Proposal of Evaluation Support System of Nursing-Care Service Components

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Abstract. We are trying to design employees' motivation and create technology to realize sustainable improvement in nursing-care service field. Components in nursing-care service such as how to care eating or how to help walking with a robot should be evaluated in order to improve the action and raise the service quality. But it is difficult to understand actions and results in the whole nursing-care service field because employees do not have enough time to record them and are not motivated to do so. Recording support mobile terminals cooperated with various sensors embedded in the facilities and employees will support visualize situation in such collaborative and face-to-face service field. Moreover motivation design for employees to record action and knowledge is crucial because human-sensor and human-computation ability is completely dependent on their proactivity. In this paper we propose evaluation support methodology of nursing-care service components with both direct effect and log-term effect of the action by participatory interaction design, which we proposed previously.

Keywords: Nursing-care service, evaluation, service components, collaborative system development.

1 Introduction

The national burden of long-term care insurance costs in Japan during FY 2009 rose to 7.7 trillion yen, underscoring a continuously rising trend [1]. It is important to reduce this burden by improving healthcare service productivity and fostering a health-conscious community.

The profitability of many care services is less than 5%. Moreover, healthcare workers bear a large workload. Thus, improving productivity while maintaining the quality of service is an urgent task. Nursing-care services comprise care facility services, visiting services, and assistive device services. This paper examines facility services because they have more possibility to improve their teamwork. Many people from different backgrounds and serving in different roles must collaborate to provide nursing-care services for various residents and patients. For these reasons, service processes vary widely depending on the workplace community characteristics related to employees, patients, and the environment. Furthermore, it is difficult to collaborate

S. Yamamoto (Ed.): HIMI 2014, Part I, LNCS 8521, pp. 613–620, 2014.

effectively and gain patients' trust, both of which can greatly improve service productivity[12].

A business analysis of helpers in a care service facility was conducted with the cooperation of an assisted-living paid nursing home in the city of Osaka, Hirano Super Court (SC Hirano). The results, reported herein, indicate that 58% of the helpers' time was spent on work that was not directly related to nursing, and 30% of their time was spent recording and sharing information, especially computer work such as transcription and calculation. Such indirect work does not engender long-term care insurance points. Moreover, it is not directly related to the value of the care received. Therefore, research is being conducted to support the creation and visualization of work records.

To this end, attention is being devoted to the introduction of IT infrastructure to promote cooperation and alignment among employees. This should promote the development of a technological interface to facilitate an efficient workflow and limit the increase in data input work, which is not directly related to care.

This proposal encourages the active participation of employees in real-world environments to develop a system that can be expected to embed itself into the employees' natural workflow (Participatory Interaction Design). In addition, employees should be able to share knowledge in the workplace, using technology to record information whenever a task is completed (point-of-care recording). In the latter case, an input system that enables the ready sharing of necessary workplace-related knowledge should be realized, thereby creating a systematic information database that can be shared among workers.

The situation is similar in mutual-support communities, such as dance circles. Members want to improve their health condition, but some require more support from others instead of trying to change the situation proactively. The members have a varying ability to support the community, and have the potential to find a more adequate solution to activate their fellow members.

Participatory interaction design is important for this purpose, and so an activity methodology combined with technical systems should be investigated. Three steps towards participatory interaction design are proposed, and prototypes for the steps are proposed [12].

Components in nursing-care service such as how to care eating or how to help walking with a robot should be evaluated in order to improve the action and raise the service quality. But it is difficult to understand actions and results in the whole nursing-care service field because employees do not have enough time to record them and are not motivated to do so. Recording support mobile terminals cooperated with various sensors embedded in the facilities and employees will support visualize situation in such collaborative and face-to-face service field. Moreover motivation design for employees to record action and knowledge is crucial because human-sensor and human-computation ability is completely dependent on their proactivity. In this paper we propose evaluation support methodology of nursing-care service components with both direct effect and log-term effect of the action by participatory interaction design, which we proposed previously.

2 Evaluation Methodology of Service Components

In this paper we propose evaluation support methodology of nursing-care service components. The methodology is designed for employees to easily adopt it because the evaluation needs their endeavor and proactivity. We developed five stages as mentioned in Figure 1.

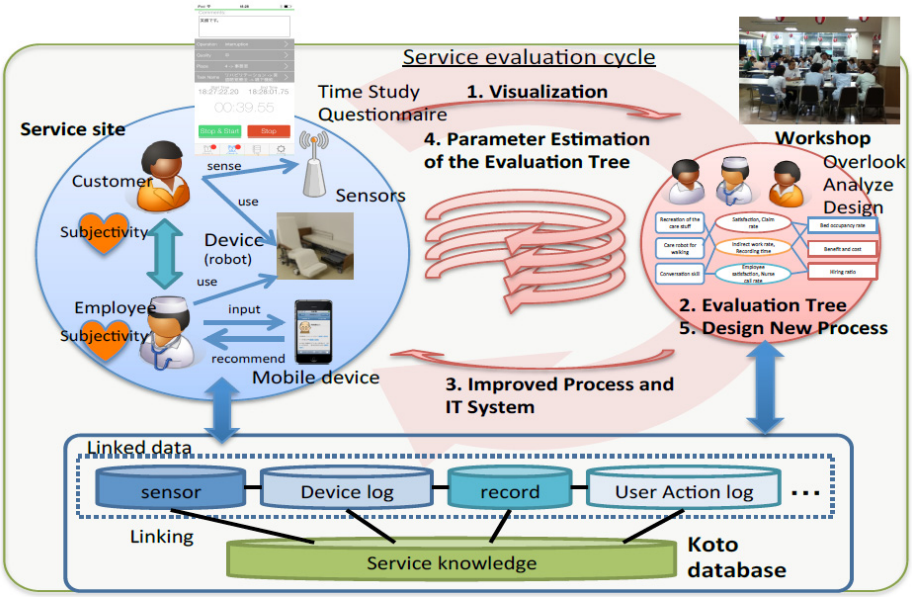

Fig. 1. Service evaluation cycle

1. Visualization
   Visualize status and activity in the service field as shown in Figure 3.
2. Evaluation Tree
   Create "Evaluation Tree" by workshop of employees and customers as shown in Figure 2.
3. Improved Process and IT system
   Apply Improved Process and develop new IT System for further data collection and process improvement.
4. Parameter Estimation of the Evaluation Tree
   Parameters are estimated by using data, which was collected in the service field.
5. Design new process by workshop
   As the results of the parameter estimation, if a certain service component is not effective, then it can be revised.

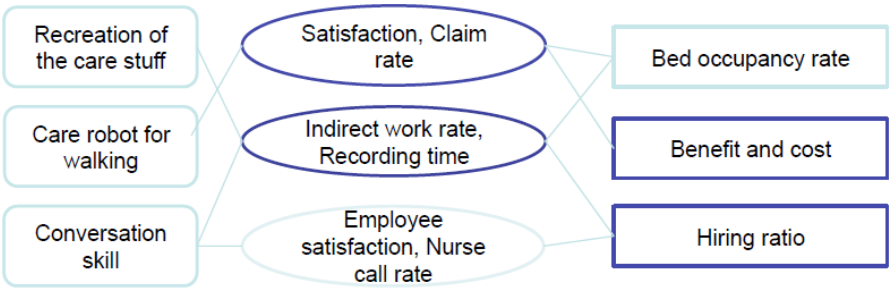

Fig. 2. An example of "Evaluation Tree" which shows relation among service components and KPIs

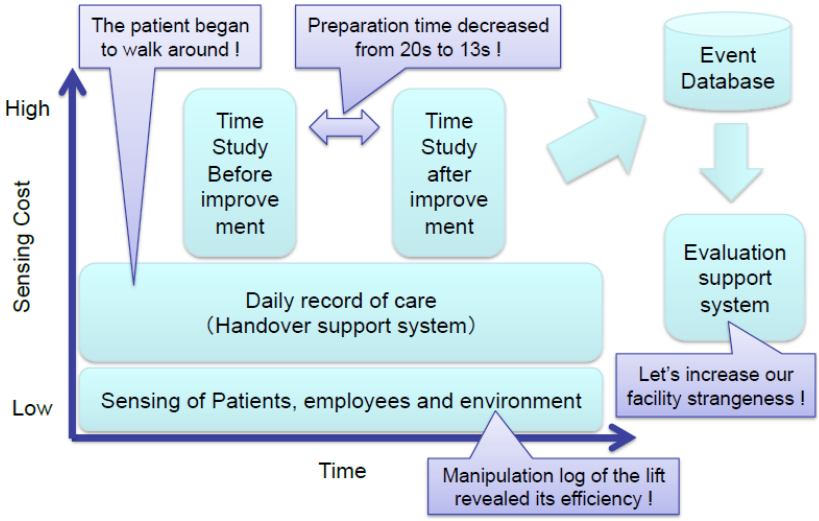

Fig. 3. Evaluation support methodology

"Evaluation Tree" is a tree which shows relationship among service components and KPIs(Key Performance Indexes) as shown in Figure 2. KPIs include sales, benefit, incident rate as well as employees' satisfaction, injury rate, separation rate or team work. Those evaluation trees are different and original because each nursing-care facilities have their own strategies and features. Therefore employees and customers should develop the tree by themselves.

But in order to develop appropriate evaluation tree, visualization of the employees' health condition, their vision, on site activities and customers satisfaction. Therefore as the first step, both direct effect observation of the action and indirect effect estimation of the action are important as shown in Figure 3.

- Direct effect observation: quality and time of each service component. This observation is achieved by time study, analyzing sensor data and questionnaires.
- Indirect effect observation: side effects after the service component. This observation is achieved by overlook action in workshop, analyzing handover messages and questionnaires.

Time study and questionnaire are usually burdensome and high cost but they are precise and quality is high. Handover support system and sensors are low cost and used in every day activities. Therefore the former methods are usually employed occasionally and enhance the data of the latter methods.

3 Support Tool Examples

We developed time study support tool with mobile device, which enable an observer to record direct effect such as an employee's action and quality quickly (Figure 4).

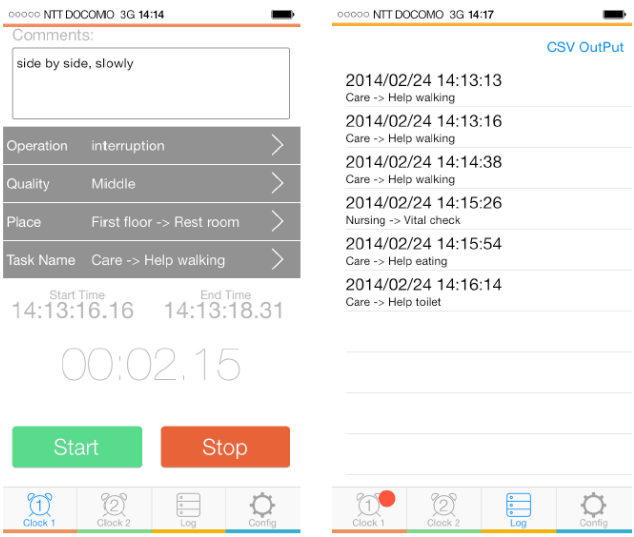

Fig. 4. Time study support tool for an observer to record category of task, place, quality and operation with some comments

The category definitions of tasks, places, quality and operation are easily introduced by table data beforehand and can be selected hierarchically on the spot. This application is available on Apple Co.'s iTunes store as a name of "QualityStudy free". The results of time study will reveal temporal and qualitative evaluation of the service components (Figure 5).

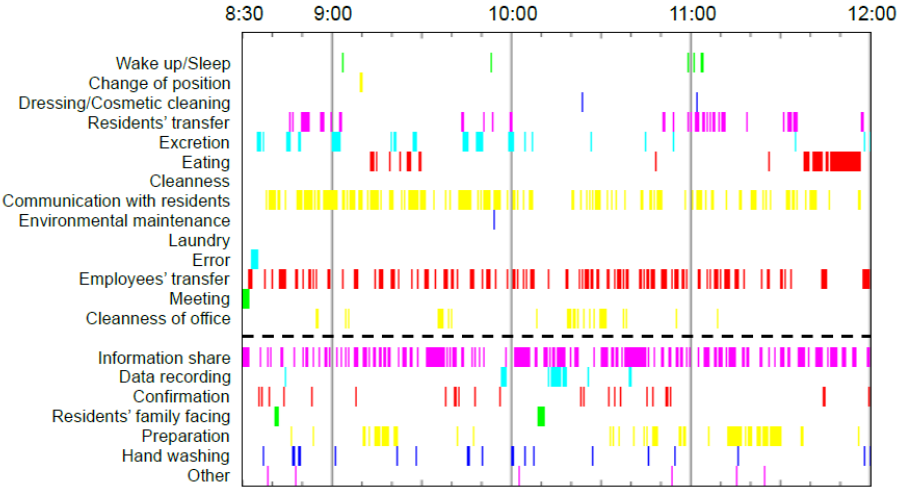

Fig. 5. An example of visualization of time study results

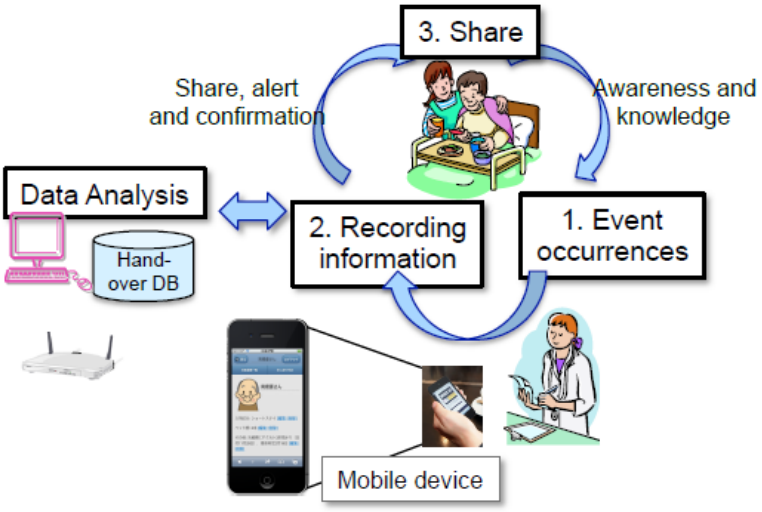

Fig. 6. Handover support system configurations

We will utilize our previous handover support system for recording indirect effect of the components. Employees usually use the system to share important events and actions for maintaining quality of service. Such daily system will help observes to find sub-effect of the components such as increase of patient's activity influenced by a walking support robot.

As Figure 6 shows, a user can use the server-side software via a wireless LAN by installing an application that has the function of capturing multimedia data such as pictures or sound. The following explains system features such as the related example function and search-term recommendations.

This handover support system has features shown in Figure 7. We suggested new workflow to the employees which enables quick input because, to change a patient's face sheet, the person and a category should be selected, which gives contextual information to the system to recommend appropriate candidates. Employees can easily change the face sheet while making handovers and can easily create a handover after changing the face sheet.

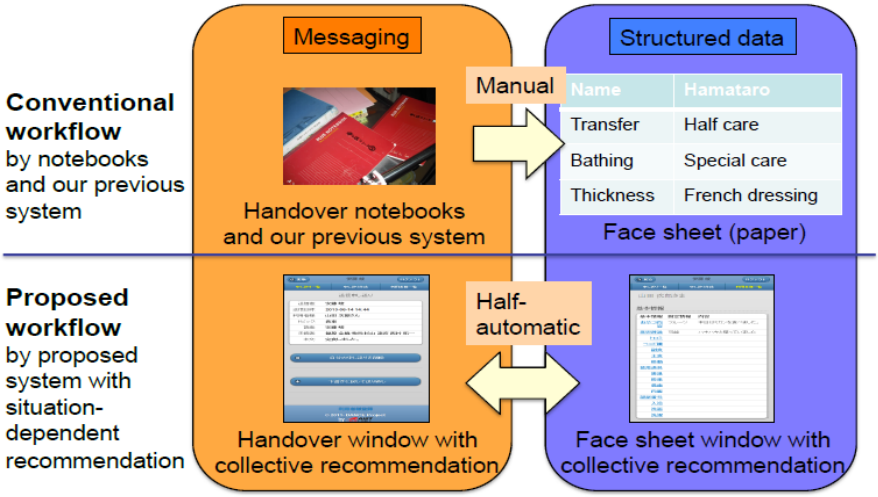

Fig. 7. Seamless between messaging and structured data

4 Conclusion

In this study, the authors proposed evaluation support methodology of nursing-care service components including five steps. And proposed visualization methodologies with both direct effect and log-term effect of the action by participatory interaction design, which we proposed previously. In future research, the authors will refine and validate each step by realizing evaluation support in actual service field.

Acknowledgments. This work was supported by JSPS KAKENHI Grant Number 24500676 and 25730190. This study was conducted as a (service engineering research and development) project to promote new market creation through the fusion of IT and business services commissioned by the Ministry of Economy, Trade, and Industry FY 2011. The authors thank the Wakoen Long-Term Care Health Facility, the paid

nursing home Super-court Hirano, and the Saga University Hospital for their cooperation in and support for this study. This work was partly supported by METI's "Robotic Care Equipment Development and Introduction Project" in 2013.

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