

Compact Usability Evaluation Procedure for HIS Procurement: Oral Imaging PACS

Mari Tyllinen²

Johanna Viitanen¹, Inkeri Tynell², Petri Mannonen² and Tinja Lääveri¹

¹ Department of Computer Science, Aalto University, Finland

² Oy Apotti Ab, Finland

INTRODUCTION

- Usability of health information systems (HIS) plays a crucial role in end-user satisfaction, operational efficiency, work-related wellbeing, and patient safety
- Need to address usability during the selection of systems
- Practice of including usability assessment in procurement has become fairly common during the last 20 years
- Research into evaluation methods used in procurements is scarce
- Key considerations for planning evaluations: resource allocation, the scope of the HIS, procurement objectives and complex nature of the healthcare environment

METHODS

- Case study – Shared EHR system provider for three public healthcare organizations in Finland
 - Procurement of an integrated oral imaging PACS
- Usability evaluation procedure influencing the final decision
 - Two user groups: general dentists and maxillofacial radiology specialists
 - Demonstration based evaluation, with predetermined user scenarios
 - Focus on user satisfaction and overall usability as evaluation goals
 - Comprehensive scope addressed in a relatively short time

Objective:

Streamlined usability evaluation procedure for a limited functional scope

USABILITY EVALUATION PROCEDURE

- Two 30-minute scenarios for demonstrations: Viewing images for general dentistry (scenario 1) and viewer for oral radiologists (scenario 2)
- Evaluation goals required input from both end users and usability specialists
- Due to similar evaluation goals, we decided to utilize same evaluation methods that were developed for the previous EHR procurement
- Modifications were needed for context, length of demonstration (scope of procured system) and stage of procurement (elimination phase vs. final selection)

USABILITY EVALUATION PROCEDURE

Evaluators

Usability specialists

Future end users

Methods

Heuristic
evaluation
during
demonstrations
[HED]

Perceived
usability
questionnaire
for
demonstrations
[DPUQ]

User
assessment of
statements on
performing key
tasks

Evaluation goal

Overall usability

User satisfaction

Full paper provides weighted scoring for scenarios and methods

[HED] Tyllinen M, Kaipio J, Lääveri T, Nieminen M. We need numbers! - Heuristic evaluation during demonstrations (HED) for measuring usability in IT system procurement, In: Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI'16); 2016 May 7-9; San Diego, CA. New York (NY): ACM; p.4129-41. doi: 10.1145/2858036.2858570

[DPUQ] Tyllinen M, Kaipio J, Lääveri T, Nieminen M. End-users' voice in EHR selection: development of a usability questionnaire for demonstrations in procurement (DPUQ). In: Lau F, editors. Building Capacity for Health Informatics in the Future, Stud Health Technol Inform; 2017 Feb; IOS Press; 234. p. 346-51. doi: 10.3233/978-1-61499-742-9-346

ADAPTED HED METHOD

- HED is an adaption on traditional heuristic evaluation
- HED phases: (1) preparation for analysis, (2) analysis during demonstration, and (3) aggregation of results along with establishing the usability grade
- Modifications for scenario/demonstration length and stage of procurement
 - Phase 1: Predetermining expected range for points in a 30-minute demonstration
 - Phase 3: New final scoring. First calculating an arithmetic mean of individual evaluators' raw points, then scaling it (a linear scale from 0 to 3)

**Very poor
usability**

Min. raw points

→ Scaled to 0

**No usability
problems**

0 raw points

→ Scaled to 3

ADAPTED DPUQ METHOD: DPUQ-LITE

- DPUQ is based on standardized end-user usability questionnaires, developed for seeing the system being used: 22 statements & three parts
- DPUQ-Lite includes 10 statements
 - Adjusted for scenario length and context specificity
- Likert scale ranging from 0 to 3 for statements, scoring calculated as the arithmetic mean of the sums of responses from each user

Example statements from DPUQ-Lite	DPUQ item #
The arrangement of fields and functions on the system screen is logical	1.1
The necessary information is easily available in the system and can be effectively utilized	2.2+2.3/3.6
The system is very suitable for completing my everyday work	3.10

INITIAL EXPERIENCES

Case study

Two PACS vendors evaluated in August 2024

Evaluators	Scenario 1	Scenario 2
10 dentists	X	
3 maxillofacial radiologists	X	X
3 usability specialists	X	X

- Scaled scores from all methods relatively similar (between 0.15 to 0.80 points)
- Statistical correlation was calculated for all methods
 - Strong positive correlation between the DPUQ-Lite and Key task questionnaires
- For all methods, the differences and ranking between vendors were consistent
 - Individual variations in score level among usability specialists in HED

Comprehensive scoring and correlations are presented in the paper

SUMMARY

- Concise and cost-effective usability evaluation procedure tailored for small HIS procurements
- Incorporates insights from end-users and usability specialists
- Results indicate good alignment between user questionnaires, and HED and key tasks questionnaire
 - Small sample size suggests further research is needed on the connection between HED and DPUQ-Lite
- Usability can be effectively assessed during procurement with reasonable resources, maintaining both scope and user involvement

THANK YOU

Contact:

Mari Tyllinen, *UX Manager, D.Sc.(Tech.)*

mari.tyllinen@alumni.aalto.fi

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