different application domains).



Legend



Summary Theme-specific Reading 1

[Lloyd 2002], Effectiveness of Elicitation Techniques in Distributed Requirements Engineering

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Empirical Study (students, role play) / 6 teams, each with Requirements Engineers and stakeholders / located in two different places according D-level 1

Messages of the paper

- Effectiveness of elicitation techniques
 - ++ Question & Answer, Use Case
 - + Brainstorming, Requ. Mgmt
 - Usage of questionnaires and email/asynchronous techniques
- Factors for SRS quality:
(in addition to the elicitation techn.)
 - + Experience of Requ. Engineers
 - + Good team work
- Involve stakeholders,
use synchronous techniques
- Distributed RE are large research
areas in the future (stated in 2002)

Expected benefits

Empirical Study

- Factors for good SRS quality
(Software Requirements Specific.)
- Effectiveness of elicitation
techniques

Weaknesses of the paper

- Control sample to small
- University environment:
How does this apply with more
heterogeneous teams and
practitioners?

Summary Theme-specific Reading 2

[Yang 2003], A three-stage model of requirements elicitation for Web-based information systems (WIS)

Messages of the paper

- WIS users are generally diverse, key users are hard to identify requirements are volatile growth of users might be high

→ Requirements elicitation for WIS

Stage I: Initial analysis and pilot

Stage II: Key user requ. Elicitation

- use Social Network Analysis (SNA) to identify key users (Opinion Leaders, Gate Keepers, Boundary Spanners)
- Collect/analyse feedback by normal techniques and as listed below

Stage III: Regular User Responses

- use emails, BBS (Bulletin Board System), on-line questionnaires

Expected benefits

- How to get user requirements for WIS (Web-based Information System)
- Staged requirements collection and WIS implementation

Weaknesses of the paper

- The paper is giving some broader short overview, but then it is focussing directly to the three-stage process and the SNA technique. This is basically not a weakness, but there might be also other elicitation processes for WIS.

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Challenges 1/4

of Distributed Requirements Elicitation

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T P

- Ensure involvement/availability (active support and participation) of stakeholders from remote locations, ensure to get qualified requirements

T P

- Time zones, national and religious holiday periods

T P

- Efficient communication and correct understanding
 - language barriers
 - cultural differences to discuss, to give feedback and to make decisions

T P

- Make people meet and discuss together across locations
 - Conventional meetings / travelling
 - Phone, email, common repositories and collaboration tools, video conferencing

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- Additional technical requirements due to the nature of global IS landscapes and global user community

Global availability 7x24 hours, global rollouts and management of releases; thus e.g. requirements for system landscape (central servers and local clients), connectivity and response time, back-ups, multi language support, simplicity and training of user functionality etc.

T P ...

See legend and comments on slide “Challenges 4/4” below

Challenges 2/4 of Distributed Requirements Elicitation

Additional challenges for Web-based IS (WIS, D-level 3):

- WIS users are generally diverse
- Key users are hard to be identified and may change
- Requirements are volatile
- Growth of users might be high
- Include additional functional requirements specific to WIS (respectively enabled by WIS), especially for:
 - Information gathering and sharing
 - Relationship and communication requirements
 - Privacy concerns, trusts and convenience
 - Graphical design, playfulness and fantasy

T P ... See legend and comments on slide “Challenges 4/4” below

Challenges 3/4 of Distributed Requirements Elicitation

Additional challenges for complex IS/WIS with different functional domains at different locations (D-level 4)

- **P** Appropriate nomination of local project teams (in terms of functional knowledge and decision making)
- **T P** Completeness and streamlined requirements (thus not redundant requirements), especially on the interfaces and in the “empty spaces” between the different functional domains and locations
- **T P** Political games, information hiding and wars (especially when the overall system is related to wins/losses of influence and number of employees on different locations)
- **P** Facilitator, mediator/negotiator and/or conflict management role might be an important part (or even the most important part) to be covered by the requirements engineer or an additional independent person.

Challenges 4/4 of Distributed Requirements Elicitation

Legend

- T** Identified challenge influences the selection of the appropriate elicitation technique respective needs some specific adaption of a selected technique.
- P** Identified challenge needs to be solved by project process/proceedings respective by project management techniques.

Comments and assumptions

- P** Elicitation process is out of scope of this group assignment. It is however an important aspect how to be successful in DRE. More iterative/agile methods are preferred.
 - 1** Are mainly not challenges but additional technical requirements (quality requirements). Can be elicited by normal techniques, stakeholders are normally not users but in the IS departments, thus are easy to be identified.
 - 2** Is not an elicitation technique but just a problem, how to find representative users in a WIS environment. Reading 2 proposes Social Network Analysis (SNA).
 - 3** Again, has less to do with elicitation techniques but must be handled within project management and within requirements engineering by means of requirements traceability, prioritisation, release management.
 - 4** Pure functional requirements specific/enabled by WIS. To be considered in the normal requirements elicitation process (same rules apply to select and use elicitation techniques)

Categories of Elicitation Techniques suitable for a distributed context

- Highly interactive techniques, thus synchronous techniques
 - Traditional techniques like interviews and workshops
 - But supported by communication tools like phone, video and web conferencing
 - Highly interactive techniques to collect user feedback directly within his work context of his IS application/dialogue
 - Trace actions performed and time spent on web sites, transactions and user dialogues
 - Collect feedback by means of   , BBS / Forum Software, email
- Remark: Such techniques known from social media and web applications would also be applicable and of great benefit for traditional IS applications!
- Analyse methods are complementary to above techniques and are very efficient to be performed in small teams of experts with one requirements engineer.

Most Successful Elicitation Techniques

suitable for a distributed context

- Interviews
- Workshops
 - Use video conferencing and electronic flip charts
- Stakeholder observation
 - “Traditional”: Phone conference with shared screen, record the session.
If required/helpful: additional support by webcam
 - “web-tech”: Build into applications:
record/trace user interactions and time spent on web sites, transactions
and user dialogues.
- Problem/bug reports
 - “Traditional”: Use of problem/bug reporting and management systems
 - “web-tech”: Build into applications
Collect feedback by means of   , BBS / Forum Software, email

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Appendix: Evaluate and select elicitation techniques for DRE

Summary, for details please refer to the slides below

Which technique for what?

Source: 2013, Martin Glinz, Requirements Engineering I

Technique	Suitability for			
	Express needs	Demonstrate opportunities	Analyze system as is	Explore market potential
Interviews	+	-	+	0
Questionnaires and polls	0	-	+	+
Workshops	+	0	0	-
Prototypes and mock-ups	0	+	-	0
Role play	+	0	0	-
Stakeholder observation	0	-	+	0
Artifact analysis	0	-	+	-
Problem/bug report analysis	+	-	-	0
Market studies	-	-	0	+
Benchmarking	0	+	-	+

Suitability for distributed Requirements Elicitation

	Better / more important
	Disadvantages, less important
	Same relative importance
	Complementary technique to others e.g. focused Q&A, elicit and verify
	Easy to perform, but: how good are the responses and results?
	Still important, heavy experience and tool support needed.
	
	Only possible in specific situations
	Use tools as know in WIS
	
	Use tools as known in WIS
	
	

1. Interviews

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Can be handled user/stakeholder specific, taking into account specific knowledge, communication skills and behaviour. b. Can be prepared (structured approach), but allows also to get further inputs, new ideas, personal statements. c. Can be scheduled depending working hours/availability of user/stakeholder. d. Allows clear tracing of requirements.	Pre-condition:	Phone
	Helpful:	Online session (share screen to discuss questions)
	1. Time consuming, need to limit to important resp. representative users/stakeholders and topics.	Involve additional persons if needed in an additional loop or later requirements engineering phase.
Recommendation (when and how to apply for DRE)		
• Is still a strong technique - even more important in DRE – to get qualified/secured inputs and feedbacks. • Applicable in all situations as soon as stakeholders are identified as knowledgeable and representative. • Within interviews, especially Query and Answer technique is efficient, it allows to focus on important points and get secured answer (with minimal risk of misunderstandings).		

Evaluation for Distributed Requirements Elicitation

Strengths		Possible Obstacles	Mitigation
a.	Well structured approach.	Pre-condition: email and/or collaboration platform	
b.	Can be distributed and collected very easy (no big organisation needed, no technical means needed).	1. No user interaction, might lead to misunderstanding.	Limit questions to quantific issues without emotional components
c.	Can be filled out asynchronously till a given due date, independent of time zone, working hours etc.	2. Participation might be low, not qualified enough and not representative across all questions and locations.	Combine with other techniques, especially also with interviews. Company internal IS: set target (might improve the participation but not the quality of answers).
d.	Can be widely distributed (many users/stakeholders can be involved).	3. Might not discover innovative requirements not already known and listed in the questionnaire.	Combine with other elicitation and innovation techniques.
e.	Allows clear tracing and weighting of requirements.		

Recommendation (when and how to apply for DRE)

- Questionnaires and pools are not strong means to elicit requirements, even less in distributed environment. Danger is to big to be neglected by important stakeholders, to get not enough, not representative, political or unqualified feedback.
- Questionnaires and polls in the classical sense might more be used in later requirements engineering phases to prioritise and approve requirements respective to give higher level directions of IS development.
- Remark/assumption: Some components of “Questionnaires and polls techniques” will evolve and be included in “Problem/bug report analysis” technique.

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Highly interactive. b. Important contribution to team spirit and common understanding (across locations and functional domains). c. Can lead to innovation. d. Can lead to consensus in case of diverse starting points.	Pre-condition:	locations with video conferencing equipment and “on-line flip charts”.
	1. Is only possible under these conditions: - discipline+experience of participants for video conferencing - common language - ability for common workshop time	Limit conference to two locations. Or/and: Focus on important topics. Highly skilled moderator. Have co-moderator on second location(s). Limit participation to relevant people. Good preparation.
	2. High coordination effort and management attention required to have all important people at the same time in a (virtual) meeting.	Project management.

Recommendation (when and how to apply for DRE)

- Is still a strong and important technique, especially to drive innovation and to come to a common understanding and agreement of requirements.
- However, unless not flying-in to a common room, it needs technical conferencing tools.
- Furthermore, it requires high professional experience and behaviour, from requirements engineer (moderator) as well from all participants.
- Beside of that, also project management and preparation efforts are higher and important.
- It is less practicable outside of companies respective communities that are not used to collaborate together. Thus for web-based applications with wide spread individual users it might not be appropriate.

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Developed prototype can be shared and communicated easily across locations. b. Can easily demonstrate, how requirement will be fulfilled. c. If consensus: Easy to get feedback by users/stakeholders. d. Partial decisions for the future solution can be already secured very early in the project.	Pre-condition: Phone / Phone conferencing Online session (share screen to demonstrate prototype)	
	1. High cost to build and iterate prototype.	Just apply to important aspects and where cost-benefit is acceptable respective where project risk can be reduced significantly.
	2. Danger of a never ending story, in case different locations have already different solutions in place and are not open enough for something new.	Expectation management. Clear control of the process from the very beginning and establishing rules for decisions and restrictions (e.g. also for the budget of the prototype and the future solution).
	3. Too many country specific issues and regulations.	Only consider, where architecture depends on this. Otherwise, just specify conventionally(if needed).
Recommendation (when and how to apply for DRE) • Still a good option for cases with high risks or good cost – benefit relations. If this is the case for a single location, then it pays off in multi location situation even more, for it is also a good mean to communicate and agree across locations.		

Evaluation for Distributed Requirements Elicitation

Strengths		Possible Obstacles	Mitigation
a.	Makes process and requirements very transparent.	Pre-condition:	Phone
b.	High involvement of the future users. Can create high commitment for improvements and the future solution.	Helpful:	Online session (share screen to discuss questions) Web-cam or video conferencing
c.	High potential for innovation and improvements.	1. Not applicable in cases with many different roles and many IT tools and non-IT steps/documents.	Could be considered in processes with mainly two roles involved on two different locations.

Recommendation (when and how to apply for DRE)

- If many roles and complex working tools are in place, role play not being performed in one room is rather difficult (respective the very purpose for direct interaction and exchange of ideas can't be achieved).
- Might be applied with same benefit like for single location, if we have requirements engineering for 1:1 relationship, for example B2B scenario with vendor on one location, buyer on another location. Another example could be a publisher – reader scenario.
- For such situation, requirements engineer could sit on one location and moderate and observe the role play.
- Another approach could be, that the requirements engineer plays all the considered roles one after another just together with one specific role and collects in this way all the requirements. But this is very challenging for the requirements engineer, and again, the direct contact and discussion between all players/roles is missed.

6. Stakeholder observation

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Makes process and requirements very transparent (at least as is and improvement ideas of users/stakeholders). b. Can be handled user/stakeholder specific, taking into account specific knowledge, communication skills and behaviour. c. Can be scheduled depending working hours/availability of user/stakeholder. d. Allows clear tracing of requirements. e. Helps to the requirements engineer to understand the user language and current IS functionality used and therefore to “sell” future improvements.	Pre-condition: Phone Helpful: Online session (share screen to discuss questions) Web-cam or video conferencing	
	1. Time consuming, need to limit to observe important IT applications to be integrated/extended/replaced resp. to observe work of representative users/stakeholders.	Involve additional persons if needed in an additional loop or later requirements engineering phase. Documentation effort could be reduced significantly by screen recording respective screen shots.

Recommendation (when and how to apply for DRE)
• Stakeholder observation in the classical way could still be performed. Just share the screen of the user (sitting on one location) to the requirements engineer (sitting on another location). In addition, maybe a webcam could be installed to show the complete environment and paper based documents. • A new way of stakeholder observation (user observation) are techniques/solutions used in web applications: Record/trace user interactions and time spent on web sites, transactions and user dialogues. This could be done not only for web-based applications but for many conventional applications used in business.

Evaluation for Distributed Requirements Elicitation

Strengths		Possible Obstacles	Mitigation
a.	Makes existing solutions transparent.	Pre-condition:	email, document repository
b.	Minimal involvement of users/stakeholders required.		Phone
c.	Existing documents can be explained upon request of the requirements engineer by specialists in a very efficient way.		Online session (share screen to discuss questions)
		1. New and innovative requirements are not detected this way.	Combine with other elicitation and innovation techniques.
		2. Documentation might not be up-to-date. No feedback, what is used and proven in reality.	

Recommendation (when and how to apply for DRE)

- Is still an efficient way, at least to understand as-is.
- Repositories that are globally accessible and collaboration tools make DRE easy.
- Might be a main information source e.g. for purely technical system upgrades, reverse IS engineering and integration projects between applications with main purpose just to automate the data transfer.

Evaluation for Distributed Requirements Elicitation

Strengths	
a.	Makes existing solutions transparent.
b.	Minimal involvement of users/stakeholders required.
c.	Existing documents can be explained upon request of the requirements engineer by specialists in a very efficient way.

Possible Obstacles		Mitigation
Pre-condition:		Error/incident/changerequest tracking system Phone Online session (share screen to discuss questions)
1.	Classification and prioritisation might be needed.	

Recommendation (when and how to apply for DRE)

- Is the main information source (at least starting point) for requirements elicitation for bug fixing and smaller improvements.
- As often in place for conventional company internal IS:
If there is a systematic process in place and supported by a problem/bug reporting and management systems, global DRE is made easy. Such systems might even been used for more extensive change requests.
- A new way of problem/bug reporting, user rating and even requirements posting are techniques/solutions used in social media / collaboration / web applications:
Collect feedback by means of   , BBS (Bulletin Board System), Forum Software, email etc.
This should directly be integrated / called from any place in the IS application, should be some funny experience and provide some benefits to the user, as getting help by other users or by automated tips, how to use the application better.
This could be done not only for web-based applications but for many conventional applications used in business.

9. Market studies

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Shows existing systems, their success and possible potentials on the market. b. A comparison with existing/own solution might show the gap to best practices. c. Minimal involvement of users/stakeholders required.	1. Thinking in solutions, miss other opportunities (new innovative solutions). 2. Requirements engineer and benchmarking team might have not enough domain know-how.	- Combine with other elicitation and innovation techniques. - Validate requirements with domain experts.
Recommendation (when and how to apply for DRE)		
• Is especially a good option for web applications that are free available for users. • For other applications in a more protected environment, this might need still quite big efforts, to really elicit requirements on a level detail enough.		

10. Benchmarking

Evaluation for Distributed Requirements Elicitation

Strengths	Possible Obstacles	Mitigation
a. Learn from others. Get a more generic view about the application.	1. Thinking in solutions, miss other opportunities (new innovative solutions).	Combine with other elicitation and innovation techniques.
b. Learn strengths, weaknesses and potentials based on existing solutions.		
c. Minimal involvement of users/stakeholders required.	2. Requirements engineer and benchmarking team might have not enough domain know-how.	Validate requirements with domain experts.

Recommendation (when and how to apply for DRE)

- Is especially a good option for web applications that are free available for users .
- Furthermore, it's the preferred technique in a company-internal environment, where various local applications need to be consolidated to one common central solution. This helps to identify the common ground (including deviations), best practices and to create a common understanding of the future common solution.