Evaluating Dissemination and Implementation Strategies to Develop Clinical Software

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Table of contents

- Context
- D&I Framework
- Case study
- Conclusion
Context

• Software products have been helpful in supporting management and productivity in several economic sectors, including healthcare.

• Much of daily clinical work is supported by software that bridge several clinical processes from health care management to more specialized procedures, such as surgeries.
To develop clinical software, developers must often face several challenges.

- Understand the *real clinical problem* that the software must address.

- The inadequate identification of clinical software requirements can lead to the *rejection* of the software and *reduce* clinicians’ expectations.
Context

• This presentation describe a study about the perception of clinicians regarding a bed management software called SIGICAM, whose software requirements were elicited and defined using the D&I Framework.

• In this study we focused on evaluating SIGICAM’s functionalities and tasks based on the usability expectation levels of clinicians using the Health-ITUES questionnaire.
Table of contents

• Context
• D&I Framework
• Case study
• Conclusion
The D&I Framework is a technique that suggests guidelines to elicit requirements in order to contextualize the clinical problem that the software must address\textsuperscript{1}.

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The D&I Framework combines requirement elicitation techniques and clinical intervention-based *implementation* and *dissemination* strategies\(^1,2\).

The D&I Framework considers four stages:

1. Identification of project stakeholders
2. Identification of clinical priorities
3. Collaborative selection of implementation strategies
4. Analysis
Table of contents

• Context

• D&I Framework

• Case study

• Conclusion
Case study (*Context*)

- SIGICAM$^{1,2}$

2. http://sigicam.cl
Case study (*Context*)

- During the development of SIGICAM, the D&I Framework supported the developers in the process of elicitation and description of requirements.

![Release Timeline](image)
Case study (*Goal and Research Question*)

- Although the D&I Framework has supported the SIGICAM development team in each release, it is unclear if the end-users (clinicians) perceive such improvements in the system.

- **Goal**
  - Analyze the functionalities and tasks of SIGICAM for the purpose of evaluating the impact of using the D&I Framework with respect to the elicitation and description of software requirements from the point of view of clinicians in the context of bed management.

- **Research question**
  - *Is there a difference in clinicians’ perception about SIGICAM’s functionalities and tasks regarding the first release (November 2018) and the last one (February 2020)?*
The subjects participating in this case study correspond to emergency nurses, floor nurses, bed managers and service directors.
Case study (Data Collection)

- We used the Health Information Technology Usability Evaluation Scale (Health-ITUES) to evaluate the usability of SIGICAM.
  - Quality of work-life (A)
  - Perceived usefulness (B)
  - Perceived ease of use (C)
  - User control (D)

Case study (*Analysis*)

- We compared the responses to the Health-ITUES questionnaire carried out in November 2018 and February 2020.
  - The first questionnaire was executed three months after the first release of SIGICAM into production; 50 clinicians participated in the questionnaire.
  - On the other hand, the second questionnaire was executed three months after the third release; 48 clinicians participated in this second questionnaire.
- To analyze the answers to both questionnaires, we used descriptive statistics.
- We first calculate the average of the answers for each question of the questionnaire.
- Then, we compared the averages of the answers of each question in both questionnaires.
- Finally, we determine whether there is a difference between the questionnaires’ averages using the $t$-test.
Case study (Results)

- According to the analysis, the difference between the responses of the two surveys is significant.
Case study (*Discussion*)

- The study results show a better perception of clinicians regarding the functionalities and tasks implemented in SIGICAM compared with 2018 and 2020.

- About the first release of SIGICAM, the developers appreciated the guidelines proposed by the D&I Framework to elicit requirements.

- Subsequently, in all the improvements implemented in SIGICAM, the D&I Framework was used to identify new requirements based on the clinical priorities concerning the hospital bed management process.
Case study (Discussion)

• Feedback from SIGICAM’s developers and the study results also reveals that the implementation and dissemination strategies help intervene in challenging and rapidly changing contexts.

• The D&I Framework supported the developers in understanding how well an intervention (implementation or dissemination strategy) helps to have a positive effect on clinicians.

• The framework also helped to detect whether there are unintended consequences to implementing some strategies (and hence to the elicitation of requirements).
Table of contents

• Context
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• Case study
• Conclusion
Conclusions

• This presentation described a study that evaluates the functionalities and task of a bed management system called SIGICAM from the point of view of clinicians.

• The identification and description of these functionalities and task were conducted through the D&I Framework.

• The results of the study indicate that clinicians perceive an improvement in the system.

• To further our research, we plan to evaluate whether the D&I Framework has supported SIGICAM’s developers in managing the COVID-19 contingency for bed management.
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