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# Designing Sustainability for All

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## Product-service system design of household medical waste management for diabetics

### Abstract

According to the data from China Center for Disease Control and Prevention shows that the prevalence of diabetes aged 18 and over is 9.7 percent, or nearly 100 million people in china. While the number of diabetic patients in China shows "explosive growth", hundreds of millions of household medical waste are at risk of being discarded. At present, the whole society including patients, hospitals, medical products manufacturers and chinese government has not attached great importance to this matter. The purpose of this paper is to clarify the study of medical waste management for diabetic patients in family and community environment, and the practice of product-service system design based on a community in China, united families and related professional institutions. It is an exploration that scientific research working intendem with design practice. We carried out the study in a systematic way by using the method of product-service system design. During the course of study, different stakeholders fully showed their requirements and creativity in the form of co-creation.

### User interview

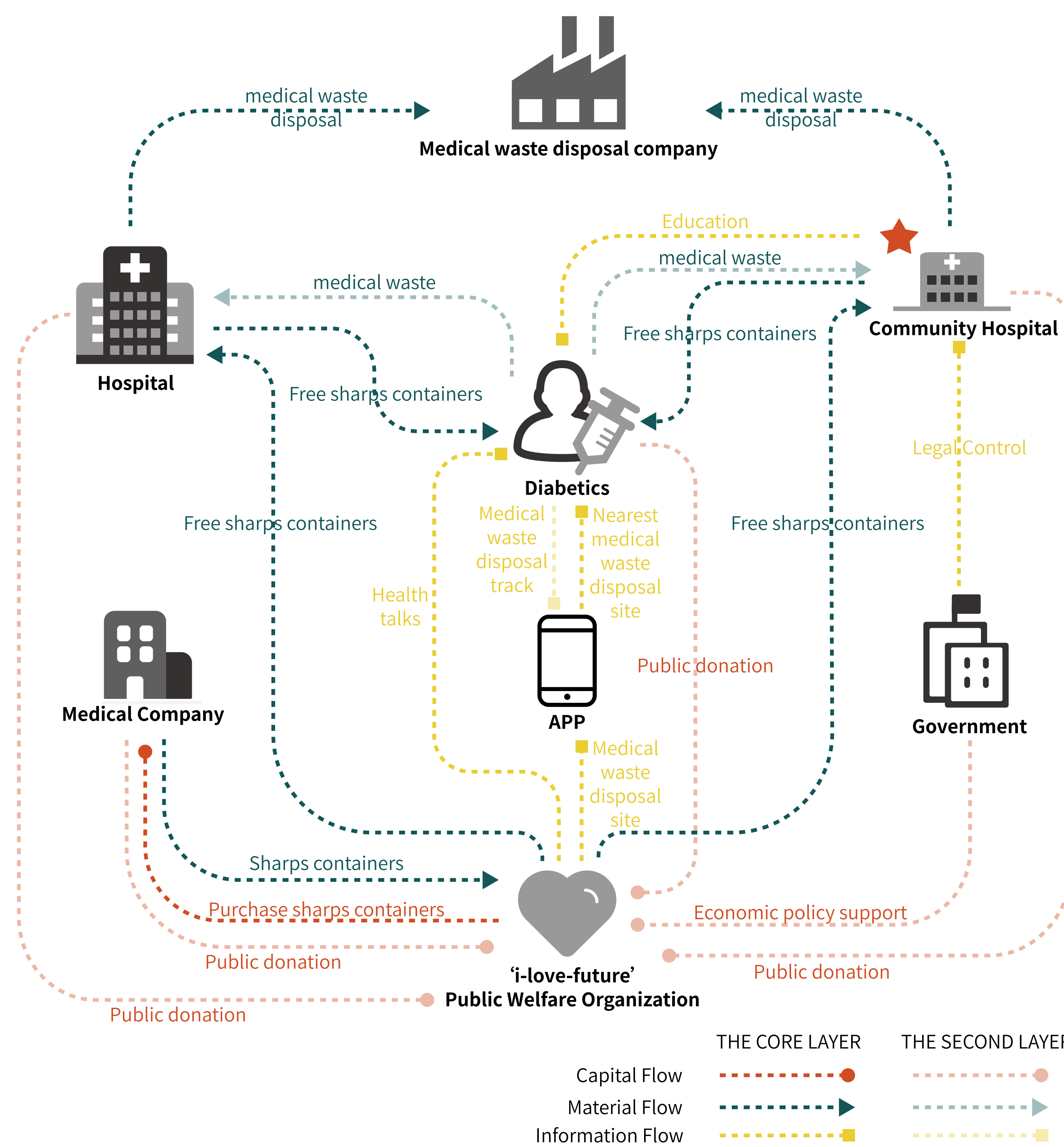
We interviewed 15 diabetics who continued to produce household medical waste. According to the patients' different consciousness and behavior, four kinds of user portraits were obtained:

(i) No concept, No cognition, No disposal: The patients have never learned about household medical waste and its hazards and disposal methods from any channel, and they will naturally throw household medical waste into domestic waste.

(ii) With concept, No cognition, No disposal: The patient is aware of the harm, but does not know the specific harm and the degree of the hazard.

(iii) With concept, With cognition, Not enough disposal: The patient is aware of the hazards, but lack of understanding of disposal. He/She chooses simple disposal and then throws waste into domestic waste. Such as wrapping them in paper, or putting them in soft drink bottles or hard cans, which are not actually correct and sustainable.

(iv) With concept, With cognition, Correct disposal: The Patient who is well aware of the hazards and disposal will take household medical waste back to hospital after a simple treatment.



[Figure 1] Service system map

### User telephone interview

This project conducted telephone interviews with 78 diabetics who had participated in the "small box and big love" project and had been distributed free sharps container. We got 34 valid samples from them. The largest number of invalid samples is due not only to the lack of valid information, but also to the provision of an error number. It means that when receiving the free sharps container, this part of the patient is not approved of the activity. In 34 valid samples, 22 patients (65%) insisted on using the sharps container and 12 people (35%) did not.

### Field research

We surveyed 5 middle-class Communities, 3 hospitals that distribute charge sharps container, and the Wuxi Environmental Protection Government. And we got the current situation of household medical waste management in Wuxi and Shanghai, developed cities in China.

### Design opportunity

This paper starts from the whole process of household medical waste management, looking for stakeholders and service touch point and insight needs. To get the design opportunity from four aspects: pre-education, hardware facilities, community collection and post-processing.

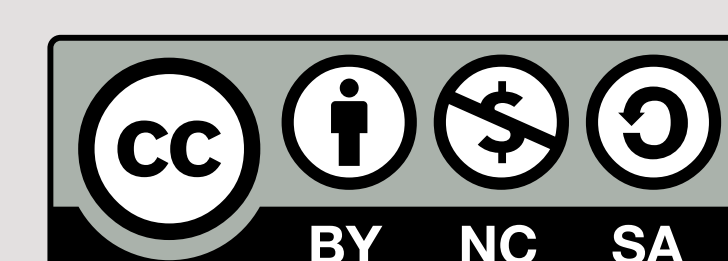
Stage	Receiving treatment in hospital	Purchasing medical product	Using medical product	Disposing of medical product	Regular inspection
Stakeholder	Medical staff	Diabetics & Medical companies	Diabetics	Diabetics	Diabetics
Touch point	Teach the way of injection, blood collection and using sharps container	Hospital & Community Hospital & Drug Store & Online shopping	Process of treatment	Hazardous waste disposal sites near the community.	Regular inspection & Taking back sharps container
Requirement	Teach quickly and efficiently and reduce the workload.	Free sharps container & Correctly using sharps container	Sharps container is easy to be used. Waste doesn't dump easily	The disposal point is not far from the residence.	The sharps container is convenient to carry. The process of recycling old boxes and getting new ones is smooth.
Design opportunity	*Brochure design *Public video	*Medical product packaging design with a warning for proper disposal of medical waste *Sharps container: be suitable for home use	*Sharps container: be convenient for the elderly to use *Sharps container: be convenient to carry.	*Recovery treatment point service design in community hospital	*The service design of managing and disposing of different boxes.

[Figure 2] Design opportunities in different stages

### Design Proposal

The study analyzed the factors that triggered awareness change and behavioral motivation of diabetics to dispose of household medical waste properly under the supervision of no laws and regulations in China at present. The methods and contents of innovative interaction among stakeholders in different service processes are also analyzed. Meanwhile, we analyzed the background of the study from the angle of environment, society and economy, and through the methods of product-service system design and co-creation, to determine the design intervention scope, the design priority order and the design practice content with community as the service center.

This Product-service system is based on the "i-love-future" public welfare organization and centered on community hospital. "i-love-future" purchases sharps containers from the Medical Company and distributes them to diabetics in the community hospitals and hospitals for free. With the APP, patients could quickly find nearby community hospitals or hospitals that can dispose of medical waste, and track information about the sharps containers ever collected. Meanwhile, "i-love-future" will give health talks on diabetes in community hospitals from time to time to guide patients to understand the harm and disposal of medical waste. And the household medical waste collected from community hospitals and hospital would be disposed of in medical waste disposal company. There are two kinds of sharps containers in this product-service system, the one is retractable and portable, the other one is convenient for the elderly and not easy to dump waste.



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