

Development of a Change Request Template for ERP Systems to Increase Time-Efficiency

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Abstract: Market environments are changing at an increasingly exponential rate. Technological breakthroughs, the internet, globalization, and the consequential emergence of highly volatile and competitive markets have made managing a company more and more complex. Enterprise resource planning (ERP) systems support the successful management of businesses in such conditions. As the needs and expectations of markets are changing, so are the requirements for ERP systems; new or altered requirements are implemented continuously. This paper explores how companies can become more time-efficient in their specification of change requests and whether methods from requirements engineering can be applied. In the practice of two sizeable German manufacturing companies, we observed that specifying change requests is time-consuming and inefficient. Sophisticated ERP systems are complex; thus, changes require a detailed description of requirements. In practice, the description often lacks information. This leads to reclarifications with the requestor, difficulties when assessing the expected benefits of change requests, and uncertainties concerning prioritization. Moreover, there is a risk of approval and development of changes that are not fully understood. Therefore, unwanted side effects harm the ERP system and require even more costly corrections later. The methods and procedures are taken from the design science research; we intended to develop an artefact that supports companies to become more time-efficient in the process of describing, evaluating and prioritizing change requests. We interviewed experts from a large automotive supplier and analyzed the data through content analysis. The research concluded that some methods from requirements engineering can be applied to this context, such as the usage of requirements specification templates, quality criteria, and categorization of requirements. The primary results of this research are an artefact in the form of a new change request template for the use case of changing ERP systems. This template was applied in the automotive supplier's change request practice, where we also gathered feedback on the artefact. The conclusions from data and results of the involved parties reported that the new template increases transparency on what information is required and serves as a foundation for rejecting change requests lacking descriptions. Implications for further research are to increase transparency and additional guidance that already has successfully brought the intended benefit of saving time in this process.

Keywords: Change management, change requests, enterprise system, ERP system, requirements specification

1. Introduction and research problem

ERP systems are still relatively new IT systems continuously adapting to the company's and its management's needs. Therefore, the excellent support for company management as an advantage becomes the disadvantage of constant adaptations to processes and business models. In other words, in order not to limit the function of ERP systems, highly effective change processes are required.

Two sizeable German manufacturing companies with integrated ERP systems and established change management processes report similar problems in specifying requirements for change requests (CRs); in both companies, the requirements specification is not formally defined. Therefore, the format and quality of described requirements vary a lot. Often, requirements lack necessary information or are not fully understood, which leads to time-consuming rounds of clarification. In some cases, incomplete requirements are approved for development, and missing requirements or errors are only discovered at a later stage during testing or implementation. Overall, the implementation of changes requires multiple rounds of clarification or corrections before they bring value in the productive system. The objective of this paper is to support companies that are facing these challenges to reduce the time needed to specify and implement CRs for their ERP systems.

2. Research approach

The nature of this paper's research problem is explorative primarily, with some pre-existing insights and hypotheses. Research question 1 (RQ1) explores how companies can save time in specifying CRs. RQ2 explores whether methods from requirements engineering (RE) can be applied to reach that aim. The answers to these RQs cannot be captured numerically; they call for the best practices of experts in the field. Therefore, we followed the design science research (DSR) approach and conducted expert interviews for the data collection and qualitative content analysis for the data analysis according to Bryman (2016) and Saldana (2021) to answer

the RQs. We compared the insights from the interviews with the existing literature on RE and developed an artefact which supports these companies in increasing time efficiency when specifying requirements for CRs.

2.1 Literature review

Prior to this study, we analyzed the existing RE literature on specifying and documenting requirements. In RE, the usage of requirements specification templates is common, which prescribe the information that must be provided and ensure that certain quality criteria are enforced (Sommerville, 2011; ISO/IEC/IEEE, 2018; Dick, Hull, and Jackson, 2017; Bühne and Hermann, 2019; Laplante, 2017). However, the templates in RE focus on the specification of requirements for entirely new IT systems, typically within a project scope. These templates focus on ensuring that a multitude of interconnected requirements are specified completely and consistently (Pohl, 2010; Dick, Hull, and Jackson, 2017). They also often aim to document the overall purpose and vision of a new system (ISO/IEC/IEEE, 2018), which is too extensive for the use case of a change to an existing system. Our analysis of the existing RE literature found no templates or guidance targeted specifically to documenting the requirements of CRs.

2.2 Data collection

In the first step, we selected six experts from a German manufacturing company who have been operating and shaping the ERP system's change management process for at least five years. Table 1 introduces the experts with regard to their position and years of experience with the change management process.

Table 1: Selected interviewees

Expert	Position	Years of experience
EXP1	High-ranking manager	> 15
EXP2	Team lead and owner of the change management process for one module of the ERP system	> 10
EXP3	Approver for CRs	> 15
EXP4	Approver for CRs	> 15
EXP5	Approver for CRs in Asia	> 5
EXP6	Team lead	5

The analysis of RE served as a foundation for the interview guide. The authors used the theoretical background to create a set of questions and hypotheses about the applicability of RE methods in the specification of requirements for CRs. In the next step, these questions and hypotheses were translated into interview questions as recommended by Saunders, Lewis and Thornhill (2019). The interview questions were designed to encourage the interviewee to talk about their good and bad experiences with CRs, specifically on the reasons why the clarification of some CRs consumes significant time and how to reduce this time investment. The interview guide was not given out to the participants beforehand. The interviews started with the interviewer asking some essential questions about the interviewee's work experience, followed by the questions from the interview guide. The experts were encouraged to also talk about aspects that might not have been part of the initial interview guide.

2.3 Data analysis

Qualitative content analysis was used to analyze the interview transcripts. In the first step, the authors have considered the recommendations from RE literature to derive categories and structure the interview material. The following table contains the definition and justification of the authors' categories. It also contains the rules established for assigning paragraphs of the transcripts to categories.

Table 2: Categories for qualitative content analysis

Category	Definition and coding rules
Categorization	The existing literature on RE provides various proposals for categorizing requirements based on functionality, level of detail, or solution dependency (Glinz et al, 2020; Sommerville, 2011). This category has been assigned to paragraphs where the interviewee discusses different types of requirements and CRs.
Template attributes	One of the core activities in RE is specifying requirements through a predefined template (Pohl, 2010; Glinz et al, 2020; Dick, Hull, and Jackson, 2017). This category has been assigned to paragraphs where the interviewee discusses what content they have found necessary or valuable in order to be able to process CRs in a time-efficient way.

Category	Definition and coding rules
Language	This category has been assigned to paragraphs addressing the interviewee's language usage experiences. This involves narratives about the requestor's primary language and considerations of natural language usage versus more sophisticated modelling languages such as UML (Unified Modeling Language), often discussed in RE literature (Pohl, 2010).
Quality criteria	This category has been assigned to paragraphs where the interviewees discuss their experiences with good and bad requirements specifications. It covers the expert's view on quality criteria for CRs and the criteria commonly suggested in RE literature, such as completeness, consistency, modifiability, and readability (Dick, Hull, and Jackson, 2017; Pohl, 2010).
Technical feasibility	This category encapsulates paragraphs which deal with the technical feasibility of a CR and the experts' narratives on when they involve a developer in the requirements specification process.
System dependencies	In highly integrated global ERP systems, many changes influence various processes or parts of the existing system architecture. This category has been assigned to paragraphs that address the system and process dependencies of a CR, such as interfaces with other systems.

The authors assigned each relevant paragraph to a category based on the rules shown in table 2. After the categories were derived, the authors familiarized themselves with the interview transcripts by reading through them multiple times and extracting critical statements from the experts' narratives. After the first round of assigning the interview material to categories was finalized, the authors read through the interview material in multiple iterations to reassess and update the category assignment. Afterwards, the authors analyzed the critical statements in each category for similarities, contradictions, and trends between the interviewees' statements.

3. Research findings

3.1 General findings

The interviewed experts all confirmed that specifying requirements for CRs often consists of multiple iterations of clarifications with the requestor to get complete and consistent requirements. In practice, the quality of raised CRs do not align with the receiver's expectations. Thus, this research concludes that companies can become more time-efficient by establishing a transparent guideline for the requestor on what is expected in a CR document. The findings also showed that some of the insights from RE – such as the categorization of requirements, the use of requirements specification templates, and enforcing the RE quality criteria – are useful to save time in the specification of CRs. As a solution to these issues and an answer to the research questions, we created an artefact in the form of a CR template with the objective to:

- Reduce iterations in the clarification of requirements
- Increase the quality of requirements in CRs

The structure and content of the template are based on the findings from each category of the content analysis. A fill-in guide was developed to support requestors by specifying their requirements. The following section presents this new CR template.

3.2 Change request template

In figure 1, the first two sections of the fill-in help for the CR template are depicted. The first section is shown on the left-top side, and the second section is on the bottom right. In the following, each attribute of the template will be explained.

The first attribute gathers essential data; at the top left of the template, the requester is asked to provide the country from which they are requesting the change and their name as the contact person.

Requesting country	Click or tap here to enter text.
Contact person	Click or tap here to enter text.
Requirement type	Choose the Requirement type Standard change Legal Requirement Error Prevention Process Improvement Standard change (Other)
Problem description – Describe your current process. – What is the problem in this process? – What workarounds have you already tested out? Why don't they work? – How will the problem evolve over the next year(s)? – If possible, include screenshots, videos, and technical field names. – Avoid assumptions, write down every detail!	enter text. Click or tap here to enter text. Description of benefits – For Legal Requirements, please provide legal evidence, for example respective legal texts. – For Process Improvements, please provide calculation of benefits in time / monetary value. – For Error Preventions, specify the type of error, frequency, consequences and who is impacted, as well as your current workarounds. What happens if the error is not prevented? – For Standard Changes, please specify the type of standard request (for example: New plant/warehouse, XML invoice setup, etc.) – For Other, please provide a detailed explanation.

Figure 1: Change request template part one

3.2.1 Requirement type

The following attribute asks for the requirement type, where the requestor can select one of the following types through a drop-down:

- Legal requirement
- Error prevention
- Process improvement
- Standard change, or
- Other

All interviewed experts (EXP1-EXP6) mentioned that the categorization of requirements enables the decision board to judge the priority and importance of a CR immediately. A standard change that is low in complexity and follows a defined process does not require further clarification and can be routed through the process efficiently when marked accordingly. The interviewees reported that they must further know whether a CR is raised to improve an internal process, prevent errors, or avoid violating legal regulations. Legal requirements or errors that impact the company's customers are critical and must be prioritized to be solved quickly (EXP1, EXP2, EXP5). However, if the problem is inefficiency, such as a time-consuming process that works but causes internal employees some additional workload, the importance and priority are lower. Thus, an initial categorization by the requestor based on these categories is proper. As suggested by RE literature, any expert did not mention a differentiation between functional and non-functional requirements.

3.2.2 Problem description

The following template attribute in figure 1 is the problem description. All experts frequently mentioned that CRs often describe a solution but do not describe the initial problem sufficiently. For such cases, a time-consuming reclarification of the initial issue that led to the CR is always needed (EXP1, EXP3, EXP4). Therefore, establishing a clear and transparent guideline for what information is expected in the requirements specification document can significantly reduce the time spent on clarification. Such a guideline also serves as a quality standard based on which the receiver of the request can reject or send back any requests which are not complete (EXP4). In our artefact, we realized such a guideline through questions the requestor is expected to answer in their problem description. As a change is done to an existing ERP system, the requestor should start by describing the current process (EXP3). This is especially important in a globally operated and highly sophisticated ERP system, where the receiver of the CR is often not an expert in all existing processes. Next, the requestor is asked to describe the problem within this process, enriched with screenshots and the names of the affected technical fields if possible (EXP4, EXP5). If any workarounds have been tested out or are currently being used, this is also

essential information that should be included in the problem description, as it narrows down the options for solutions (EXP2). The guideline also asks the requestor to estimate how the problem will evolve, which is essential to detect potential global trends early on (EXP2); for example, when a requestor raises a CR for a problem that affects customers who receive a PDF invoice via e-mail, then the problem might have been rated as unimportant ten years ago when almost all customers received paper invoices. However, during this time, customers increasingly started requesting to receive their invoices as PDFs attached to e-mails. This is essential information which increases the relevance of the described problem. Lastly, the requestor is reminded to be as detailed as possible and not assume any information to be self-evident.

One interesting proposal for the problem description mentioned by EXP1 was to provide the requestor with a list of options to narrow the problem area within the ERP system. This could support less experienced requestors in putting their CR into context. However, even EXP1, who has over fifteen years of work experience with this system, states that he cannot define a functional structure due to the high system complexity. Other experts have also voiced their concerns about the feasibility of creating such a structure to decrease the overall time needed to specify CRs. Therefore, it is not explored further at this point.

3.2.3 Description of benefits

The next part of the CR template asks for a description of the benefits. EXP4 reported that, in practice, the most common benefit description is basically "This will make my life easier". Such a description is incomplete and too vague to assess if the effort of a requested change is justified by its benefit. To improve the quality of the descriptions, we added another guideline which supports the requestor to provide the expected information for the requirement type they specified. For CRs raised to meet legal requirements, the law or details should be stated in the specification; a quantifiable justification of the benefit is not required, as legal requirements are mandatory for the company. For the categories, standard change and others, the guideline is less specific, as these can capture various changes, which must each be assessed in detail. For error prevention, a description of the error, its frequency and its impact on the company or its customers must be provided. For process improvements, a business case should be provided with a quantifiable calculation, preferably monetary value (EXP1, EXP2, EXP3, EXP6). A quantifiable benefit could also be a calculation of saved time, the sales volume of an affected customer, or the number of affected documents in the system (EXP5). This calculation is the foundation for the approval of the CR.

3.2.4 Giving examples

One of the core findings of the interviews is that incomplete problem and benefit descriptions are common and require significant time for clarification. However, the development of well-designed criteria to judge a good or bad problem and benefit description was a challenge. Most experts have given a vague statement that they must be able to see that the requestors have invested some time into justifying their request. However, this subjective judgment cannot be translated into a clear guideline. It is challenging to pinpoint standardized quality criteria, as CRs for ERP systems vary significantly due to the high system complexity. To conquer this issue, we also added examples of a good problem and benefit description to the CR template, which gives the requestor a reference on the scope and level of detail expected.

3.2.5 System dependencies

The next section of the CR template, pictured in figure 2, deals with the dependencies of a requested change. A change to an integrated ERP system will often impact other parts of the system, like different SAP modules or interfaces with other internal or external systems. To avoid unwanted side effects, it is essential to recognize these dependencies whenever a CR is raised (EXP2, EXP5). In the left column of figure 2, the system dependency checks identified through the interviews of experts in the field are listed as an example. The needed checks in a CR template will vary between organizations, as ERP systems are customized to the individual needs of an organization.

System dependencies

Master data	☐ no impact	Click or tap here to enter text.
Authorization	☐ no impact	Click or tap here to enter text.
Order entry / upload	☐ no impact	Click or tap here to enter text.
Delivery Notes, Shipments	☐ no impact	Click or tap here to enter text.
Billing documents / e-Invoicing / EDI invoicing	☐ no impact	Click or tap here to enter text.
Pricing and Rebates (incl. upload forms)	☐ no impact	Click or tap here to enter text.
Return processes / complaint handling	☐ no impact	Click or tap here to enter text.
Output types	☐ no impact	Click or tap here to enter text.
Reports	☐ no impact	Click or tap here to enter text.
Interfaces to other systems	☐ no impact	Click or tap here to enter text.
Other special processes (please specify in detail)	☐ no impact	Click or tap here to enter text.

Figure 2: Change request template part two

Evaluating all system dependencies requires an excellent understanding of the system. Therefore, judging the impact a change has on the system is a highly complex task that often requires experienced developers' support (EXP4, EXP5). Because the system dependencies are critical yet complex to assess, the authors recommend that this section should be filled in by all involved parties in the change management process: The requestor, receiver of the request, and developer doing the implementation should judge the system dependencies from their perspectives. In practice, the requestor will likely be aware of any other local systems or market-specific processes impacted by the change. The request receivers can use their global experience to judge further the impact on other system processes, such as the invoice layouts, pricing conditions, and output types. Lastly, the developer assesses technical system dependencies, for instance, by checking the program code. The results of each check must be documented in the column on the right. If a check is not relevant to the respective CR, it can be indicated by ticking the "no impact" box in the middle column.

3.2.6 Language

For a globally operated ERP system, a common language must be defined in which requirements are to be documented. Some experts reported that requiring the requestor to write down their requirements in English as a typical secondary language does not pose any problem (EXP4, EXP5); others reported that it had caused some issues with understanding a request in the past (EXP1, EXP3, EXP6). Nevertheless, the use of English as a typical secondary language is unavoidable. English should, therefore, be a prerequisite for a person to assume the role of a requestor of CRs for a globally operated ERP system. Regarding modelling languages, as commonly used in RE, all interviewees reported that they have no experience with using them in the CR process.

Nevertheless, the interviewed team leads and managers reported that they expect modelling languages to be beneficial in reducing language-driven errors and the overall ambiguity of descriptions (EXP1, EXP2, EXP6). EXP1 noted further that establishing the use of modelling languages requires a thorough organization preparation first. Requestors globally must be equipped with the tools, programs, and training to create diagrams in the selected modelling language. EXP2 also noted that asking the requestor to use a particular modelling language could risk good ideas not being submitted because raising a CR is too big of an investment. An organization could lose some good ideas, which may have made processes more efficient for many business users of the system. Overall, implementing the usage of a modelling language requires a well-designed global approach for the whole

organization, which is out of scope for this artefact. As a short-term solution to reduce ambiguity in natural language, we ask the requestor to include screenshots and videos in their CR specification (see figure 1), as proposed by some experts (EXP2, EXP3).

3.2.7 Risks of a new template

A general remark was given by EXP2, who noted the concern that an organization must ensure that the process of raising new CRs is not too bureaucratic, as it could lead to a false impression for the requestor that their ideas to improve the system are not welcome. The company relies on good ideas from its users to continually enhance its ERP system. Thus, we focused on keeping the template and its guidelines reasonably simple while also ensuring that the requestor understands which information is essential.

3.3 Evaluation of the template

As a next step, we put the new CR template to a trial in practice and gathered feedback from both parties, the requestors for changes and those who receive and evaluate these CRs.

3.3.1 Requestor feedback

To trial the new CR template regarding its usability, we approached requestors of CRs from five countries worldwide and asked them to fill out the template for one of their current or past CRs. Each requestor has a different level of experience in the CR process of the company, varying from less than one year of experience to more than ten years of experience.

The first requestors from Romania (REQ1) and Korea (REQ2) have less than one year of experience requesting changes for the ERP system. They reported that the template is clear and will not consume more time to raise a CR with it. They also noted that the template requests more information from the beginning, which avoids long e-mails for further clarification. REQ2 added that the template helps them structure their requirements.

A requestor with three years of experience is from the United Arab Emirates (REQ3). REQ3 mentioned that it is unclear what kind of proof is required to describe benefits for a legal requirement. From the authors' perspective, this is a valid point that should be further explained in the guideline. The extent of the template itself does not discourage them from raising new CRs; REQ3 noted that it is more transparent what information must be provided upfront.

A requestor from the UK (REQ4) has more than three years of experience and raised numerous CRs. REQ4 reported that the additional explanations and questions for the descriptions encouraged to think of details that might have been overlooked otherwise and concluded that the quality of the requirements descriptions would "improve massively". Overall, REQ4 expects to spend less time raising CRs, as they will also forward the new template and guideline to the British business end-users of the ERP system to show them what information is required when raising a CR for the UK market.

The Danish requestor (REQ5) with over ten years of experience noted that they especially appreciate the list of system dependencies that can be ticked off because it helps remind them what parts of the system could be affected and should be considered. REQ5 expects that the quality of CR descriptions will remain the same with or without the template. This makes sense from the authors' perspective, as REQ5 has many years of experience in this process to know what information they should provide. REQ5 also noted that they can fit "a very high proportion" of new CRs in this template and do not see the need to add more templates for different use cases.

Generally, the requestors with less experience expressed that they value the guidelines on the problem and benefit descriptions the most. The more experienced requestors expressed that they value the guideline for the level of detail and completeness of information the most. The value-add of the template seems more prominent for the less experienced requestors, which meets the expectations of the authors, as requestors who have raised numerous CRs in the past have naturally obtained a good understanding of how to best specify their requirements.

Overall, the feedback aligns well with the authors' intended benefit of the new template. The template and guideline seem beneficial to the requestors to increase the quality of their descriptions and, for some, also to reduce the time needed to raise CRs.

3.3.2 Receiver feedback

We sent the filled-in CRs from section 3.3.1 to three employees who are the receivers of changes in this process at the interviewed company. We selected employees who were not part of the expert interviews and asked them for their feedback on the new template regarding the quality of descriptions provided by the requestors and whether they see the need for additional clarification. In addition to feedback from the requestors, another critical evaluation is whether the template saves time for the receivers of a CR.

The first receiver (REC1) feedback that the template's content was easily understandable. Regarding the completeness and consistency of the requirements description, REC1 noted that it has improved, but the description of benefits still lacks the needed level of detail from their perspective. In this company, the benefit description of a change was not prioritized in the past; it was common practice that one sentence about how this change will help with sales was accepted. We expect it will take time for the more experienced requestors to get used to this new guideline and quality standard for descriptions. REC1 further mentioned that they appreciate the guideline for the problem and benefit description because it helps them quickly judge whether to send back a CR due to incompleteness. In the past, this decision had to be made case by case based on experience and gut feeling; thus, having such a quality standard brings more transparency and efficiency into this process.

The second receiver who asked for feedback (REC2) reported that the provided filled-in CRs all have an evident problem description and proposed solution, but the benefit description is still too generic and would require some reclarification. Overall, REC2 noted that the template helps follow a more structured process to gather the information and question the requestor's requirements. The requestor is encouraged to think about additional aspects like the system dependencies. This receiver believes that the time to specify requirements might increase at first, as the template must be enforced with the experienced requestors who are not used to a guideline in which they must fit their requested changes. Long-term, they assume the template will help save time clarifying requirements.

The last receiver (REC3) gave brief feedback that the quality of the requirements provided in the template was better than without it. Like REC1 and REC2, REC3 also noted that the only aspect that needs reclarification in the provided CRs is the description of the financial benefit.

Overall, the feedback from REC1-REC3 demonstrates a positive effect of the template on the quality of the requirements descriptions and a long-term positive effect on the time it takes to clarify CRs.

4. Conclusion and outlook

This paper has explored how companies can become more time-efficient in their specification of CRs and whether methods from RE can be applied. The outcome of the qualitative content analysis shows that some of the existing methods from RE could be applied to the use case of CRs, such as the categorization of requirements and usage of transparent requirements specification templates. We also found that a complete and consistent description of the problem that originally triggered the CR as well as a description of its benefits led to a significant decrease in the time needed for clarification. Furthermore, the research concluded that every CR should contain a detailed consideration of its dependencies to the existing ERP system. To achieve this, we developed an artefact in form of a CR template which provides the requestors with a transparent guideline on how to properly specify their CRs.

The CR template was tested in the practice of a German automotive supplier. The feedback was promising; the requestors for changes reported that the new template is clear and understandable. The template does not discourage anyone from raising new requests. Both the requestors and receivers have noted positively that the transparency of what information is expected in a requirements description for a CR has improved. Furthermore, the overall time of specifying CRs and the quality of each change description has been judged to have improved or remained the same compared to without the template.

Although the feedback from the trial implementation of the template in the company was positive, this short trial cannot accurately reflect the template's usefulness in day-to-day business. The requestors have likely dedicated more time to completing these CRs than they would regularly. Moreover, the template was developed based on the findings from interviews with experts from the same company where the method has also been

trialed. To judge whether the template would be universally applicable and beneficial, more trials at different companies facing similar issues with the specification of CRs should be conducted. A quantitative assertion of how much the overall time efficiency is increased through this new template requires a long-term trial with different participants and companies, which should follow as the next step in this field of research.

Nevertheless, within the company involved in this research, the artefact has been a success; the template has been in use for more than six months, and the employees involved in the CR process have voiced positive feedback regarding time-efficiency and quality of raised requirements.

References

- Bühne, S., & Hermann, A. (2019) "Handbook Requirements Management according to the IREB Standard" [online], <https://www.ireb.org/content/downloads/16-cpre-advanced-level-requirements-management-handbook/ireb-cpre-handbook-for-requirements-management-advanced-level-en-v1.1.pdf>.
- Bryman, A. (2016) *Social Research Methods*, 6th ed, Oxford University Press, Oxford.
- Dick, J., Hull, E. and Jackson, K. (2017) *Requirements Engineering*, Springer International Publishing, Cham.
- Glinz, M., van Loendhoud, H., Staal, S. and Bühne, S. (2020) "Handbook for the CPRE Foundation Level according to the IREB Standard: Education and Training for Certified Professional for Requirements Engineering (CPRE) Foundation Level", [online], International Requirements Engineering Board (IREB), https://www.ireb.org/content/downloads/5-cpre-foundation-level-handbook/cpre_foundationlevel_handbook_en_v1.0.pdf.
- ISO/IEC/IEEE (2018) *ISO/IEC/IEEE 29148: Systems and software engineering – Life cycle processes – Requirements engineering*, 2nd ed, ISO/IEC/IEEE.
- Laplane, P. A. (2017) *Requirements Engineering for Software and Systems*, 3rd ed, CRC Press, Boca Rata, Florida.
- Mayring, P. (2000) "Qualitative Content Analysis", *Forum: Qualitative Social Research*, 1(2). doi: 10.17169/fqs-1.2.1089.
- Pohl, K. (2010) *Requirements Engineering*, Springer Berlin Heidelberg.
- Saldana, J. (2021) *The Coding Manual for Qualitative Researchers*, Sage, London.
- Saunders, M., Lewis, P. and Thornhill, A. (2019) *Research methods for business students*, 8th ed, Pearson, London.
- Sommerville, I. (2011) *Software engineering*, 9th ed, Pearson, London.