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Research protocol and results for A Tertiary Study on Quality in Use Evaluation of Smart Environment Applications

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Research protocol and results of a tertiary study submitted to the RCIS 2024 conference

A Tertiary Study on Quality in Use Evaluation of Smart Environment Applications

Maria Paula Corrêa Angeloni, Rafael Duque Medina, Káthia Marçal de Oliveira, Emmanuelle Grislin-Le Strugeon, Cristina Tirnauca

This document is a part of the replication package to ensure the repeatability validity of A Tertiary Study on Quality in Use Evaluation of Smart Environment Applications published in the proceedings of the 18th International Conference on Research Challenges in Information Science (RCIS 2024).

Summary

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| 1 Protocol | 2 |
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1 Protocol

1.1 Change record

| Date | Description | Author(s) |
|------------|---|---|
| 19/07/2023 | Creation of the research question and search string | Káthia |
| 19/07/2023 | First search on Scopus and WoS databases | Maria Paula |
| 19/07/2023 | Exclusion of duplicates | Maria Paula |
| 19/07/2023 | Creation of inclusion and exclusion criteria | Káthia, Maria Paula |
| 21/07/2023 | Conclusion of the primary selection by title | Maria Paula |
| 02/08/2023 | Conclusion of the peer-review according to the titles | Emmanuelle, Cristina |
| 04/08/2023 | Conclusion of the peer-review of the differences in the previous step | Emmanuelle, Cristina |
| 15/08/2023 | Conclusion of the primary selection by abstract | Maria Paula |
| 21/08/2023 | Conclusion of the peer-review according to the abstracts | Rafael |
| 22/08/2023 | Conclusion of the peer-review of the differences in the previous step | Káthia |
| 20/09/2023 | Conclusion of data extraction | Maria Paula |
| 22/09/2023 | Conclusion of the peer-review of the extracted data | Rafael |
| 06/11/2023 | End of discussion about the selection papers | Maria Paula, Rafael |
| 23/11/2023 | Conclusion of the first version of the paper | Maria Paula |
| 22/12/2023 | Conclusion of the second version according to corrections | Maria Paula, Káthia |
| 08/01/2024 | Conclusion of the third version according to corrections | Maria Paula, Káthia, Rafael, Cristina, Emmanuelle |

1.2 Procedure

Performing a tertiary study – a review that analyze secondary studies – to identify methods and techniques applied to evaluate software quality in use.

1.3 Main research question

1. What are the most common evaluation approaches for QinU in smart environments?

1.4 Additional research questions

1. What are the most evaluated types of systems regarding smart environments?
2. Which quality characteristics were the most evaluated in smart environments?

1.5 PICOC and search terms

- **Population:** (“usability” OR “quality in use” OR “effectiveness” OR “efficiency” OR “satisfaction” OR “freedom from risk” OR “context*” OR “usefulness” OR “trust” OR “pleasure” OR “comfort” OR “flexibility”)
- **Intervention:** (“evaluation” OR “assessment” OR “quality evaluation” OR “quality assessment”)
- **Outcome:** (“*systematic literature review” OR “systematic* review*” OR “mapping study” OR “systematic mapping” OR “structured review” OR “secondary study” OR “literature survey” OR “review of survey*” OR “state of research” OR “state of art” OR “rapid review” OR “SLR” OR “scoping review”)
- **Context:** (“smart*” OR “intelligent environment” OR “pervasive” OR “ubiquitous” OR “AAL” OR “ambient intelligence” OR “assisted living” OR “systems of systems” OR “internet of things” OR “Cyber-Physical Systems” OR “Industry 4” OR “fourth industrial revolution” OR “web of things” OR “Internet of Everything” OR “IoT” OR “CPS”)

1.6 Search strategy

- **Scopus:** <https://www.scopus.com/>
- **Web of Science:** <https://www.webofscience.com/>

1.7 Time period

No date limits were established.

1.8 Inclusion criteria

1. Published in the Computer Science or Engineering area;
2. Published in the proceedings of a conference, journal, or as a book chapter;
3. Published as a secondary study;
4. Studies concerning the evaluation of the QinU of smart environment applications.

1.9 Exclusion criteria

1. Studies not published in English;
2. Editorials, books or erratums;
3. Studies duplicated in the results;
4. Studies that have not been found fully available.

1.10 Data extraction

1. **Title**, the study's title;
2. **Goal**, the study's main objective;
3. **Number of papers reviewed**, the amount of papers the secondary review analyzed;
4. **Approaches used for evaluation**, what methods and techniques were applied to evaluate software quality in use;
5. **Type of the system that was evaluated**, the category of the system that had its quality in use evaluated, such as ambient intelligence, multi-touch systems, and so on;
6. **Quality characteristics that were evaluated**, among usability, effectiveness, efficiency, satisfaction, freedom from risk or context coverage;
7. **Type of secondary study**, among systematic literature review, scoping review or systematic mapping;
8. **Type of publication**, among conferences or journals;
9. **Year of publication**, for when the study was published in a digital library or online repository.

1.11 Database search

Scopus

- Subject areas: Computer Science or Engineering areas;
- Language: English;
- Search string: TITLE-ABS(("usability" OR "quality in use" OR "effectiveness" OR "efficiency" OR "satisfaction" OR "freedom from risk" OR "context*" OR "usefulness" OR "trust" OR "pleasure" OR "comfort" OR "flexibility") AND ("evaluation" OR "assessment" OR "quality evaluation" OR "quality assessment") AND ("*systematic literature review" OR "systematic* review*" OR "mapping study" OR "systematic mapping" OR "structured review" OR "secondary study" OR "literature survey" OR "review of survey*" OR "state of research" OR "state of art" OR "rapid review" OR "SLR" OR "scoping review") AND ("smart*" OR "intelligent environment" OR "pervasive" OR "ubiquitous" OR "AAL" OR "ambient intelligence" OR "assisted living" OR "systems of systems" OR "internet of things" OR "Cyber-Physical Systems" OR "Industry 4" OR "fourth industrial revolution" OR "web of things" OR "Internet of Everything" OR "IoT" OR "CPS")) AND (LIMIT-TO (SUBJAREA,"COMP") OR LIMIT-TO (SUBJAREA,"ENGI")) AND (LIMIT-TO (LANGUAGE,"English"))

Web of Science

- Subject areas: Computer Science or Engineering areas;
- Languages: English;

- TS=((("usability" OR "quality in use" OR "effectiveness" OR "efficiency" OR "satisfaction" OR "freedom from risk" OR "context*" OR "usefulness" OR "trust" OR "pleasure" OR "comfort" OR "flexibility") AND ("evaluation" OR "assessment" OR "quality evaluation" OR "quality assessment") AND ("systematic* literature* review*" OR "systematic* review*" OR "mapping study" OR "systematic mapping" OR "structured review" OR "secondary study" OR "literature survey" OR "review of survey" OR "state of research" OR "state of art" OR "rapid review" OR "SLR" OR "scoping review") AND ("smart*" OR "intelligent environment" OR "pervasive" OR "ubiquitous" OR "AAL" OR "ambient intelligence" OR "assisted living" OR "systems of systems" OR "internet of things" OR "Cyber-Physical Systems" OR "Industry 4" OR "fourth industrial revolution" OR "web of things" OR "Internet of Everything" OR "IoT" OR "CPS"))

1.12 Results

- **Scopus:** 338 publications found on 19/07/2023;
- Duplicates within Scopus: 11;
- Total without duplicates: 327.

- **Web of Science:** 861 publications found on 19/07/2023;
- No duplicates within WoS;
- Total: 1,199 publications.

- Duplicates between the two databases: 160 publications;
- Total without duplicates: 1,028 publications.

2 Studies selected by title

In the first step, the following studies were selected to be included in our tertiary review according to their titles.

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3 Studies selected by abstract

In the second step, the following studies were selected to be included in our tertiary review according to their abstracts.

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4 Fully available studies

The following studies were the selected ones that were fully available in a digital library or online repository.

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The following studies were included in the review performed in our tertiary study.

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6 Studies excluded after reading

The following references were excluded from the tertiary study after we read its content in full, as it did not fulfill all inclusion criteria.

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