The Effect of Health Data Visualization to Promote Healthy Behavior: 
A Summary of the Kashiwa-no-ha Smart City Project*

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Abstract
An experiment held in Kashiwa-no-ha showed that users who could visualize their daily health log adapted better health behavior than participants who were given an activity monitor or a combination of an activity monitor and mentorship.

Objective
Japan is an aging country. The over 65 population is now more than 23% of the total population and among the highest in the world. In such a society, the need for maintaining the healthy life expectancy becomes ever more important. Increasing one’s activity level and exercising is one of the ways to achieve a high healthy life expectancy. However, having people engage increasing their activity level is very hard. Many attempts have been made to encourage people to be more active. Therefore, we aimed at solving this problem by changing the people’s perspective about health, as well as providing the tools and support to continuously, pro-actively enjoy engaging in healthy behavior.

Method
In an attempt to have the participants engage in raising their activity level, we had 151 citizens of Kashiwa-no-ha participate in 1 of the following programs.(50 people each) Course A) Receive mentoring, activity monitor, digital scale, web-interface to see the data. Course B) Receive mentoring and activity monitor. Course C) Receive activity monitor.

The participants were monitored from January to March 2013 and were tested for results.

Mentoring…Participants took part in a workshop where they learned from professionals the importance on walking and sleep.

Activity Monitor…Participants were given a watch-type wearable device that recorded the user’s activity. The data was uploaded to the web through a PC.

Digital Scale…Participants were given a digital scale that recorded the user’s weight and body fat rate, and uploaded it to the web.

Web Interface…Participants were able to see the data from the activity monitor and digital scale online. Users could see their weight, BMI, activity level in graphs. Also, users could see their sleep patterns, the frequency and strength of exercise visually. Finally, users could check their daily lifestyle patterns in the tapestry.

Fig1. Example of tapestry of a user with a stable lifestyle

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The results showed that those who had access to the web-interface and were able to visualize their daily activity had the most significant improvement in changing their lifestyle.

When asked if the program was “useful in maintaining and improving their health”, 73.9% of Course A participants agreed or strongly agreed. This is 20% higher then the Course B participants (58.8%) and Course C participants (53.2%).

Also, the exercise level had increased the most in those who participated in Course A (36.7% increase) when compared to Course B (25.8% increase) or Course C (5.3% decrease) participants.

*exercise level = the intensity of activity (Mets) times the duration of the activity (minutes)

**Fig2.** Example of tapestry of a user with an unstable lifestyle

**Fig3.** Was the program useful in maintaining and improving your health?

1. Recording health/activity data is not enough to influence user behavior. User’s need support to make sense of the data recorded.
2. Visualization of user data has a strong influence over users, when combined with information to help users understand the data.

The technology to record various data is becoming ever more available. At Kashiwa-no-ha, a town on the suburbs of Tokyo, the whole town is leveraging this technology to build a “smart city”. Sensors are located in houses, facilities, cars and on people to record data. Digital signage, information kiosks and community web-portals are accessible around the town to provide citizens with relevant information. In this way, Kashiwa-no-ha’s citizens can be informed about their energy and health conditions in real time.

Although obtaining information to make a correct assessment is important, our findings suggest that emphasis in supporting users to makes sense of the information is key in having impact on user behavior. Furthermore, experimenting with ways in visualizing the data to help users understand the current situation and make better decisions may be important.

The experiment at Kashiwa-no-ha is scheduled to continue in 2013-2014. There are plans to see how adding other incentives (such as point programs) may impact user behavior. We hope to use the data collected at Kashiwa-no-ha to further understand how IT and computing technology can help people live healthier lives.

**Conclusion**

This experiment’s was limited in its duration and number of participants to produce a definite conclusion. However, we feel the results suggest the following.

**References**

