

Activities to Improve System Integration and Service Quality and Add Additional Values - Reducing the Cost in Applying Human-Centered-Design Process -

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Abstract. NEC Soft has organized a team of Human-Centered-Design (HCD) specialists who have been engaging in activities to apply the HCD process to system integration (SI) and service projects for improving usability since 2007. HCD is an effective method for improving usability in SI and services. However, many engineers do not focus on improve usability because of the difficulty measuring the effectiveness of its benefits, unlike quality control actions such as eliminating bugs. In this paper, we will propose a method for applying the HCD process for minimal cost to convince engineers of the quantitative effects of using the HCD process for improving usability.

Keywords: HCD, cost benefit, system integration, small start, reducing HCD cost.

1 Introduction

Definitions of Terms

- Human-Centered-Design (HCD) specialist: knows about HCD and usability for designing system UI
- Designer: knows about artistic coloring and designing
- Engineer: receives customer requirements and does programing

NEC Soft has organized a team of Human-Centered-Design (HCD) specialists who have been engaging in activities to apply the HCD process to system integration (SI) and service projects for improving usability since 2007.

HCD is an effective method for improving usability in SI and services. However, many engineers do not focus on improving usability because of difficulty measuring the effectiveness of its benefits, unlike quality control actions such as eliminating bugs.

As costs are reduced and delivery deadlines are shortened for SI and service projects, further cost reduction efforts are needed to improve usability. Thus, the HCD process is applied.

Since NEC Soft started applying the HCD process to SI and service projects in 2007, the application rate has remained steady at approximately 10% or less of the total number of projects within NEC Soft.

We have hypothesized that the reason for this low take-up rate is the engineers' reluctance to apply the HCD process to their projects. They have not been convinced to apply the process due to uncertainty about the cost effectiveness and the cost benefits of HCD.

In this paper, we will propose a method for using the HCD process for minimal cost to convince the engineers of the quantitative effects of using the HCD process for improving usability.

2 Engineers' Opinions towards Improving Usability

HCD effectively improves usability at SI and service projects and customer satisfaction. However, its effectiveness is difficult to explain quantitatively to engineers and stakeholders, so we started to let the engineers experience improved usability.

2.1 Understanding Engineers' Attitudes

We wanted to know what the engineers' thoughts and objectives are, who the other stakeholders are, and what their projects involve. To find these out, we held a seminar for and meet with engineers.

Seminar for Engineers

In the seminar, we gave the engineers a questionnaire.

<Example questions >

- What do you know about HCD?
- How necessary do you think usability is and why?
- What, if any, are the problems with your project?
- In what ways, if any, does your product/service need its usability improved?
- How much you would pay to improve usability?

Meeting Engineers to Introduce Our HCD Activities

After explaining our organization's HCD activities for 15 to 30 minutes, we discussed with the engineers about their projects.

<Example questions >

- What kind of customers do you have (e.g. manufacturing, retail, etc.)?
- What is your current project?
- What was your previous project?
- How necessary do you think it is to improve your product/service usability?

We interviewed more than 100 engineers in the seminar and the meeting. We noticed that most engineers rejected focusing on improving usability and applying HCD for various reasons.

2.2 Results of Interviews with the Engineers

The results of the questionnaires and interviews revealed the following reasons the engineers did not want to improve usability or apply HCD.

- The engineers did not have any ideas for improving usability.
- Quality, cost, and delivery times (QCD) are the top priorities, so the engineers did not want to do more than necessary for meeting QCD requirements.
- We made a usability checklist that is available commonly, but it has too many items for the engineers to check.
- The engineers cannot clearly imagine how to improve usability and apply HCD because they have no experience of doing so. They also have no idea how much they would pay to do so.

We finally hypothesized that to promote improving usability, it is important to let the engineers experience applying HCD and realizing its effectiveness. To do so, we proposed a “small start” for applying HCD while aiming to minimize the necessary HCD cost. In this paper, we explain our method and describe two case studies.

3 Case Studies

We applied HCD for improving usability for more than 100 projects over seven years. Two such cases are described below.

3.1 Case 1: Improving Usability of Service (SAAS) for Telephone Shopping Call Center

1. Stakeholders: sales division, the engineers, designers, and HCD specialists.
2. The engineers’ motivation for improving usability: medium. They want to differentiate themselves by improving usability. However, differentiation by adding functions is the top priority.
3. Users: temporary employees at call centers, mostly female.

4. Frequency of use: one to five times a week. One user handles several dozen calls.
5. Recognized aim: minimizing operation time.
6. Experience of applying HCD: none.
7. Ingenuity point: finish system operation without speaking, only using a keyboard. Less UI interaction is needed, and all functions are incorporated onto one screen.
8. Cost for HCD: 3% of project budget.

3.2 Case 2: Improving Usability of Automatic Ticket Machines in Cinema Complex

1. Stakeholders: sales division, engineers, designers, and HCD specialists.
2. The engineers' motivation for improving usability: high. Because of customer requirements, they have to improve usability and consider UX.
3. Users: movie goers from 10 to 80 years old.
4. Frequency of use: inconsistent. From once a year to several times a week.
5. Recognized aim: buying movie tickets using automatic ticket machine without employees' help.
6. Experience of applying HCD: none
7. Ingenuity point: operable for first-time user. Attractive design matching cinema atmosphere.
8. Cost for HCD: 5% of project budget

- 1.
2. The contents of both cases are shown in Table 1.
- 3.
- 4.

Table 1.

5.	6. Case 1	7. Case 2
8. Project outline	9. Service (SAAS) for telephone shopping call center	10. Automatic ticket machine in cinema complex
11. Hardware	12. Personal computer	13. Automatic ticket machine
14. Stakeholders	15. Sales division, engineers, designers, and HCD specialist	16. Sales division, engineers, designers, and HCD specialist

Table 1. (Continued)

17. Engineers' motivation for improving usability	18. Medium. They want to differentiate themselves by improving usability. However, differentiation by adding function is top priority.	19. High. Because of customer requirements, they have to improve usability and consider UX.
20. User Location	21. Call center for telephone shopping	22. Cinema complex
23. Users	24. Temporary employees, mostly female.	25. Movie goers.
26. User age	27. From 18 to 40	28. From 10 to 80.
29. Frequency of use	30. One to 5 times a week. One user handles several dozen calls.	31. Inconsistent. From once a year to several times a week.
32. Recognized aim	33. Minimizing operation time.	34. Buying movie tickets using automatic ticket machine without employees' help.
35. Experience of applying HCD	36. None	37. None
38. Ingenuity point	39. Finish system operation without speaking, only using a keyboard.	40. Operable for first-time users. Attractive design matching cinema atmosphere.
41. Cost for HCD	42. 3% of project budget	43. 5% of project budget

4 Application of HDC

4.1 Engineer's Understanding in Both Cases

The commonality of both cases is that there was no experience of applying HCD. Thus, the engineers' understanding was as follows.

- A) They had no idea what to do.
- B) They had no image of what improved usability would be like.
- C) They did not know how much to spend to improve usability.
- D) They wanted to reduce the risk of applying HCD.

4.2 “Small Start” for Applying HCD

We proposed that the engineers do a “small start” for applying HCD.

ISO9241-210 Process of Design Solutions Production Activities

To improve operability for minimal cost and also improve the attractiveness of design, we had to make the engineers realize the effectiveness of HCD. Therefore, we concentrated resources on Design Solutions Production Activities. However, other processes also needed to be applied effectively, so we applied processes using different methods.

- Understand and specify the context of use
- Specify user and organizational requirements
- Evaluate designs on the basis of requirements [1]

<Example methods >.

- User interviews

After we collected information that engineers had received from customers, we concentrated on filling in gaps in information by interviewing users.

- Heuristic evaluation method

The heuristic evaluation method checklist has too many items. To evaluate usability better, we devised a shorter checklist for each project.

- Select standard screens as formats

We selected standard screens for formats, such as a selection menus and input screens.

Project Management Techniques for Maximizing Cost-Effectiveness of HCD

To maximize cost benefits of applying all HCD processes, especially Design Solutions Production Activities, engineers, designers, and HCD specialists need to collaborate. Below is what HCD specialists should do to manage projects effectively.

What HCD specialist should do.

1. Watch over the progress of the project.
2. Clarify the agreed on responsibilities of the engineers, designers, and HCD specialists.
3. Understand programming restrictions.
4. Reduce the budget for designing screens by using standard formats.
5. Understand the details of the each task, production costs, output, and technical terms and act as an intermediary between the engineers and designers.

6. Work with offshore designers by illustrating ideas with pictures, not only words.

5 Results and Discussion

5.1 Quantitative Effectiveness

- Costs were reduced after inclusion of HCD specialists and the subsequent application of the method. The costs were reduced by 10% to 40% in cases where a domestic designer participated in the project and 30% to 60% in cases where a domestic designer was replaced by an offshore designer.
- In both projects, the cost for applying the HCD process fell by one to two million yen regardless of the size of the project.

5.2 Qualitative Effectiveness

After the HCD process had been applied:

- End user's satisfaction level improved.
- The results of heuristic evaluation improved.

The initial target was demonstrating qualitative effectiveness for improving usability by applying HCD, but we also demonstrated quantitative effectiveness.

6 Conclusion

We applied Human-Centered-Design (HCD) for minimal cost to projects at the outline design phase (or later). We found that the cost for applying the HCD process can be reduced by the HCD specialists playing an effective role. By applying only relevant activities of the HCD process, it was proven that usability improvements, as assessed through heuristic evaluation, can be ensured.

In this study, we concentrated on letting engineers experience improving usability through HCD. We proposed a "small start" for applying HCD, especially Design Solutions Production Activities.

We will study more effective ways for improving usability.

Reference

1. ISO standards. Usability Partners,
<http://www.usabilitypartners.se/about-usability/iso-standards>
(retrieved)