Social Value Design Promotion Activities in NEC

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Abstract

Activities to promote Social Value Design in an enterprise consist of (1) the planning and development of products and services, (2) analysis of the effects of human-centered design (HCD) in activities and case implementation, (3) standardization of user interface (UI) and appearance and development of standard processes, (4) human resource cultivation and education and (5) organizational arrangement. In this paper, the authors report on the activities related to the effect analysis and case implementation that are effective to make NEC employees recognize the necessity of HCD. In this paper, the in-house effects of HCD activities include contributing to sales and improving development efficiency and quality and the effect for the benefit of customers is improved job efficiency. In addition, this paper also clarifies the effects of the NEC Group's in-house HCD enforcement project. The results of the analysis were posted on our intranet site and utilized it in education to enhance understanding of HCD and the will to undertake related endeavors throughout the entire Group.

Keywords

human-centered design, effect measurement, return on investment, in-house promotion

1. Introduction

Social Value Design creates new value for society and our customers' business using human-centered design (HCD) and design thinking. At NEC, we believe it is important to consider value from the perspectives of humans and society based on full use of advanced technology in order to develop NEC's Solutions for Society. To apply Social Value Design to the planning and development of products and services, the efforts of the entire NEC Group are critical. In this paper, we will report on our activities to promote Social Value Design within the NEC Group.

2. Overview of Social Value Design Promotion Activities

Our in-house promotion of Social Value Design consists of five types of activities, as shown in **Fig. 1**. The basis of all of them is (1) the planning and development of products and services applied Social Value Design. These activities are performed in collaboration between each operations department and a group of HCD specialists. To promote Social Value Design widely in-house, we are conducting various activities based on these hands-on activities.

For example, we perform (2) analysis of the effects of HCD in hands-on activities and case implementation and also (3) standardization of UI and appearance and also development of standard planning/development processes incorporating HCD. Based on the results of these activities, we then perform (4) human resource cultivation and education to promote understanding of HCD and improve skills. Concurrent with education activities, we also study methods to develop activities in collaboration with each operations department and (5) arrange the organization and system appropriate to each department by considering the characteristics of its handled products, existing processes and organization.
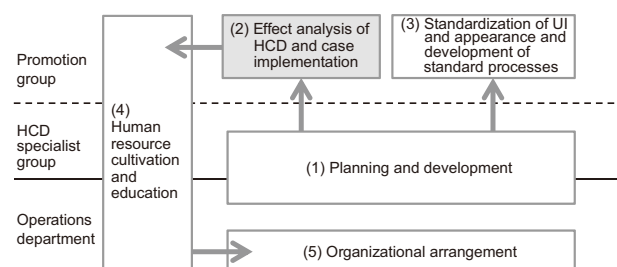

Fig. 1 Outline of in-house Social Value Design promotion activities.

In the next section, we will discuss in detail the effect analysis and case implementation that are effective at helping in-house staff recognize the necessity of HCD.

3. Analysis of the Effect of HCD

3.1 Purpose of Effect Analysis

To apply HCD to the product development of an enterprise, it is necessary for the in-house staff, including developers and management, to recognize the necessity of HCD and incorporate it into their development processes. However, since the introduction of HCD often involves new activities that are not included in existing development processes, it is important to demonstrate a return on investment. We therefore collected the activity processes of projects applying HCD and analyzed what kinds of effects were obtained.

3.2 Effect Types and Analysis Methods

HCD effects can be divided into in-house effects, such as those for the development department, and effects for customers, which can be further divided into effects from the viewpoint of management and those from the viewpoint of the actual users of products. What is important in measuring the effects is to use quantitative analysis expressed in numerical values and qualitative analysis. **Table 1** shows the effect types that can be measured with the two analysis methods.

3.3 Effect Analysis

We analyzed the effects of the in-house projects applying HCD. The important aspects of effect analysis include (1) clarification of relationship between effects and HCD activities, (2) collection of estimated values for quantitative analysis and (3) compilation of hypothesized effects for qualitative analysis.

Table 1 Quantitative and qualitative analysis.

	Quantitative analysis	Qualitative analysis
In-house effects		
Contribution to sales	Total orders, total contributed	Contribution details
Development efficiency improvement	Estimated cost reduction	Actual feeling concerning the development period and requirements identification
Quality improvement	Operation time, error count, etc.	Actual feeling of satisfaction and differentiation from competitors
Customer effects (end users)		
Job efficiency improvement	Job efficiency (time, error count, etc.)	Actual feeling of satisfaction, etc.
Customer effects (management)		
Job efficiency improvement	Job efficiency (cost)	Actual feeling of satisfaction, etc.

(1) Clarification of relationship between effects and HCD activities

HCD activities are not particularly familiar to the in-house developers and management staff to whom their effectiveness is to be shown. It is therefore important to specify the details and costs of HCD and to clarify the relationship between HCD activities and their produced value.

To make this possible, we compiled a case sheet for each project, the format of which consists of (1) project outline, (2) purpose and background of HCD application, (3) processes and members, (4) details of HCD development processes, (5) effects on customers, (6) in-house effects and (7) HCD development costs and schedule. Using this case sheet, we conducted hearings with the persons involved in each project, including developers and planners, in order to obtain common recognition of the activities and their effects among those persons.

(2) Collection of estimated values for quantitative analysis

To show the effects of HCD in an easy-to-understand manner and to encourage recognition of its necessity, it is important to convert its effects into numerical values. However, since it is difficult to measure and compare numerical values by arranging optimal conditions at the actual development site, we contrived to obtain estimated values by the following method.

First, we held hearings with developers about the qualitative effects associated with development efficiency improvement, such as reductions in development man-hours and backtracking. In each hearing, we collected information on the improvements made possible by HCD compared to traditional development by separating them

Table 2 Examples of questionnaire items for estimate collection.

Q. Please select the items you think are improved by HCD compared to past development projects.
1. Specification of usage scenarios
2. Creation/implementation of ideas
3. Concept design
4. Identification/classification of customer needs
5. Determination of user persona
6. Identification/analysis of usage situations
7. Identification/evaluation of usability issues
8. Prototype development
9. Software user interface classification/patterns/templates
10. Hardware prototypes/mockups
11. Standards, rules and development instructions
12. Universal design compatibility (compatibility with standards)
Q. If the item is performed without using HCD:
Time ( )
Cost ( )
Impossible at any cost or amount of time

into specific items, then asked each developer to estimate the time and cost reduction effects of each item compared to previous equivalent projects performed without HCD (**Table 2**).

(3) Questionnaire items for qualitative analysis

Even when the developer and customer are not aware of the effects associated with HCD, it is necessary to make tentative effect lists in advance and draw out developer's and customer's opinions that they are not aware of.

We developed tentative effect lists by referring to the effects obtained in a variety of past in-house projects applying HCD and to past reference materials. We asked the persons involved in various projects which effect lists apply to their project (**Table 3**).

3.4 Results of Effect Analysis

Table 4 shows the results of the effect analysis of seventeen in-house projects. To clarify the characteristics of these projects, the table shows the domains (concept, software and hardware) and development phases (planning, proposal, requirements definition and design and development) to which HCD is applied. It also divides the effects into in-house effects

Table 3 Examples of questionnaire items for qualitative analysis.

Q. Please select the effects for the company.
1. Contribution to sales
• Proposal support (e.g., "We could deal with indispensable requirements such as submission of standard documents.")
• Customer satisfaction (e.g., "Customers gave us favorable comments.")
2. Development efficiency improvement
• Optimal requirements identification/specification (e.g., "We were able to find potential issues that even customers did not notice.")
• Development efficiency improvement (consensus building) (e.g., "Coordination of opinions and agreement on targets with customers have become smoother than before.")
• Development efficiency improvement (components) (e.g., "The establishment of UI standards has reduced the burden on development personnel.")
• Development efficiency improvement (risk avoidance) (e.g., "Early establishment of interface design has made it possible to avoid the risk of later modifications.")
3. Quality improvement
• Differentiation from competitors (e.g., "We were able to develop concepts that differentiate us from our competitors.")
• Unified feeling (e.g., "We could create a consistent UI.")
• Usability quality (e.g., "The ease of learning has improved.")
Q. Please select the effects for customers.
1. End user's perspective (efficiency, effectiveness, satisfaction)
• Work efficiency improvement (e.g., "The working hours of workers have been reduced.")
• Work error reduction (effectiveness) (e.g., "We were able to reduce the risk of operational mistakes.")
• Worker satisfaction improvement (e.g., "Workers gave us favorable comments.")
2. Manager's perspective
• Training costs (e.g., "Novices, including part-timers, can use it.")
• Inquiries (e.g., "Inquiries into operating procedures have been reduced.")
• Maintenance (e.g., "Maintenance time has been reduced.")
• Brand (e.g., "The brand value of the products has increased.")

(contribution to sales, development efficiency and quality improvement) and customer effects (job efficiency/satisfaction improvements from the perspective of end users and job efficiency/satisfaction improvements from the perspective of management) and records an "○" when an answer saying "It was effective" was given to each question in the questionnaire.

Although each item includes several questions, the table defines an item as "effective" if at least one answer said "It was effective." The fact that "effective" was answered for most of the items, from contribution to sales to job efficiency improvement, of all of the projects shows that the project members of projects applying HCD actually feel the effectiveness of HCD.

The specific effects clarified by the questionnaire are as follows:

(1) Contribution to sales

In a project related to system proposals, we identified the issues from the perspective of end users, who are the customers of our customer, by using HCD techniques such as observation and proposed a concept that would enhance the customer's business value. As a result, we succeeded in receiving an order for a new system by beating competitors that included the manufacturer of the current system. With this case, we described the effect of contribution to sales, including the sum of orders received as well as an appreciation of the system concept developed based on HCD activity in the proposal competition.

(2) Development efficiency improvement

In a UI development project accompanying a large-scale system renewal, we applied the HCD technique of pigeonholing customers' needs by visualizing them. As a result, we succeeded in decreasing the loss of work related to the creation and implementation of ideas by about 10 persons and 2 or 3 months compared to traditional development. With each case of this kind, we described such development efficiency improvement effects.

(3) Quality and job efficiency improvements

For a business system UI, we unified all operations and made intuitive control possible. As a result, it was predicted that work time would be reduced compared to equivalent products from competitors. If there are 1,000 users operating a system and the time taken for an operation performed once a day can be reduced by 8 seconds, total work time can be reduced by about 800 hours per year. With each case of this kind, we described such job efficiency effects for the customer.

3.5 Utilization of Effect Analysis Result

We sorted the cases for which we described effect analysis results by the business field the projects are involved in and by each background issue necessitating HCD. These cases are posted on our intranet site for use in in-house explanation and

Table 4 Effects on projects.

PJ No.	Scope of application	Phase	In-house				Customers	
			Contribution to sales		Development efficiency improvement	Quality improvement	End user job efficiency satisfaction	Management job efficiency satisfaction
			Customer satisfaction	Contribution to orders received				
1	Concept	Proposal	○	◎	○	○	━	○
2	Concept	Proposal	○	◎	○	━	━	━
3	Concept	Proposal	○	◎	○	○	○	━
4	Concept Software	Proposal	○	◎	○	○	○	○
5	Concept Software	Planning Requirements definition Design and development	○	◎	○	○	○	○
6	Software	Planning Requirements definition	○	◎	○	○	○	━
7	Software	Requirements definition Design and development	○	━	◎	○	○	○
8	Software	Requirements definition Design and development	○	━	○	○	○	○
9	Software	Requirements definition Design						
10	Software	Design	○	━	◎	○	○	○
11	Software	Design	○	━	○	○	○	○
12	Software	Requirements definition Design	○	○	◎	○	○	○
13	Software	Design and development	○	○	○	○	○	○
14	Software	Design and development	━	◎	◎	○	○	○
15	Hardware	Planning Design and development	○	◎	○	○	○	○
16	Hardware	Planning Design and development	━	━	○	○	━	○
17	Hardware	Planning Design and development	○	◎	○	○	○	○

◎: Effective (with quantitative value), ○: Effective, ━: Not applicable

education. In fact, an increasing number of operations departments reading the actual cases on the site have been addressing inquiries to us on the uses of HCD. The understanding of HCD and the will to make related endeavors have also been enhanced by in-house education introducing the cases that seem to be related to the operational fields and issues as well as the expected effects of the trainees. We believe that clarifying the effects of HCD is very effective at encouraging the in-house recognition of the necessity of HCD.

4. Conclusion

As introduced above, the Design Strategy Groups of the MONODUKURI Innovation Division of NEC are promoting Social Value Design throughout the NEC Group through the planning and development of products and services including effect analysis, case implementation, standardization, education and system implementation. We believe that it is important in the future to enforce promotion measures appropriate to actual fields, including the compilation of process guides that explicitly indicate operation processes and Human-Centered Design activities, the establishment of an in-house skill approval system and the development of an in-house human resource cultivation system. In addition, we believe it is important to practice and verify HCD in new fields by enhancing its utilization in new fields of operation and promoting its global deployment.

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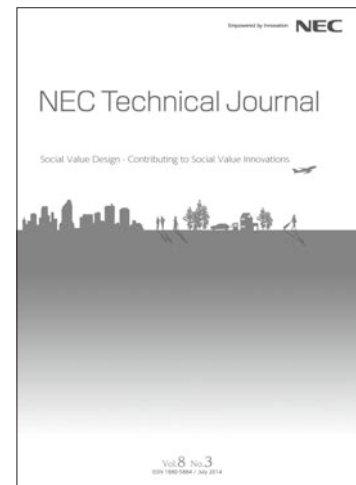
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NEC Group's Approach to Social Value Design

Social Value Design Promotion Activities in NEC

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Special Issue TOP