

Survey - Uncertainty in Non-Functional Requirements

Free and Informed Consent (IC)

You are being invited to participate in the research entitled "An Assessment of Uncertainty in Non-Functional Requirements". This research aims to survey the uncertainty of these requirements (RNF - Non-Functional Requirements) and how it is managed throughout the software life cycle.

Confidentiality and anonymity: Data obtained during this study is strictly confidential and disclosed only in events or scientific publications and will only be used for this purpose. Your participation is anonymous (confidentiality).

Researchers contact information: During the research period, you have the right to ask any questions or ask for any other clarification, simply by contacting the responsible researchers Luiz Viviani <luiz.viviani@ensino.ipt.br> and Eduardo Guerra <eduardo.guerra@unibz.it>

Consent Registration: Since the questionnaire is being carried out through an electronic form, you must tick the option in which you agree to participate in the study.

The total duration of the survey is approximately 20 minutes.

* Required

1. Consent *

Mark only one oval.

- I agree to participate
- I prefer not to participate

Conceptualization of non-functional requirements

Non-functional requirements are constraints on services and functions offered by the system and may include, for example, time constraints, constraints on the development process, and constraints imposed by standards.

Non-functional software requirements in general are related to quality standards and are important because they define whether the software will be efficient and suitable for the task it proposes to do.

A non-functional software requirement describes not what the software will do (functional), but how the software will do this, for example: Availability, Robustness, Flexibility, Performance, Resilience, Scalability, Extensibility, Reusability, Security and others.

2. Do you understand the concept of non-functional requirements described above? *

Mark only one oval.

Yes, I do

No, I don't

Skip to section 18 (Thanks and link to leave your contacts)

Participation

The questionnaire will be divided into sections, which address each one of the non-functional requirements.

To complete the survey, if you have experience in companies and projects with different characteristics, use the most current or most relevant project from the point of view of non-functional requirements to base your answers.

3. Are you aware that you only need to choose one project to base your answers on? *

Mark only one oval.

Yes, I have already chosen the project

No, I don't have a project to use as a reference

Professional information

4. What is your company's business segment? *

Mark only one oval.

- Academic
- E-Commerce
- Govern
- Education
- Entertainment
- Financial
- Health
- Social Media
- Transport
- Agro Business
- Other: _____

5. How big is your company? (Number of collaborators) *

Mark only one oval.

- 1-10
- 11-100
- 101-500
- 501-2000
- 2001-5000
- +5000

6. Which of the following terms relate to roles you have worked in the last 5 years? *

Check all that apply.

- Director or C-level (CIO, CTO, etc...)
- Product Manager or Product responsible
- Software Architect
- Requirements Analyst
- Software engineer
- Operation or DevOps Engineer
- Site Reliability Engineer
- Developer
- Researcher
- Test Analyst / QA
- Other: _____

7. How many years have you been working with software development? *

Mark only one oval.

- less than 1 year
- 1 to 3 years
- 4 to 6 years
- 7 to 9 years
- 10 to 12 years
- 13 to 15 years
- 15 years or more

8. What is your level of experience with assessment, design, implementation and/or indicators/measurement of non-functional requirements? *

Mark only one oval.

- Noob - knows the theory and the principles of non-functional requirements and use them in simple contexts
- Advanced Beginner - Has hands-on experience validating, understanding, and tracking non-functional requirements
- Intermediate - has experience in adopting a culture supporting the importance of non-functional requirements, their implementation, measurement and review/follow-up in different contexts and real-world scenarios
- Proficient - handles different software and can make decisions consciously and with a high degree of assertiveness
- Specialist - deals with different software and can make decisions assertively and without significant difficulties

Approach to non-functional requirements

Considere o projeto escolhido como referência para responder essas perguntas.

9. In the project used as a reference, what is the influence of the following roles in the definition of non-functional software requirements? *

Mark only one oval per row.

	Very high influence	High influence	Moderate influence	Low influence	Very low influence	no influence
Diretor or C-level (CIO, CTO, etc...)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product Manager or Product responsible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirements Analyst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Final Users	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Architect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operações / DevOps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test Analyst / QA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Generally speaking, are non-functional requirements for your company's systems described in a more qualitative or quantitative way? Qualitative: presents the objective in a non-measurable way, for example "The system must be scalable to deal with the expansion of the company."; Quantitative: uses numerical values, eg: "The system should scale to 10,000 users in the next 2 years."

Mark only one oval.

1 2 3 4 5

always always quantitative

Non-functional requirement - Response time

11. In the software you are using as a reference to answer this survey, is there any non-functional requirement regarding the response time of a feature? (ex: "The login service must have a maximum response time of 100 ms", "The GUI must be rendered in a maximum of 1s", "The report processing time cannot be longer than 1 hour.") *

Mark only one oval.

- Yes *Skip to question 12*
- No *Skip to question 18*

Non-functional requirement - Response time - Detail

12. What were the approaches used to define the non-functional requirement regarding response time? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

13. During what type of activity, was the non-functional requirement regarding response time added to the system needs? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

14. After its addition to the project, was the non-functional requirement regarding response time revised or modified? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.) *

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

15. If you answered YES to the previous question, what motivated the modification or revision made to the non-functional response time requirement? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- Cost management
- NOT modified/reviewed
- Other: _____

16. Considering your opinion, what is the status of the non-functional requirement regarding response time in the current state of the software (if you no longer work on the project, consider the time of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the software well, and not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

17. If you wish, further explain or justify your previous answers regarding how the non-functional requirement regarding response time was defined, modified and its current state in the project that you are using as a reference for the answer to this survey. Feel free to express your opinion and comment on your experience in other projects as well.

Non-functional requirement - Number of simultaneous requests

18. In the system you are using as a reference to answer this survey, is there * any non-functional requirement regarding the number of simultaneous requests for a functionality or service? (eg, "The system must be capable of executing up to 200 simultaneous checkout transactions", "The application's home page must be able to handle up to 1000 simultaneous accesses.")

Mark only one oval.

- Yes *Skip to question 19*
- No *Skip to question 25*

Non-functional requirement - Number of simultaneous requests - Detail

19. Qual foi o método utilizado para definição do requisito não-funcional a respeito da quantidade de requisições simultâneas? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

20. During what kind of activity was the non-functional requirement regarding the number of simultaneous requests added to the system needs? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

21. After its addition to the project, has the non-functional requirement of the number of concurrent requests been revised or modified? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.) *

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

22. If you answered YES to the previous question, what was the moment/reason for the modification or revision carried out?

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- Cost management
- NOT modified/reviewed
- Other: _____

23. Considering your opinion, what is the status of the non-functional requirement regarding the number of simultaneous requests in the current state of the system (if you no longer work on the project, consider the moment of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the system well, not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

24. If you wish, better explain or justify your previous answers regarding how the non-functional requirement regarding the number of simultaneous requests was defined, was modified and its current state in the project that you are using as a reference for the answer of this survey. Feel free to express your opinion and comment on your experience in other projects as well.

Non-functional requirement - Scalability

25. In the system you are using as a reference to answer this survey, is there any non-functional requirement regarding the scalability of the system? (ex: "The solution must support 10% annual growth of new customers", "The solution must support 15% annual growth of the previous number of transactions") *

Mark only one oval.

- Yes *Skip to question 26*
- No *Skip to question 32*

Non-functional requirement - Scalability - Detail

26. What was the method used to define the non-functional requirement regarding scalability? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

27. During what kind of activity was the non-functional requirement regarding scalability added to the system needs? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

28. After its addition to the project, was the non-functional requirement regarding scalability revised or modified? *

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

29. If you answered YES to the previous question, what motivated the modification or revision made to the non-functional scalability requirement? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- cost management
- NOT modified/reviewed
- Other: _____

30. Considering your opinion, what is the status of the non-functional requirement regarding scalability in the current state of the system (if you no longer work on the project, consider the time of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the system well, not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

31. If you wish, further explain or justify your previous answers regarding how the non-functional requirement regarding scalability was defined, modified and its current state in the project that you are using as a reference for the answer to this survey. Feel free to express your opinion and comments on your experience in other projects as well.

Non-functional requirement - Flexibility

32. In the system you are using as a reference to answer this survey, is there any non-functional requirement regarding the flexibility of the system? *
Flexibility refers to the ease of adding and modifying new functionalities, usually of a specific type (e.g. "The system must be able to incorporate new alternatives for freight calculation", "The system menu must be able to recognize and add link to new modules", "It must be possible to add charts with new analyzes of the purchase data", "Products of new types may have different types of information associated with them").

Mark only one oval.

- Yes *Skip to question 33*
 No *Skip to question 39*

Non-functional requirement - Flexibility - Detail

33. What was the method used to define the non-functional requirement regarding the flexibility of the system? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

34. During what kind of activity was the non-functional requirement regarding flexibility added to the needs of the system? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

35. After its addition to the project, was the non-functional requirement regarding flexibility revised or modified? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.) *

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

36. If you answered YES to the previous question, what motivated the modification or revision made to the non-functional flexibility requirement? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- cost management
- NOT modified/reviewed
- Other: _____

37. Considering your opinion, what is the status of the non-functional requirement regarding flexibility in the current state of the system (if you no longer work on the project, consider the time of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the system well, not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

38. If you wish, better explain or justify your previous answers regarding how the non-functional requirement regarding flexibility was defined, modified and its current state in the project that you are using as a reference for the answer to this survey. Feel free to express your opinion and comments on your experience in other projects as well.

Non-functional requirement - Portability

39. In the system you are using as a reference to answer this survey, is there any non-functional requirement regarding the portability of the system? *
Portability refers to requirements that the system or part of it can be easily adapted/replaced/installed to another platform (e.g. "The system must be able to run on private and public cloud", "The system must be able to use any or a specific SQL database list", "The system must run on both mobile and desktop browsers")

Mark only one oval.

- Yes *Skip to question 40*
- No *Skip to question 46*

Non-functional requirement - Portability - Detail

40. What was the method used to define the non-functional requirement regarding the portability of the system? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

41. During what kind of activity was the non-functional requirement regarding portability added to the system needs? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

42. After its addition to the project, was the non-functional requirement regarding portability revised or modified? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.) *

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

43. If you answered YES to the previous question, what motivated the modification or revision carried out in the non-functional portability requirement? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- cost management
- NOT modified/reviewed
- Other: _____

44. Considering your opinion, what is the status of the non-functional requirement regarding portability in the current state of the system (if you no longer work on the project, consider the time of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the system well, not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

45. If you wish, explain better or justify your previous answers regarding how the non-functional requirement regarding portability was defined, modified and its current state in the project that you are using as a reference for the answer to this survey. Feel free to express your opinion and comments on your experience in other projects as well.

Non-functional requirement - Robustness

46. In the system you are using as a reference to answer this survey, is there any non-functional requirement regarding system robustness? Robustness refers to both internal and external failure recovery requirements. (e.g. "Report processing must resume on system restart if interrupted by a failure", "System must detect and cancel duplicate transactions", "System must make up to 3 attempts to access the payment system before send an error message to the user."). *

Mark only one oval.

- Yes *Skip to question 47*
- No *Skip to section 18 (Thanks and link to leave your contacts)*

Non-functional requirement - Robustness - Detail

47. What was the method used to define the non-functional requirement regarding the robustness of the system? *

Check all that apply.

- Elicitation with stakeholders (CIO, Product Manager or Product Manager, End User, TechLead/Architect, Developers, Testers, Operations Team, etc)
- Restrictions imposed by legacy systems or to be integrated
- Norm/Regulation to which the system must comply
- Competing software reference
- Defined from a standard form or template used by the company
- Based on the experience of the professionals involved
- Experimentation and A/B testing
- Based on measurements performed in the software
- From problems found in the project
- Complaint from Software Users
- I am not aware of the approach used
- Other: _____

48. During what kind of activity was the non-functional requirement regarding robustness added to the needs of the system? *

Mark only one oval.

- Conception
- Analyze
- Design
- Refining requirements (functional and non-functional)
- Development (programming)
- Tests
- Monitoring software in production
- User validation and feedback
- I am not aware of the timing of the addition of this requirement
- Other: _____

49. After its addition to the design, was the non-functional requirement regarding **robustness** revised or modified? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Mark only one oval.

- No
- Yes, the requirement has been re-evaluated but not modified
- Yes, the requirement has been modified

50. If you answered YES to the previous question, what motivated the modification or revision carried out in the non-functional robustness requirement? (IMPORTANT: Note that this question does not refer to a change in the application, but in its needs. That is, if it has been modified how the requirement says the application should behave and not necessarily how it behaves.)

Check all that apply.

- Regular review of requirements
- Experiment or evaluation made by the technical team
- Test results made for this non-functional requirement
- Technical opinion from a team member or consultant
- Test results of other functional requirements
- Software behavior in production
- Changes in user needs
- Comparison with the competition
- The current requirement created limitations in other parts of the software
- Technical limitations prevented compliance with the requirement
- Architecture change or revision
- Norm/Regulation to which the system must comply
- cost management
- NOT modified/reviewed
- Other: _____

51. Considering your opinion, what is the status of the non-functional requirement regarding robustness in the current state of the system (if you no longer work on the project, consider the moment of your last contact with it)? - Note that your answer will be about whether the requirement represents the needs of the system well, not whether or not it is being met. *

Mark only one oval.

- It meets the current system needs
- It is out of date with the current system needs
- I can't comment

52. If you wish, explain better or justify your previous answers regarding how the non-functional requirement regarding robustness was defined, was modified and its current state in the project that you are using as a reference for the answer of this survey. Feel free to express your opinion and comments on your experience in other projects as well.

Overview of Non-Functional Requirements Uncertainty

53. After answering the survey questions, if you wish, add your general impressions of how projects deal with the uncertainty of non-functional requirements. We suggest topics such as: when to define these requirements, reasons for change and how the team deals with it. Comment if you think the way your team has been dealing with these changes is adequate, or if you believe that current methods provide adequate mechanisms to deal with this issue.

Thanks and
link to leave
your contacts

Thank you for responding to the survey.

If you would like to receive the results and if you are available to participate in future studies, fill in your details in the form available at the link below:

<https://forms.gle/J3aJqFUAG9VmtHqd7>

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