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Group E

Group E's Theme Proposed by Infrastructure Innovation Institute Inc.

ALPS theme title: **Cool & Comfortable Community under the restriction of energy supply**

Proposer Organization's Name: Kokusai Kogyo group Infrastructure Innovation Institute, Inc.

Japan has faced energy crisis !

After Tohoku earthquake , We have faced serious energy crisis , especially about electricity in summer.
We might be NOT going to be supply enough energy to keep our health.

Do you remember last hot summer

・In Tokyo , heat wave killed almost 100 person/year. Many of them are aged!
・Tatebayashi, the hottest city worry about residents health , in every summer.

The weak are suffering from heat wave without electricity!

Aged people who live by themselves , mother with baby and people who need other ones hands….How can they protect their lives against heat wave without any electric power?

The solidarity is " power" to solve the problem!

Point

- Development the Cool & Comfortable (C&C) city by community
- Join & enjoy cooperation with various generation
- Limited electricity ,Unlimited welfare
- Who needs help under the circumstances ?

For reference

Heatstroke in Tokyo: http://www.metro.tokyo.jp/INET/CHOUSA/2010/08/60k8c100.htm
City in distress: http://headlines.yahoo.co.jp/hl?a=20110427-00000518-san-soci

Electricity supply: http://www.meti.go.jp/setsuden/index.html

Fig. 1: stakeholder

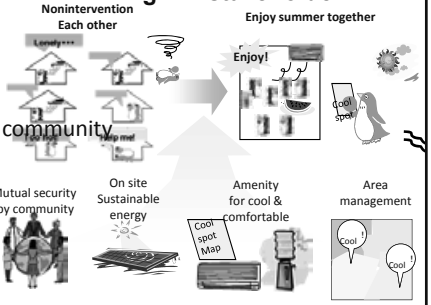


Fig. 2 Image for solve the problem

Keyword : Energy savings, Against heat wave, Cool & Comfortable, Welfare, Health, The weak

ALPS Final Report 2011

Group E

Project Title:

Cool & Comfortable Community under the Restriction of Energy Supply Synergy and Symbiosis by Delivery Service and Community Health

Theme:

Cool & Comfortable Community under the Restriction of Energy Supply

Proposer Organization: Infrastructure Innovation Institute Inc.

Proposer Organization's Supporter: Kokusai Kogyo Group, Infrastructure Innovation Institute Inc.

Keio Mentor: Shinichiro HARUYAMA & Yudha PRAMBUDIA

Members:

Masahiko ITO

Takafumi SHINYA

Yu SAKUMA

Rumiko OSHIMA

Akiko RAI

Graduate School of System Design and Management

Keio University

Cool & Comfortable Community under the Restriction of Energy Supply

Synergy and Symbiosis by Delivery Service and Community Health

ALPS GROUP E
Masahiko Ito, Takafumi Shinya
Yu Sakuma, Rumiko Oshima, Akiko Rai

1. Executive Summary

· Description of the problem

Our project started from the Initial Requirements of the ALPS proposer company, Infrastructure Innovation Institute, Inc. The following social problem was proposed to us, “how should we have cool & comfortable community in summer under the restriction of energy supply due to the Great East Japan Earthquake on March 11.”

· Scope of the project

We understood that elderly people living alone were more likely to be victims of heat waves in the research. We specified the focus of research. We defined the most significant problem as “Elderly people are affected by heat stroke in their homes.”

· Purpose of the report

Purpose of the report is to enable elderly people to live a healthy life feeling Cool & Comfortable in their home.

· Conclusions and recommendation

In conclusion, we propose the new service system named the "MIKAWAYA". It combines delivering service and health check-up.

MIKAWAYA is designed to expand the service performed by delivery services to include a health check-up for elderly people (USER). It is different from existing delivery service enterprises. “MIKAWAYA” visits the user’s home, complies with user’s request and performs a health checks. We propose the elderly people's families and the real estate landlord as the CUSTOMER of this service. Elderly people's families worry about their parents' health. The real estate landlord has to deal with elderly people's lonely death and the neighbor’s trouble that arise from this problem. We should send the elderly people’ s health information to their family and landlord. This system makes profit from deliveries and from a fee paid by the family and landlord.

· Methods and results used to address the problem

Our solution has greatly changed twice due to two important discoveries during our research processes. The first discovery is that elderly people who live alone cannot care for themselves to prevent heat stroke. We devised many methods for letting

elderly people feel physically cool & comfortable since the beginning this project. However we changed the solution to include the support of others in the community. The second discovery is that elderly people who live alone have a lot of characteristic demands. Old age was an obstacle to connecting with the society and participating in the community. These two discoveries caused the elderly people to not be able to prevent heat stroke even though they should be able too. There is a mismatch between preventive measures against heat stroke and the needs of the elderly people living alone. Our system solution, “MIKAWAYA”, aims to address this gap as well as make the elderly people Cool & Comfortable.

・View of future

The social value will increase if this system succeeds as a new service to elderly people living alone. It is thought that this system not only has the potential to participate in elderly people's family and the real estate landlord, but also the public-service company, regional industries, the government, and municipalities etc. If good system diffusion takes place, it is likely to become a means for the users of the system to increase, and to solve the entire senior citizen's social trouble.

2. Table of Contents

3. Problem Statement

3.1 Initial Requirement

In Japan, the rise of the normal temperature continues due to global warming. And, both maximum temperatures and sweltering nights are rising every year. (Table 3.1) Especially, the heat island phenomenon due to global warming causes the problem in the city. The highest temperatures in Japan 40.9℃*1 in 2007 were recorded in Kumagaya City, Saitama Prefecture and in Tajimi City, Gifu Prefecture. This temperature rise and sweltering nights have increased the unpleasantness in life, and this causes the health hazard by heat stroke.

The patients of heat stroke are increasing every year. The number of the heat stroke patients was 53,843 people in the summer of 2010 said to be the strongest heat wave. Moreover, the number of people that died due to heat stroke is 1,718 people. (Figure 3.1) Originally, we can easily prevent heat wave by adjusting the moisture replenishment and the temperature. However, we cannot prevent heat stroke by using the electric power for a while in the future because of the restriction of the energy supply due to the recent disaster.

Table 3.1 Rate of change for Frost days, Sweltering nights, Extremely hot days *1-1,1-2

City	Rate of change(days/10years)		
	Frost days	Sweltering nights	Extremely hot days
Sapporo	-4.9	0	0
Sendai	-6.4	0.3	0.1
Tokyo	-8.7	3.6	0.7
Yokohama	-6.7	2.8	0.5
Niigata	---	---	0.7
Nagoya	-7.7	3.5	2.4
Kyoto	-8.2	3.5	2.1
Fukuoka	-5.5	4.7	1.3
Average	-5.5	1.4	0.4

* 1-1.Frost day: when the minimum temperature drops below 0 degrees.
Sweltering night :when the minimum temperature exceeds 25 degrees.
Extremely hot day: when the maximum temperature exceeds 35 degrees.
1-2.The change for every ten years rate is shown. A winter day and a tropical night: a statistical period and 2010 from 1931 the extremely hot day: from 1961 to 2010. (Note)

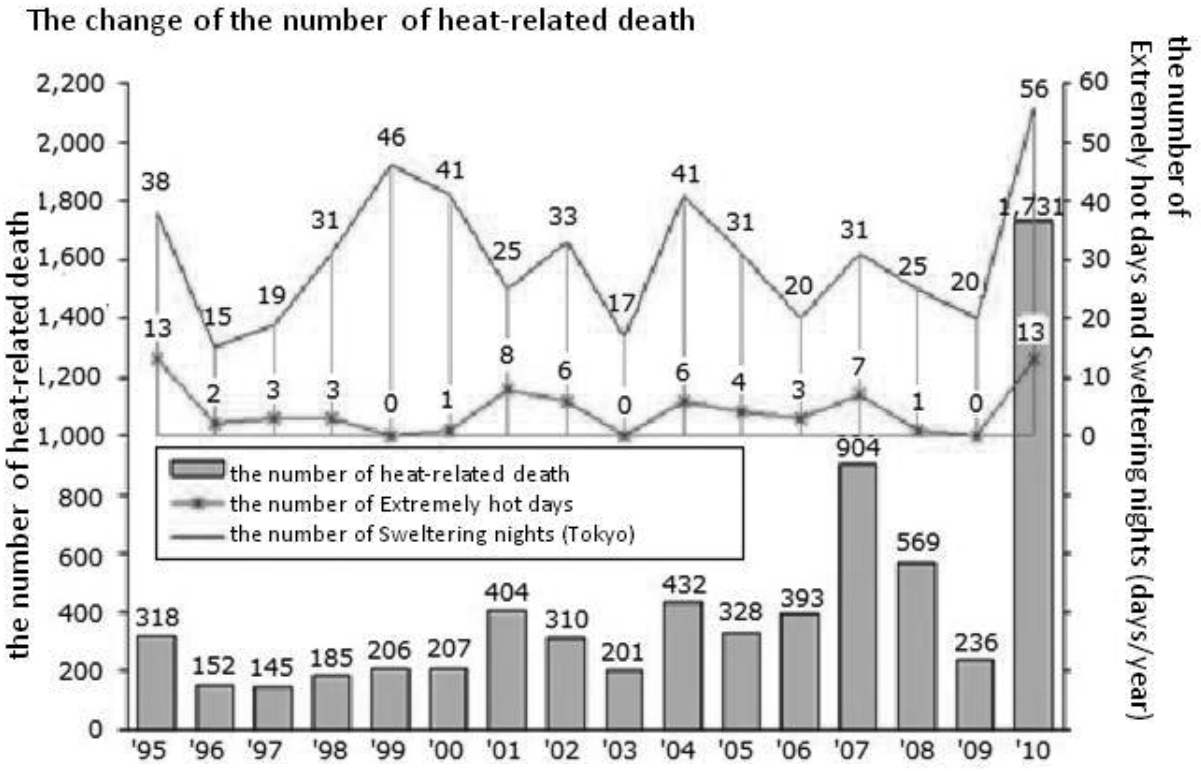


Figure 3.1 The number of the death by heat stroke. [*2*3]

(Sourse)Tokyo News Paper," Tokyo News Paper's graphic explanation(2011-6)",demographic movement

3.2 Current situations

3.2.1 Analysis of Needs

（1） Analysis of the heat stroke patients

We analyzed the trend of the monthly patients, the patient rate from the highest temperature, the patient from the age groups, the occurrence places, etc. (Table 3.2)

The majority of patients are 65 years old or older. (Figure 3.3) When the place of incidence is seen, many male patients are affected in the outdoor environment. The majority of 65 years old or more are affected in their home. (Figure 3.4 and Figure 3.5) The patients of heat stroke are seen from May to August. (Figure 3.6) Moreover, The temperatures from 25℃ or more causes the heat stroke.

The patients increase drastically in temperature from 31℃ or more. (Figure 3.7) The incidence rises constantly in the senior citizen along with the rise of the temperature. Without sufficient countermeasures being taken, the damage is steadily increasing.

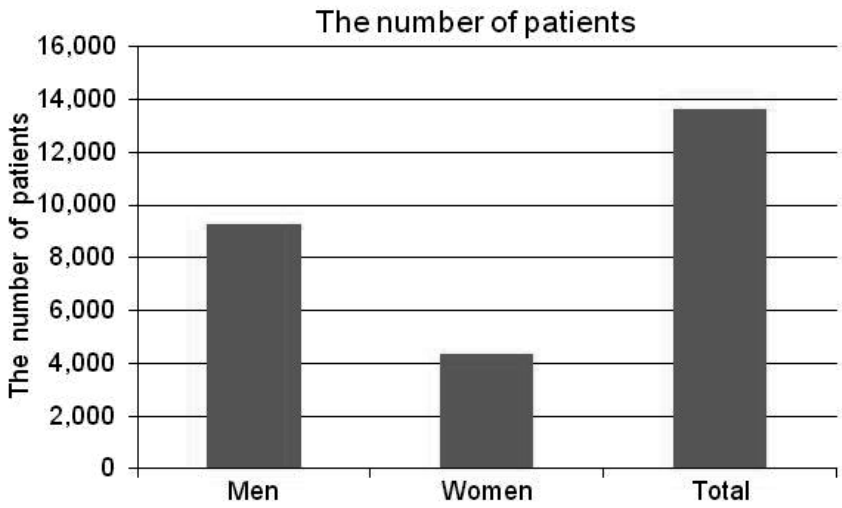


Figure 3.2 The number of patients (by gender)* [2]

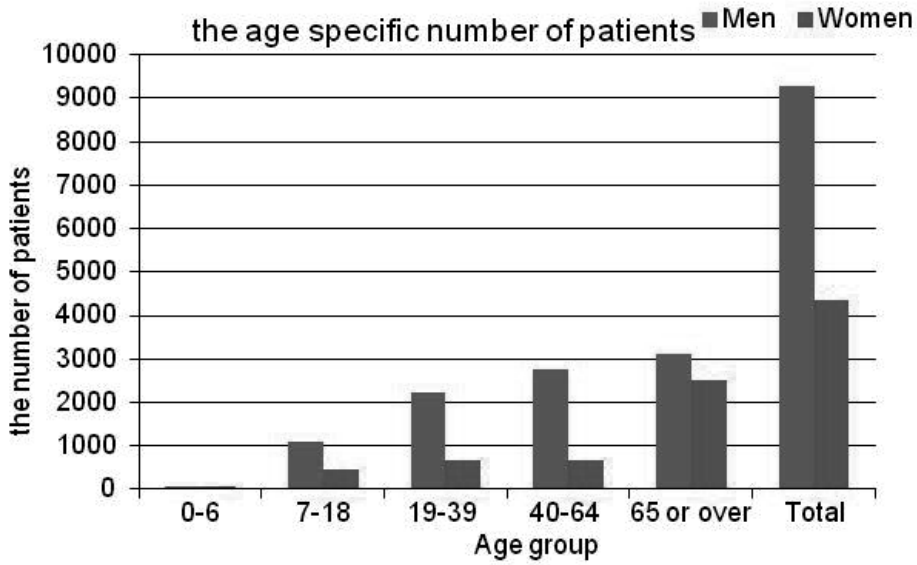


Figure 3.3 The age specific number of patients*[4]

*[2] National Institute for Environmental Studies, Heat Stroke Report(2010),p.16 (2011-2)

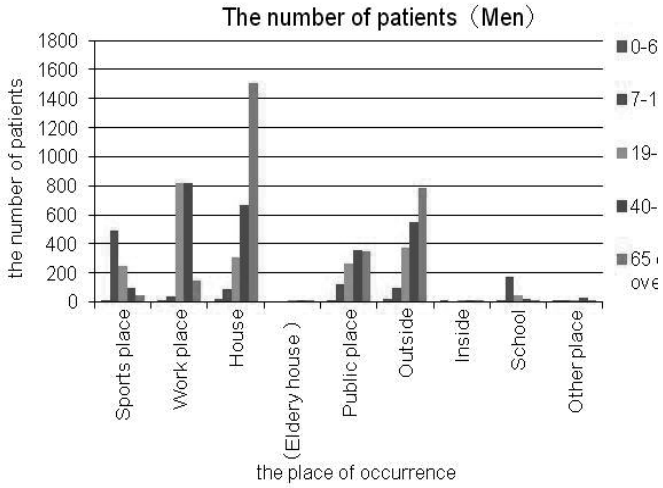


Figure3.4　the number of patients (by gender , age and place)*3

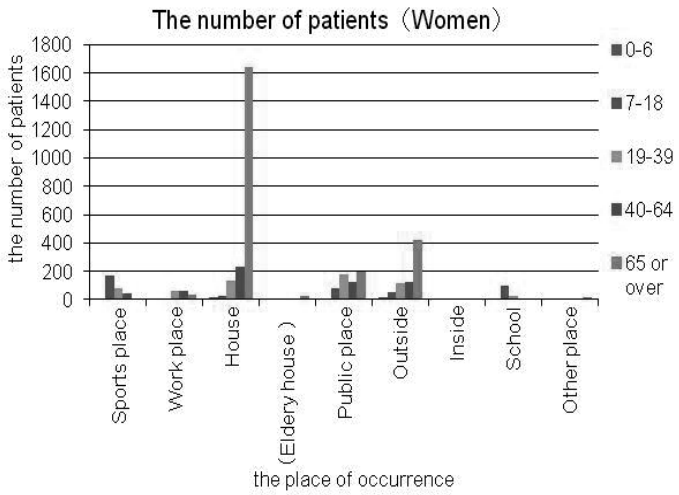


Figure3.5　the number of patients (by gender , age and place)*5

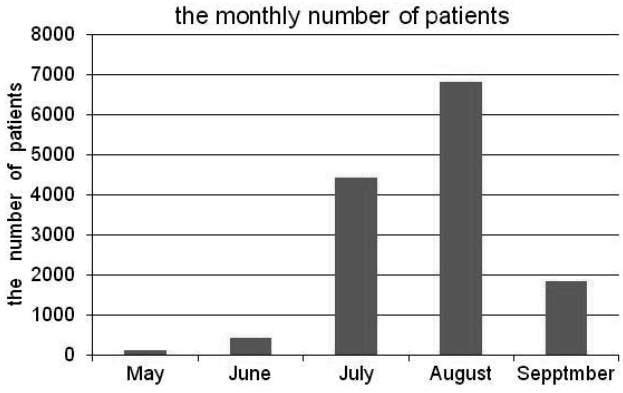


Figure3.6 the monthly number of patients*4

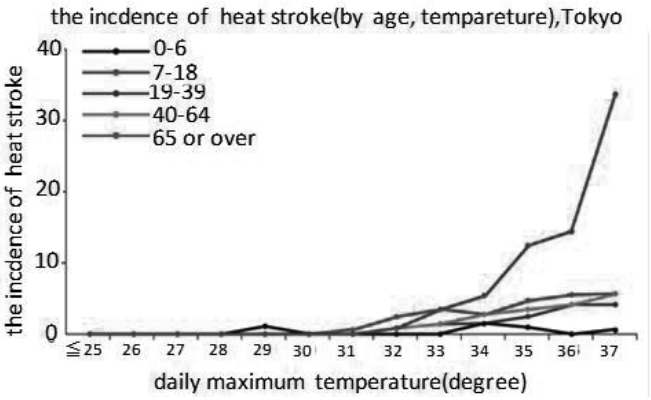


Figure3.7 the incidence of heat stroke*5

（2）Analysis of the death from the heat stroke

We analyzed the death from the heat stroke. Many of heat stroke patients have died at home as indicated in table 3.2. And the deaths are predominantly in the 65 years old or more bracket. (Figure 3.8)　We think that the causes are as follows.

① The elderly people increase in population.

② The elderly people live in their home alone.

67.1% of the death from the heat stroke in Tokyo lives in their home alone last year, 2010. Because most elderly people living alone live in their homes all day long, they have died without being notice by anyone.

*3 National Institute for Environmental Studies, Heat Stroke Report (2011)
*4 National Institute for Environmental Studies, Heat Stroke Report(2010),p.10 (2011-2)
*5 Tokyo News Paper," Tokyo News Paper's graphic explanation(2011-6)",demographic movement

Table 3.2 The number of heat-related death(by gender and place)*6

Place of occurrence	The number of heat-related death		
	Total	Men	Women
Total	**1 718**	**920**	**798**
House(including yards)	783	387	396
Accommodation	3	-	3
School, Public place	3	3	-
Sports place	3	3	-
Street, Highway	20	18	2
Commercial and service facility	5	4	1
Industrial area, Construction site	19	19	-
Farm	62	31	31
Other specific place	46	37	9
Other (unknown)	774	418	356

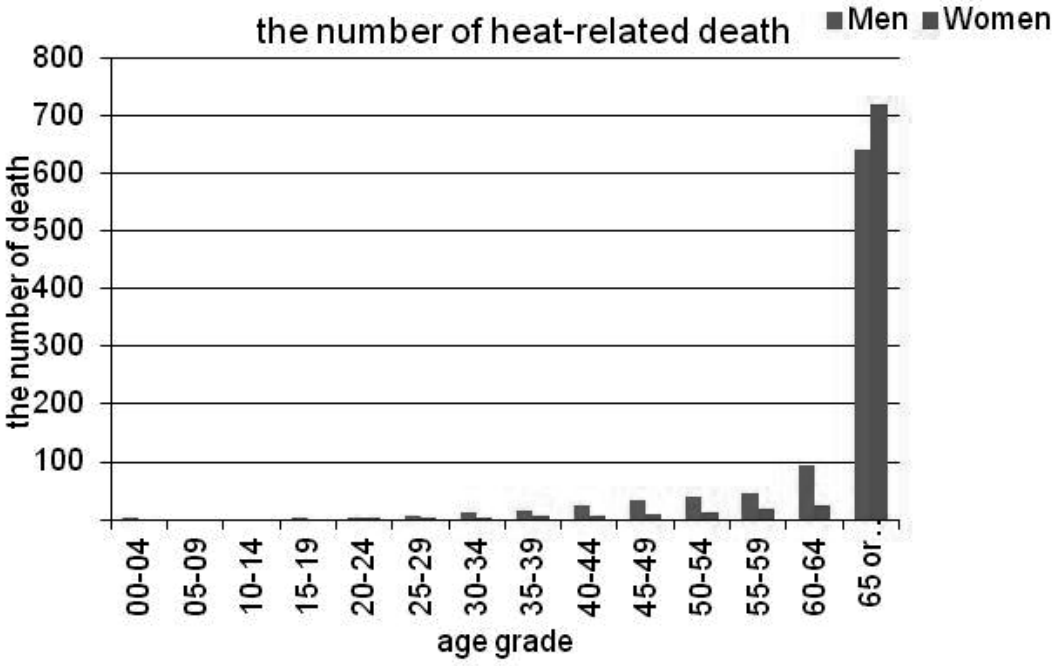


Figure 3.8 The number of heat-related death, rate of death, percentage(by gender and age)*7

*6 Ministry of Health, Labour and Welfare, Prompt Vital Statistics Report, (2010-12) http://www.mhlw.go.jp/stf/houdou/2r9852000001g7ag.html
*7 Ministry of Health, Labour and Welfare, Prompt Vital Statistics Report, (2010-12)

（３）Prevention of heat stroke

Heat stroke is defined as below.

Heat stroke is a general term of sickness that is cause by lacking total body water or not working to adjust in high temperature. A heat stroke can cause death, but it is easy to prevent heat stroke (Table 3.3) .

With knowledge of prevention, it is easy to prevent from heat stroke, but elderly people and children need to be more careful. Because, elderly people especially are enfeebled body adjustment function by aging.*[8]

Table 3.3　Heat Stroke Manual *[9]

How to prevent heat stroke	examples
(1)Avoid heat areas.	Move outside to a shady spot , Use an air conditioning, Wear a hat
(2)Wear cooler clothes	Wear light-colored clothing that is light weight and loose-fitting.
(3)Drink plenty of water	Drink plenty of cool water or tea (one small cup every 15–20 minutes).
(4)Be aware of wide temperature swings	Pay attention to the beginning and end of rainy season.
(5)Slowly build up to the heat	Acclimating to the heat by doing exercise everyday
(6)Take care of your condition	Rest often. Give the body a chance to cool off
(7)Take care of someone in a group	Don't leave anyone in vehicles or enclosed spaces without air conditioning.

3.2.2 Analysis of Seeds

Present policy about prevention of heat stroke is showed in below.

（１）Policy of government and local government

Policy of government is as follows.

1. Distribution of weather information
2. Distribution of heat stroke and measure information
3. Distribution of information about generation status of heat stroke
4. Research of heat stroke

And so on(Table 3.4)

After the Tohoku Earthquake, They also furnish measure of heat stroke in

*8 http://www.env.go.jp/chemi/heat_stroke/manual/full.pdf

*9 Ministry of the Environment,"Heat Stroke Manual",pp.26-31(2011-5) http://www.env.go.jp/chemi/heat_stroke/manual/full.pdf

energy restriction.*[10]

In local government, Machida city, Kumagaya city, Oofu city, Tajimi city, Kusatsu city tackle heat stroke. For example, Distribution manual of club activities instructions to a junior high school (Machida city), Sending mail service about information of heat stroke (Kumagaya city) and so on (Table 3.5).

※The Wet Bulb Globe Temperature (WBGT) is a composite temperature used to estimate the effect of temperature, humidity, wind speed (wind chill) and solar radiation on humans.

Table 3.4　political measure about heat stroke *[11]

government policies	Details
Give the weather information related to heat stroke	offer measure temperature and weather forecast (Japan Meteorological Agency)
	give warning when the temperature is extremely high. (Japan Meteorological Agency)
	make the announcement about WBGT*(Ministry of the Environment)
Give the information about the way to prevent heat stroke	the way to prevent heat stroke in agency service(the Fire and Disaster Management Agency)
	the way to prevent heat stroke in daily life(Ministry of Health, Labour and Welfare, Ministry of the Environment, Japan Meteorological Agency)
	the way to prevent heat stroke for the elder people(Ministry of Health, Labour and Welfare, Ministry of the Environment)
	the way to prevent heat stroke for school(Ministry of Education, Culture, Sports, Science and Technology)
	the way to prevent heat stroke for worker(the Fire and Disaster Management Agency)
	the way to prevent heat stroke for emergency evacuation area (the Fire and Disaster Management Agency)
	the way of energy saving activities and advertising information about heat stroke(Ministry of Economy, Trade and Industry)
Give the information about the incidence status of heat stroke	give the information about the number of people with heat stroke every weeks (the Fire and Disaster Management Agency)
	give the information about the incidence status of heat stroke in scholastic institution every years. (Ministry of Education, Culture, Sports, Science and Technology)
	give the information about the number of heat-related death during working time every years. (Ministry of Health, Labour and Welfare)

[10] http://www.env.go.jp/chemi/heat_stroke/ic_rma/torikumi.pdf)

[11] related government ministries and agencies,"political measure about heat stroke"(2011-7) http://www.jmbsc.or.jp/hp/topicks/0807/heatstroke08torikumi.pdf

	gave the information about the number of heat-related death via Population Survey Report(Ministry of Health, Labour and Welfare)
Study about the heat stroke	estimate the risk of heat stroke in the future considering global warming（Ministry of the Environment）, conduct survey research about the heat stroke during working time(Ministry of Health, Labour and Welfare)

Table 3.5 The examples of municipal action to prevent heat stroke *[12]

municipality's name	Action
Machida education committee（Tokyo）	・Made manuals for children and sports clubs to prevent an accident during sports, ・Supplied all elementary school in Machida with humidity/temperature meter and heat stroke checker, ・Supplied each junior high school with air blower and freezer, ・Conduct a training seminar about heat stroke for teachers
Kumagaya（Saitama）	・Set up a heat stroke meter at municipal office and elementary school, ・Mail delivery service which citizen can get information about heat stroke・Produce posters and leaflets about heat stroke and bring them to the elder's house
Ohfu（Aichi）	・Provided course of lectures on health for citizens ・Mail delivery service which citizen can get information about heat stroke and emergency information
Tajimi（Gifu）	・Mail delivery service which citizen can get information about heat stroke
Kusazu（Shiga）	・Established a regulation for preventing heat stroke ・Mail delivery service which citizen can get information about heat stroke

[12] Japan Meteorological Business Support Center ,"Municipal Action to prevent heat stroke ",(2008-8)

（２） Example of Kumagaya city

In this paragraph, we will see more precisely about Kumagaya city.

We did a interview to officer of Kumagaya city office. And also, we did observation and interviews to residents in Kumagaya city.

Kumagaya city recorded 40.7 degrees [Celsius] in 2007. After that, they efforted prevention of heat stroke. For example, they put cool mist sprinkler system in Kumagaya station. The sprinkler provides citizen with cool and comfortable. In addition, they let citizen introduce green curtain for relaxation of heat island phenomenon. Also, They publish “ATSUIZO! Kumagaya (There is hot! Kumagaya)”.

Table 3.6　Project of sending information about heat stroke(Result of interviews in Kumagaya city)*[13]

Action	Details
Made the information system to prevent heat stroke and colds	・Set up a heat stroke meter at municipal office and elementary school. ・Gave people the information which got from the heat-stroke checker by the Internet
Gave mail delivery service about heat stroke	1104 peoples used this mail service in 2010. The number of peoples increased by 271 in more than last year.
Gave the information about heat stroke through Kumagaya TV	Gave the information about heat stroke through Kumagaya TV so that people can take care of their health. The information was changed 2times/day.
Supplied the batteries for heat-stroke checker to the elder people who live alone	・Supplied heat-stroke checker and cold scarf to the elder people who live alone(2009) ・Supplied the batteries for heat-stroke checker to the elder people who live alone.(2010)
Others	・Supplied leaflets about heat stroke with all citizen
	・Provided a consultation service for heat stroke
	・Did neighborhood patrol and gave wireless broadcast about heat stroke for the peoples
	・Put posters about heat stroke in city official car, public offices, stations and supermarkets ,and so on.

（３） policy in overseas.

According to R sari Kovats, Kristie L Ebi “Heatwaves and public health in Europe” ,

[13] Kumagaya city,"APPARE NARUHODO , Project of sending　information about heat stroke"(2010) http://www.city.kumagaya.lg.jp/appare/naruhodo/mimamori/johohassin/gaiyou2.files/yobo

There are some policy towards heat stroke in Europe as below.

Table 3.7 Public health measures in US and European HHWS*[1]

Measure, strategy	Level of implementation[a]	Comments
Media announcements (radio, television)	+++	Provide general advice on heat stress avoidance to general public
Bulletin or webpage	+++	May be restricted access, to relevant professionals or accessed by anybody
Leaflets	++	General advice, and advice for nursing home managers. Often distributed at beginning of the summer via health centres, and places where vulnerable people may be
Telephone help-line	++	Either a dedicated telephone service is opened (e.g. Heatline in Portugal) or people are encouraged to phone a pre-existing general health advice line (e.g. NHS Direct in the UK)
Opening of cooling centres	++	Some evidence that cooling centres not used by high-risk individuals, but used by low-risk individuals
Alert to hospital emergency rooms, ambulance services	+	Used to improve operational efficiency (e.g. if need to deploy extra staff). Needs to be based on local information and carefully evaluated
Home outreach visits to vulnerable persons	+	Important but usually expensive. Use pre-existing networks of volunteers (e.g. Buddy systems in Philadelphia), or professionals (e.g. social workers). Requires some registry of vulnerable people
Evacuation of vulnerable persons from their homes to cooling centres	+	Using a registry of vulnerable people, who are visited at home, and evacuated, if necessary
Outreach to homeless	+	High-risk group in southern US (11 homeless people died in heatwave in Phoenix, July 2005)
Electricity companies cease disconnection for non-payment	+++	Utility companies have initiated and financially supported HHWS in the US. Most important where population relies on heavily air conditioning (as in the US)
Water companies cease disconnection for non-payment	+	
Fan distribution	++	Fans are effective when they circulate cooler air, but not above temperatures ~37°C

Based on direct contact with agencies and the following sources: Refs. (3, 39, and 50)
a: Level of implementation as reported and not observed. + rarely implemented, ++ often implemented, +++ very often implemented

3.2.3 problem establishment

As it has been analyzed above, most of dead person is elderly people. And most of dead elderly people are living alone. In addition, they die in house. Then, we established the most important problem as “elderly people are affected by heat stroke in their home”. And we focus on elderly people (over 60 yeas old) living alone. Of course, a baby, elementary schoolchild, and a laborer also are weak towards heat stroke. But they have supervisors like a teacher and parents and so on. So they can

be helped easily. As a result, we thought that focusing on the elderly people is most important problem.

In addition, according to Rupa Basu and Joathan M. Samet "Relation between Elevated Ambient Temperature and Mortality: A Review of the Epidemiologic Evidence", 1, elderly, 2,lower socioeconomic status, 3,living alone, 4,black have a danger of heat stroke.

Table 3.8 Result from descriptive studies analyzing risk factor*[1]

Study population (reference no.)	Exposure	Outcome	Results
Three September heat waves in Los Angeles, California, 1939, 1955, and 1963 (29)	Daily temperature ≥100°F; compared with 1947 "normal" temperatures	Daily no. of deaths	Death counts were higher with increasing temperature and age; lag time between maximum temperature and maximum mortality was ~1 day
Heat waves in New York City during the summers of 1972 and 1973 (59)	Heat wave for each year	No. of deaths	Increase in deaths after several days of excessively warm weather and on the day following the hottest day; ischemic heart disease and age ≥65 years most prominent
All age groups in New York (January 1965–December 1968) and England and Wales (1970–1971) (32)	Mean monthly temperatures based on daily temperatures (>68°F, also <50°F)	Daily deaths from myocardial infarction, stroke, and pneumonia	Short-term (1–2 days) exposure had little effect; medium-term (7–10 days) and longer-term (>3 weeks) exposures were associated with very significant changes in death rates; stronger effect seen in the elderly
Heat wave in New York City, August 1995 (33)	Daily maximum air temperatures	Daily mortality (all-cause and type-specific)	Elderly of both sexes were at greatest risk; no difference seen by race or gender; ischemic heart disease was most prominent
Heat wave in Birmingham, England, June 24, 1976–July 8, 1976 (34)	Several weather variables (mean daily temperature above 72°F)	Daily no. of deaths	No. of deaths increased by nearly 20% (and by >30% from July 3 to July 5); excess seen primarily in elderly men and women (aged 70–79 years) with CVD* or cerebrovascular disease
Heat wave in Memphis, Tennessee, June 25, 1980–July 20, 1980 (51)	Average daily temperatures	Heat-related deaths and other mortality outcomes (e.g., type-specific mortality, all-cause mortality, death from natural causes, DOA* rate)	Elderly (aged ≥60 years), poor, Black, inner-city residents were at greatest risk; 83 heat-related deaths in July 1980 vs. 0 in July 1979; statistically significant increase in total and CVD mortality rates and DOA rate; rise in emergency room visits 3 days prior to rise in heat-related deaths
Heat wave in St. Louis and Kansas City, Missouri, July 1980 (53)	Daily maximum temperatures	Heat-related illnesses and deaths from heat stroke	Deaths from all causes increased by 57% and 64% in St. Louis and Kansas City, respectively, and by only 10% in rural areas; greatest risk was seen for elderly (aged ≥65 years), non-Whites, and those of lower SES*
Case-control study; 156 cases with heat stroke or a close friend/family member and 462 controls matched by age, sex, and neighborhood (62)	St. Louis and Kansas City, Missouri heat wave (July 1980)	Fatal and nonfatal heat stroke	Alcoholism, living on higher floors of multistory buildings, and using major tranquilizers increased risk; spending time at home or in other places with air conditioning, living in a residence shaded by trees, being able to care for oneself, being able to undertake vigorous physical activity (and reducing activity during heat waves), and taking extra fluids decreased risk
Heat waves in Texas, June 18, 1980–August 27, 1980 (57)	Afternoon temperatures in excess of 100°F	Heat-related deaths	Males, elderly, Blacks, and persons engaged in heavy labor were at greatest risk; related to lower SES
Heat wave in Chicago, Illinois, July 12, 1995–July 16, 1995; 465 heat-related deaths, July 11, 1995–July 27, 1995 (4)	Heat index (temperature and humidity)	Deaths from hyperthermia (core body temperature ≥105°F)	Males, Blacks, and persons aged ≥75 years were at greatest risk; highest mortality was observed 2 days after heat index peaked; excess CVD deaths
Case-control study; 339 relatives, neighbors, or friends of persons who died and 339 controls matched by age and neighborhood (61)	Chicago, Illinois heat wave, July 12, 1995–July 16, 1995	Heat-related and CVD deaths	Persons confined to bed (OR* = 8.2, 95% CI*: 3.1, 22.0) or living alone (OR = 2.3, 95% CI: 1.2, 4.4) were at increased risk; having a working air conditioner (OR = 0.3, 95% CI: 0.2, 0.6) and having access to transportation (OR = 0.3, 95% CI: 0.1, 0.5) were associated with decreased risk
Heat wave in England, Wales, and Greater London, United Kingdom, July 1995–August 1995 (58)	5-day heat wave	Excess mortality	619 extra deaths (8.9% increase, 95% CI: 6.4, 11.3%) compared with moving average of 31 days for that period in all age groups; mostly women and persons with respiratory and cerebrovascular diseases; attributed >60% of total excess mortality
Heat wave in the northeastern United States, July 4, 1993–July 14, 1993 (55)	Extremely hot weather	Mortality rates compared with June 8, 1993–June 18, 1993	26% increase in total mortality and 98% increase in CVD mortality in Philadelphia, Pennsylvania
Case-control study; 17 cases from surrogate information and 34 controls matched by neighborhood (63)	Cincinnati, Ohio heat wave, summer 1999	Heat-related deaths	Having a mental illness increased risk (OR = 14.0, 95% CI: 1.8, 633); having a working air conditioner decreased risk (OR = 0.03, 95% CI: 0, 0.2)
Heat waves in Milwaukee, Wisconsin, in 1995 and 1999 (93)	Comparison of heat waves	Heat-related deaths and EMS* visits	At least 49% fewer heat-related deaths and EMS visits in 1999 than in 1995; may have been partly due to changes in public health preparedness
Case-control study; 63 cases from surrogate information and 77 controls matched by age and neighborhood (60)	Chicago, Illinois heat wave, summer 1999	Heat-related deaths	Living alone (OR = 8.1, 95% CI: 1.4, 48.1) and not leaving home daily (OR = 5.8, 95% CI: 1.5, 22.0) increased risk; having a working air conditioner decreased risk (OR = 0.2, 95% CI: 0.1, 0.7)

* CVD, cardiovascular disease; DOA, dead on arrival; SES, socioeconomic status; OR, odds ratio; CI, confidence interval; EMS, emergency medical services.

4. Analyses and Discussion of ALPS Methods for Research Process

4.1 Outline of Chapter 4

We have discussed the problem by performing ALPS methods. We often found a lot of new discoveries and new developments. And we had two important discoveries during our research process. The first discovery is the aging problem that elderly people who live alone cannot care for themselves to prevent heat stroke. The second discovery is that elderly people who live alone have a lot of characteristic demands. We found these discoveries by performing ALPS methods, and our solution has greatly changed twice in order of first prototype, second prototype, and final solution by these discoveries.

We analyze and discuss ALPS methods in this chapter. It is the same as our research process. We analyze and discuss how discover it by performing ALPS methods during our research process from first prototype to second prototype. We also analyze and discuss ALPS methods in chapter 5 and 6.

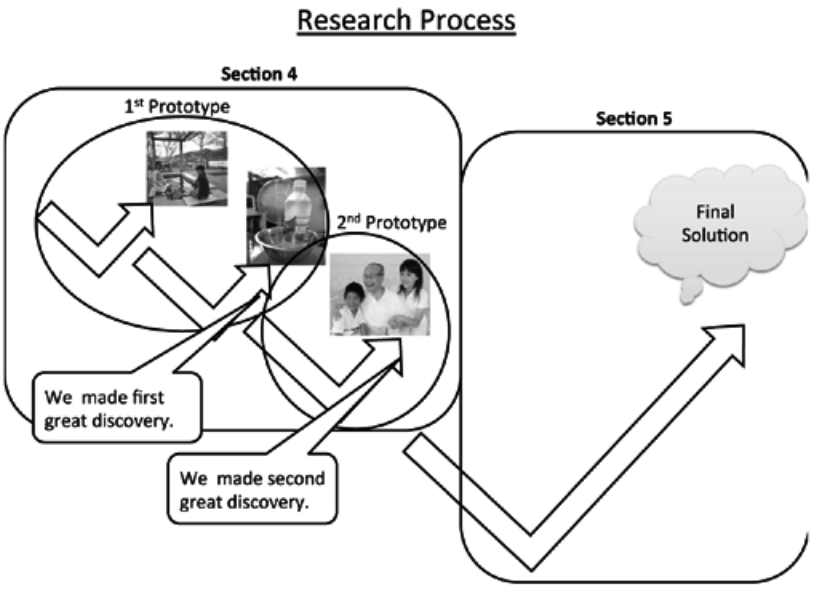


Figure 4.1 Research Process

4.2 Interviews and Observation

Governor takes measures to prevent to catch heatstroke but it has only small effect. We started having an interview with more than 100 people (elderly people, local government, NPO, hospital community facility).

Interviews and Observation were quite use as verification of prototype. Our ideas were wholly denied but it opens up to our solution (Its references were written in 12th

paragraph.).

4.3 1st Prototype (physical)

4.3.1 Foot Bath

4.3.1.1 Requirements Analysis

(1) Brain Storming KJ Method

We analyzed information from the Initial Requirement. We argued points Cool & Comfortable Community then we separated and analyzed as KJ Method. It used a lot of times. It leaded to a further understanding of components of Cool & Comfortable Community.

(2) Scenario Graph

We arranged components of Cool & Comfortable Community. Then a solution was discovered by Scenario Graph. We decide to choose Foot Bath as prototype. By performing the Scenario Graph, we made matching some method at random in 5W1H.

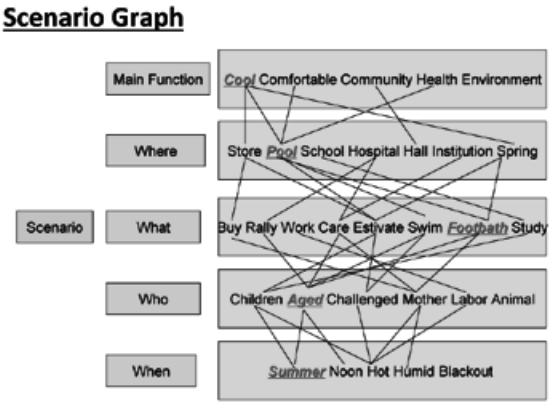


Figure 4.2 Scenario Graph for Foot Bath

4.3.1.2 Stakeholder Model

(1)CVCA (Customer Value Chain Analysis)

We used the CVCA.

It is a modeling tool for connection of stakeholders. (Figure 4.3) By performing the CVCA, we found which stake holder is very important to interview. We were surprised to understand it.

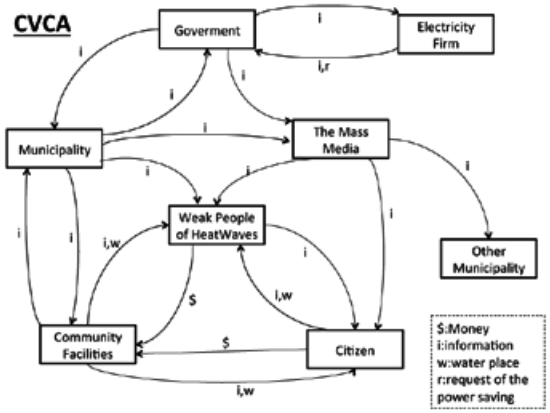


Figure 4.3 CVCA for Foot Bath

(2)WCA (Wants Chain Analysis)

We used the WCA. It is a modeling tool for needs of stakeholders. It was considered to act of them. We have 2 hypotheses. (Figure 4.4)

①People go to place where is Cool & Comfortable in summer.

②People want make relationships each other in there.

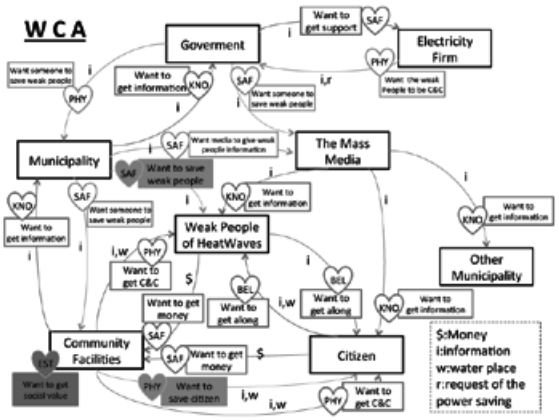


Figure 4.4 WCA for Foot Bath

4.3.1.3 Scenario Prototyping Rapidly

We test having interview about our prototype.

Our idea was wholly denied because it is difficult to take elderly people and children. (Figure 4.5) It is very important and useful to explain for interviewers and to get VOCs.

4.3.2 Frozen plastic Bottle

4.3.2.1 Requirement Analysis

(1) Scenario Graph

Our scope change to clearly again. It was considered about elderly people stay in their home where bad of heat stroke index.

They should use air conditioner and drink water. (Figure 4.6)

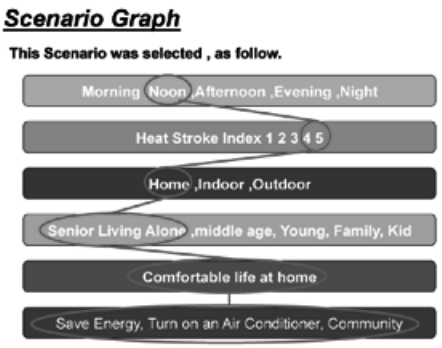


Figure 4.6 Scenario Graph

(2) AS IS, TO BE

We redefined of the AS IS and TO BE. (Figure 4.7)

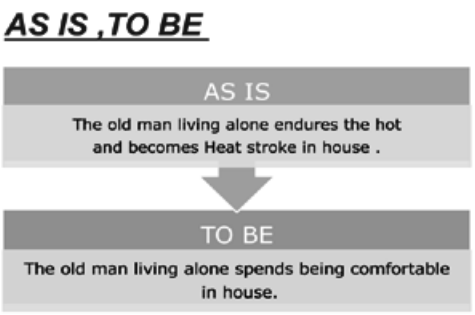


Figure 4.7 AS IS, TO BE

(3)TOC (Theory of Constraint)

We analyzed the bottle neck by TOC.

It has 4 issues.

①They don't know about heat stroke.

②They don't understand their health.

③They are not so good at operating machines.

④They don't understand suitable temperature.

(Figure 4.8)

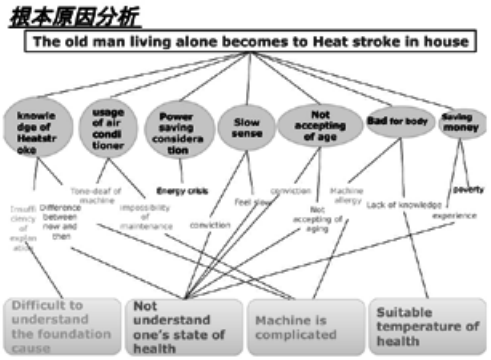


Figure 4.8 TOC

4.3.2.2 Concept of Solution

(1) Approach of 4 fundamental problems

We chose 2 methods.1st method is to reduce indoor humidity easily and cheaply. 2nd method is attended by WBGT (Wet Bulb Globe Temperature.). (Figure 4.9)

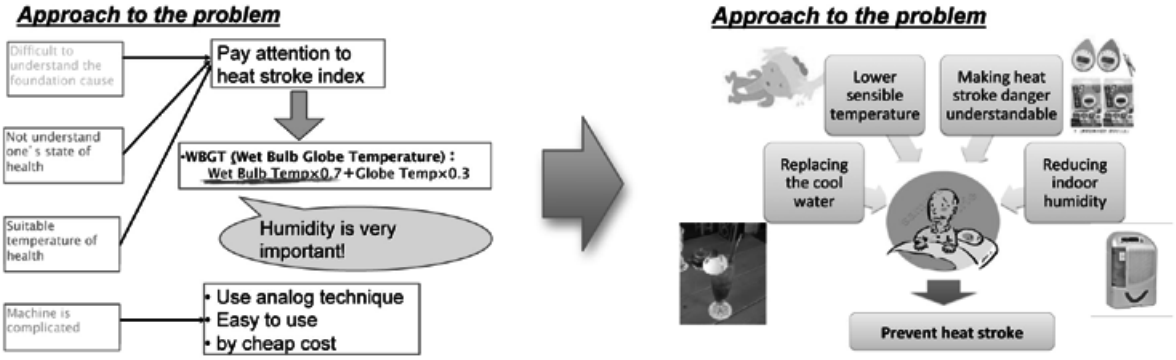


Figure 4.9 Approach of 4 fundamental problems

(2)Morphological Diagram

We combined functions by Morphological Diagram. 4 concepts were made it.

①Spot air Conditioner

②Small Private School

③Air Conditioner Coupled WBGT

④Frozen Health Drink (Figure 4.10)

It's useful for making system from some functions. We understand our system should be combined drinking and cooling.

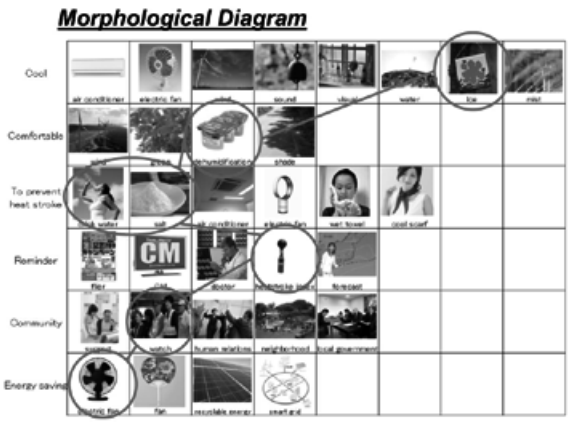


Figure 4.10 Pugh Method

(3)Pugh Method

We compared all of concepts by Pugh Selection. Frozen Health Drink was chosen. (Figure 4.11) By performing the Pugh Method, we can choose concepts in engineered approach.

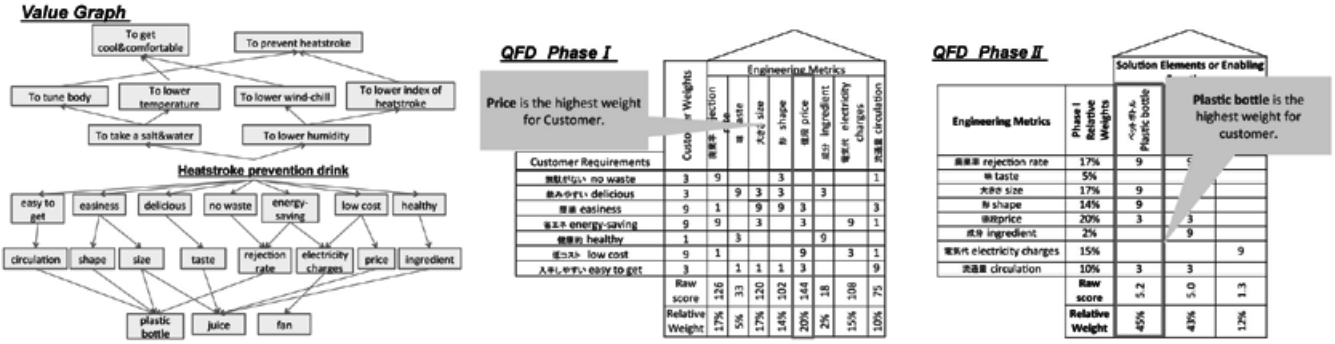
Pugh Method

		Air Conditioner	Cool Foot Bath	Spot Air Conditioner	Small Private School	Air conditioner coupled WBGT	Frozen Health Drink
Cost	D		+	S	+	S	+
Community	A		+	S	+	S	S
Cook	T		-	S	-	S	S
Prevention	U		-	S	-	S	S
Spreadable	M		S	-	S	-	+
Easy			+	S	+	+	+
Energy saving			+	+	+	+	+
Σ of +			4	1	4	2	4
Σ of -			2	1	2	1	0
Total			2	0	2	1	4

Figure4.11 Pugh Method

(4)QFD (Quality Function Development)

It was considered which function of prototype is important. Health Drink was bottled in plastic bottle. (Figure 4.12) Iced bottle was thawed by electric fan to reduce humidity as icicles. After that they drink melting health drink.



Cost& Worth using QFD

Table 8: Cost Worth Matrix

Part #	Solution Element	Cost/ day	* From QFD Phase II	Relative Cost	Cost / Worth
1	ペットボトル *plastic bottle*	12.00	*45%*	9%	0.20
2	ジュース *juice*	100.00	*43%*	75%	1.74
3	扇風機 *fan*	21.00	*12%*	16%	1.36
	Total Cost	133.00	*100%*	100%	

Figure 4.12 QFD

(5)TO BY USING

Our concept was bottom down by TO-BY-USING. (Figure 4.13)

To_By_Using

- ***To :*** Prevent Heat Stroke.
- ***By :*** Lower WBGT & Receive Hydration.
- ***Using :*** Frozen Healthy Drink.
- **WBGT (Wet Bulb Globe Temperature):**
  Wet Bulb Temp×0.7＋Globe Temp×0.3

Figure 4.13 TO BY USING

4.3.2.3 Architecture Design

(1) OPM (Object-Process Methodology)

It was considered object and function of our prototype. Turning of electric fan then it made to reduce humidity.(Figure 4.14)

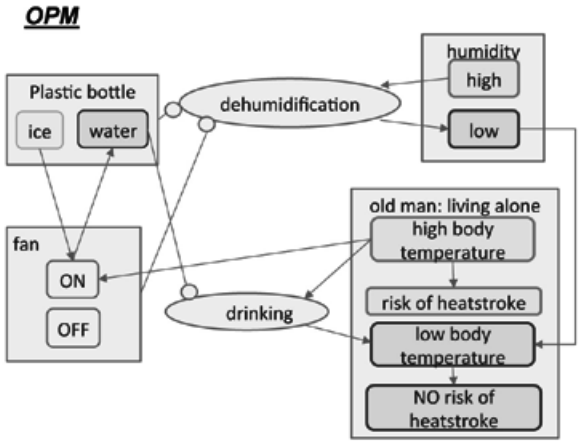


Figure 4.14 OPM

(2) Quality Score Carding

The system need to evaluate quantities by the Quality Score Carding.It was considered variable and noise. (Figure 4.15) It is useful to be used as reference.

Figure 4.15 Quality Score carding

4.3.2.4 Scenario Prototyping Rapidly

We made prototype then test for reducing humidity. It was considered our prototype works as air conditioner.

Figure4.16 Prototype of Frozen Health Drink

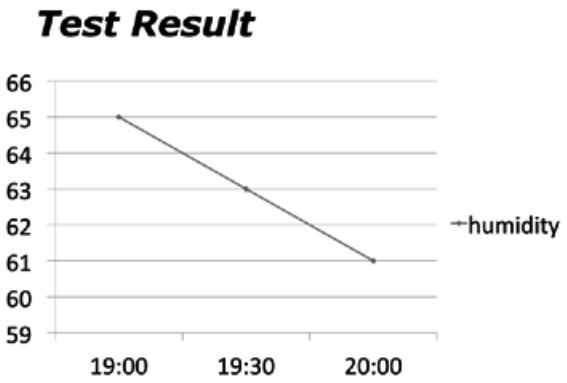


Figure 4.17 Prototype System Test

We asked elderly people as test but they denied it. They told 2 reasons.

①Heat stroke is a somebody else's problem.

②They don't understand their health by age.

They were discovered us. We thought elderly people want prevent heat stroke but they don't have the need so they cannot prevent themselves. Our approach was preventing physically but it doesn't work. It will cause policy resulting to be very little. We joined conference of welfare commissioners. They were discovered problems of their system. (Figure 4.18)(Figure 4.19)

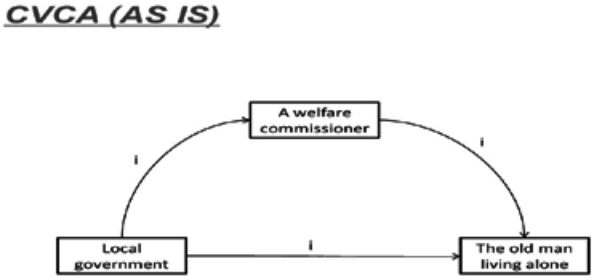


Figure4.18　CVCA（AS　IS）

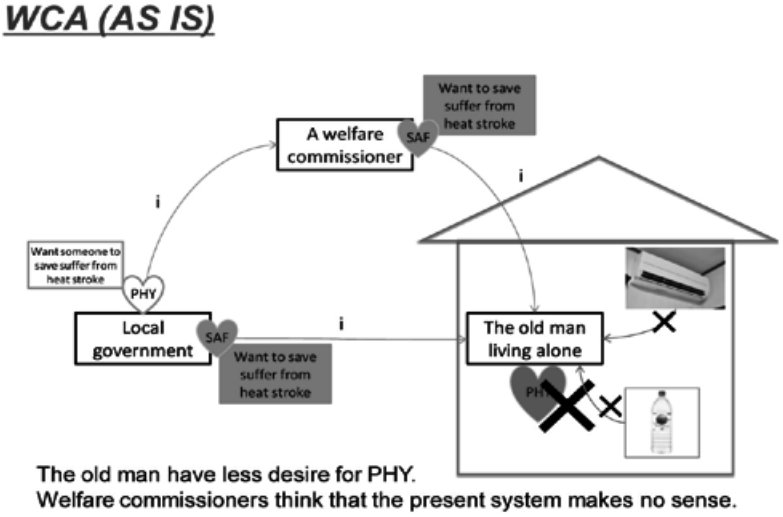


Figure 4.19　WCA(AS　IS)

Government helms elderly people but they cannot care themselves because they don't feel hot and thirsty well as age. It is the bottle neck of catching heat stroke.

4.4 2nd Prototype (Community with Children)

4.4.1 Requirement Analysis

Our solution changed from physical to community because they cannot prevent to catch heat stroke themselves.

(1) AS IS, TO BE

We changed our AS IS and TO BE.
Our goal is elderly people can get someone's help. (Figure 4.20)

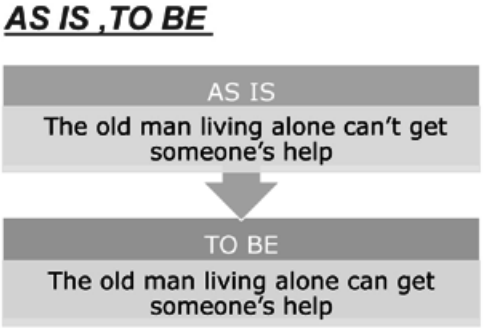


Figure 4.20 Prototype of Frozen Health Drink

4.4.2 Concept of Solution

We got a lot of interviews. Elderly people have altruistic mind for children and local society. Jan C. Semenza, Ph.D Heat-related Deaths during the July 1995 Heat Wave in Chicago (1996) link heat stroke and living alone. Ex. Pets make reducing risk of heat stroke. It was considered to be important for notice by someone.

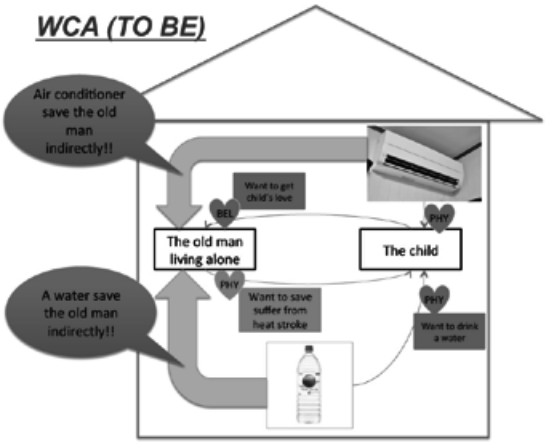


Figure 4.21 WCA

(1) WCA

It is important drinking water and using air conditioner in directory for heat stroke by their altruistic mind.

The best way is finding early by children and preventing heat stroke with children.

(Figure 4.21)

(2) Quality Score Carding

The system need to evaluate quantities by the Quality Score Carding.It was considered variable and noise. (Figure 4.22)

Figure4.22 Quality Score Carding

4.4.3 Stakeholder (CVCA & WCA)

We modeled relation of stakeholders by CVCA and WCA.

Our hypotheses were elderly people like children and working mothers want leave children with elderly people. (Figure 4.23)

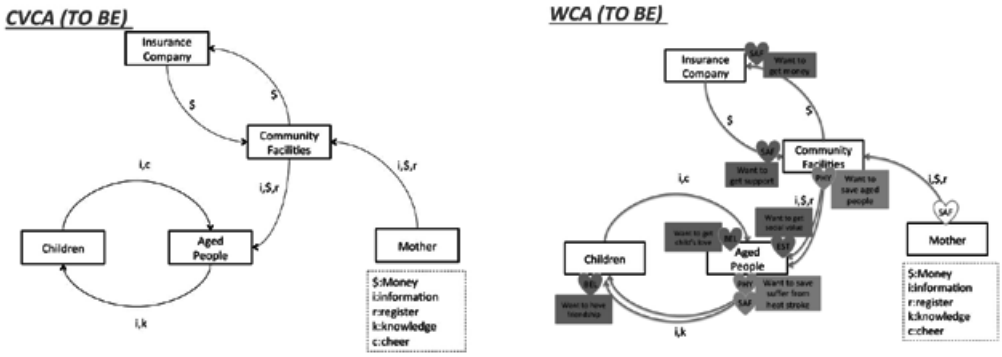


Figure 4.23 CVCA, WCA

4.4.4 Scenario Prototyping Rapidly

Figure4.24 2nd Prototype

We got interviews about new prototype. Our concept is symbiosis of elderly people and latch key children but elderly people don't want take care of children because they are afraid of social responsibility. Then we got interview about their needs. They have daily worries. Ex. Shopping, taking out garbage and something. A lot of volunteers support them but elderly people refrain from volunteering. They need service to cost. Our approach changed to address between preventing heat stroke and their worries. (Figure 4.24)

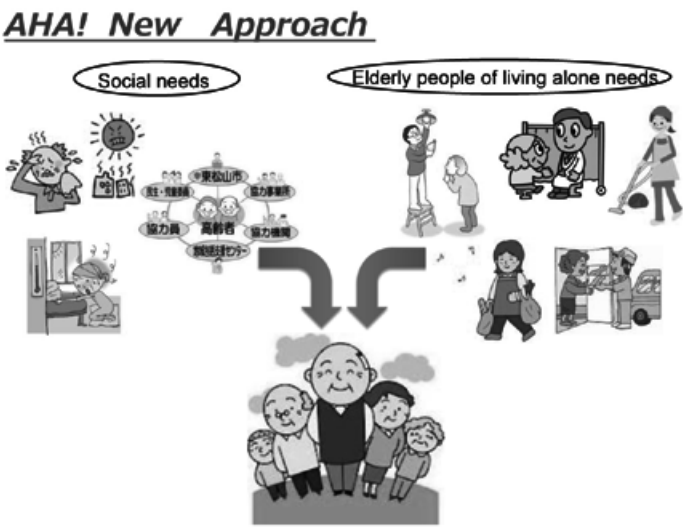


Figure 4.25 New Approach

4.5 The other of ALPS Methods

(1) Project Priority Matrix

As a result of doing the comparison analysis of a demand of the proposer enterprise and an actual project for the feature, the cost, and the time of the project, it became as shown in Figure 4.23

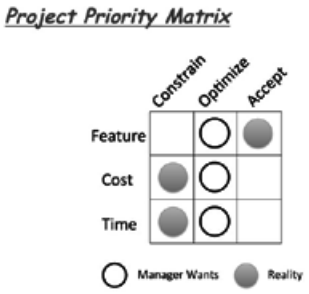


Figure4.26 Project Priority Matrix

(2) Mind Map

Because brain storming had been selected as a technique for freely emanating the idea, we did not use it

(3) Design Structure Matrix

It was a technique for analyzing whether an efficient process such as services and manufacturing was performed , so this research topic did not apply.

(4) Value Graph, QFD, Morphological Analysis, Pugh Selection and CVCA for Final Solution

Refer to Chapter 5.

(5) Net Presented Value and PSM Analysis for Final Solution

Refer to Chapter 6.

5. Design Recommendation

5.1 Process for Final solution

5.1.1 Requirement Re-Development

The interview result was quite different from our expectation as in 1st and 2nd prototypes test. We understood that elderly people living alone cannot take care of themselves to prevent heat stroke because of aging. And we also understood that elderly people who live alone have a lot of characteristic demands. We needed to go back first step of requirement development again under this situation. As the result of interviews and observation, the requirement set was developed as figure 5.1.

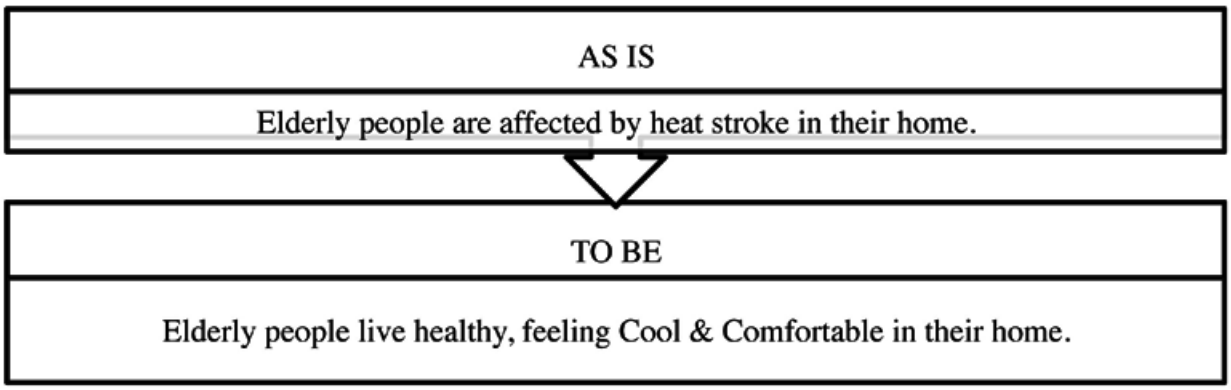


Figure 5.1 AS IS - TO BE for Requirement Re-Development

It was confirmed as most significant problem that elderly people were affected by heat stroke in their home. And our purpose was to set of how elderly people should live healthy, feeling Cool & Comfortable in their home under the restriction of energy supply. The ambiguous words, Cool, Comfortable, Community, and Restriction of energy supply, were specified as Figure 5.2. Cool measure was defined not to cool physically but to decrease the number of heat stroke patient. Comfortable and Community was quantified for valuation. The energy restriction is included due to the recent disaster. We agree with our proposer company about these things at decision gate.

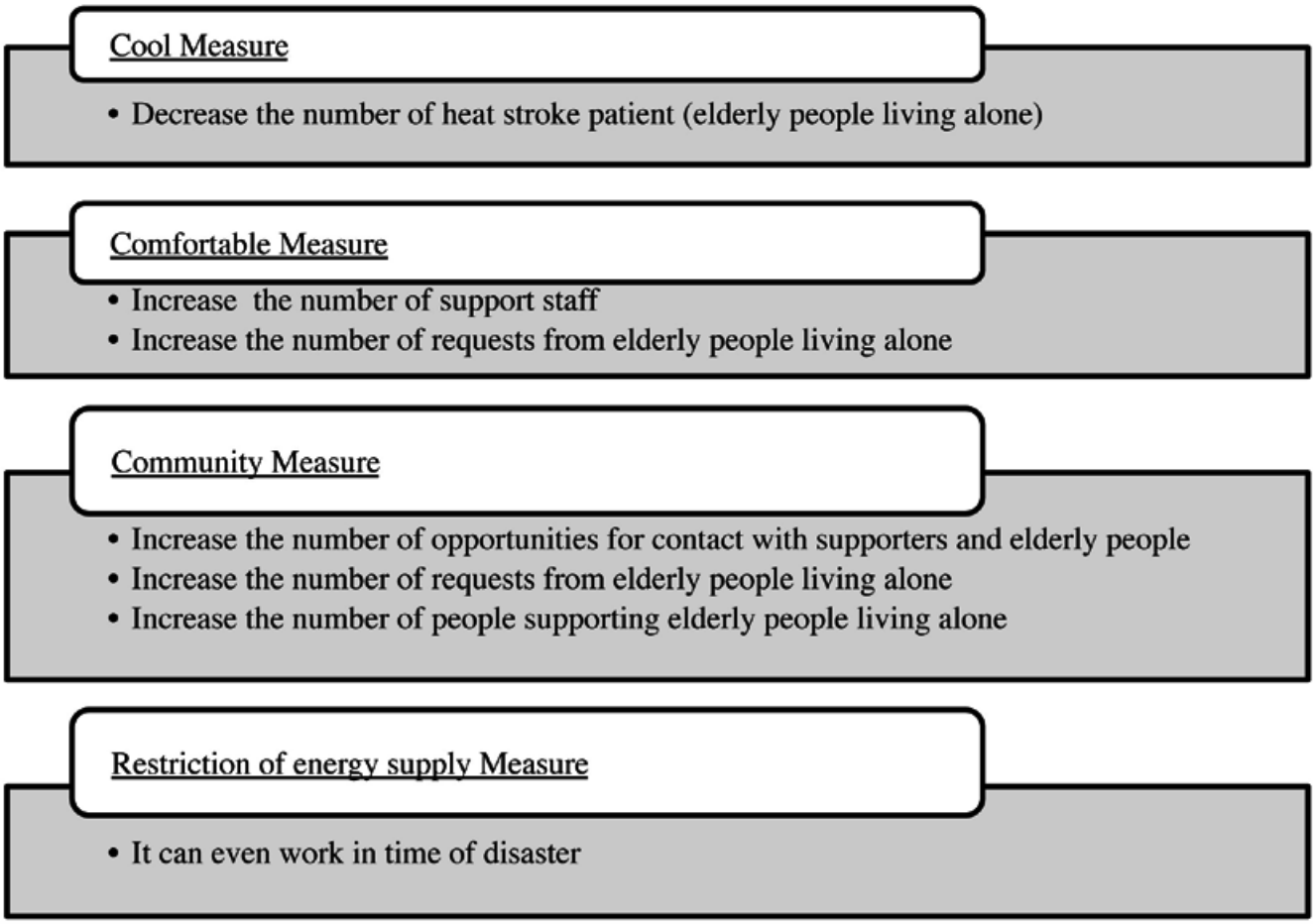


Figure 5.2 Definition of Measure

5.1.2 Visualizing Stakeholder Needs

The administration such as local governments and the neighborhood activist such as the welfare commissioners want elderly people to prevent heat stroke. However, unfortunately, elderly people do not want to prevent heat stroke. There is a mismatch between preventive measures against heat stroke and needs of the elderly people those living alone. Then, what is the most necessary for the elderly people living alone? We performed the Value Graph in order to visualize stakeholder needs as figure 5.3.

Value Graph

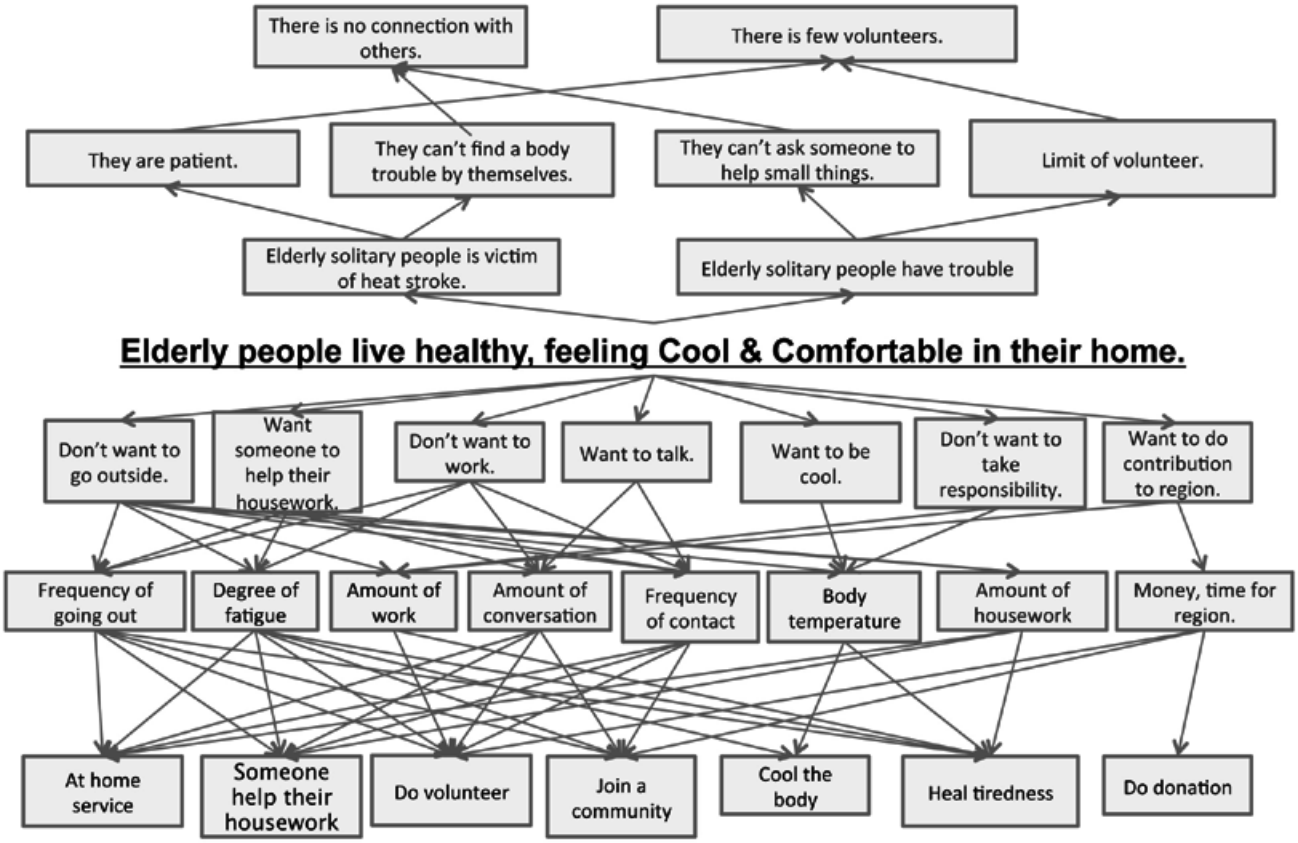


Figure 5.3 Value Graph

By performing the Value Graph, we found that various voices of customers were characteristic and trifling needs, exchange of lamps, speech partner and help of housework, etc. These values are controlled by economic and social indexes, amount of conversation and contact frequency, etc. The relating functions and actions were defined. We were able to arrange the element that necessary for the problem solving. (Figure 5.4)

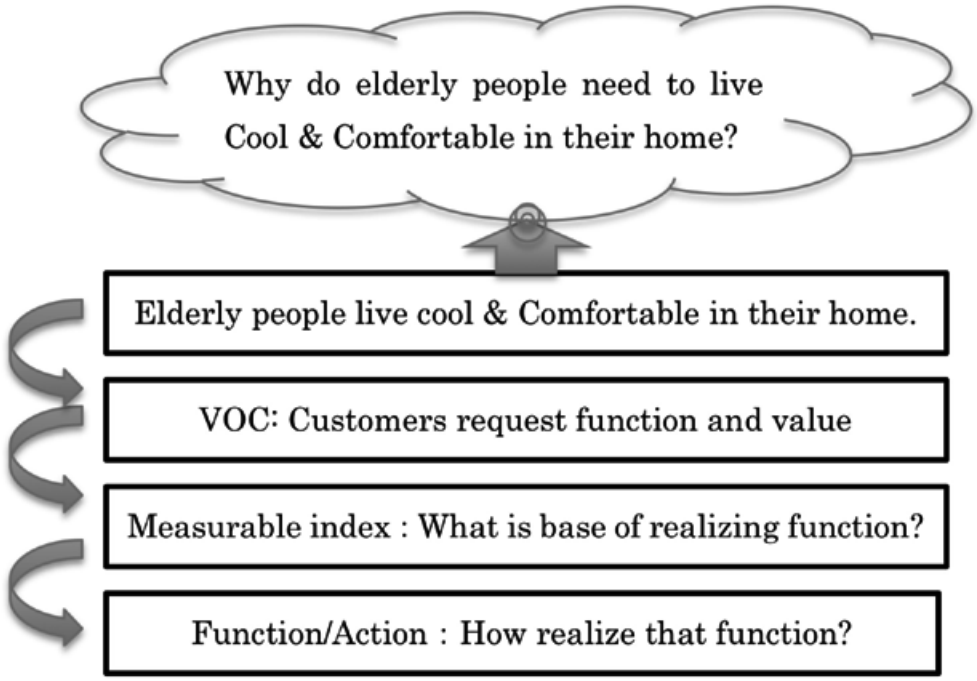


Figure 5.4 Visualizing Stakeholder Needs

5.1.3 Concept of Design

We compared demand of Stakeholder by performing the QFD (Quality Function Deployment) as a function requirement for the system with engineering. The result is as follows. (Figure 5.5 QFD PHASE 1 and Figure 5.6 QFD PHASE 2)

QFD Phase1

Customer Requirements	Customer Weights	Engineering Metrics: Frequency of going out	Degree of fatigue	Amount of work	Amount of conversation	Frequency of contact	Body temperature	Amount of housework	Money, time for region.
Don't want to go outside.	9	9	9	3		3	1	3	
Want someone to help their housework.	9	3	9		1	3		9	
Don't want to work.	9	3	9		1	1			
Want to talk.	3				9	9			
Want to be cool.	3						9		
Don't want to take responsibility.	9			9					
Want to do contribution to region.	9			1					9
Raw score		135	243	117	45	90	36	108	81
Relative Weight		16%	28%	14%	5%	11%	4%	13%	9%

Figure5.5 QFD PHASE 1

QFD Phase2

Engineering Metrics	Relative Weights	Solution Elements or Enabling Functions: At home service	Someone help their housework	Do volunteer	Join a community	Cool the body	Heal tiredness	Do donation
Frequency of going out	16%	9	3	3	3		3	
Degree of fatigue	28%	3	9	3	1	3	9	
Amount of work	14%			9			3	
Amount of conversation	5%	1	3	3	9			
Frequency of contact	11%	1	3	3	9			
Body temperature	4%					9	3	
Amount of housework	13%	9					3	
Money, time for region.	9%		9	9	9			9
	Raw score	3.6	4.6	3.9	3.0	1.2	3.9	0.9
	Relative Weight	17%	22%	10%	10%	6%	19%	4%

Figure 5.6 QFD PHASE 2

The priority level of function/action was shown in figure 5.7. An objective priority level of the system could be shown by QFD.

Weight of Function/Action

Ranking	Function/Action	Ratio
1	Someone help their housework	22%
2	Heal tiredness	19%
3	Do volunteer	18%
4	Take a at-home service	17%
5	Join a community	14%
6	Cool the body	6%
7	Do donation	4%

Figure 5.7 Function/Action priorities

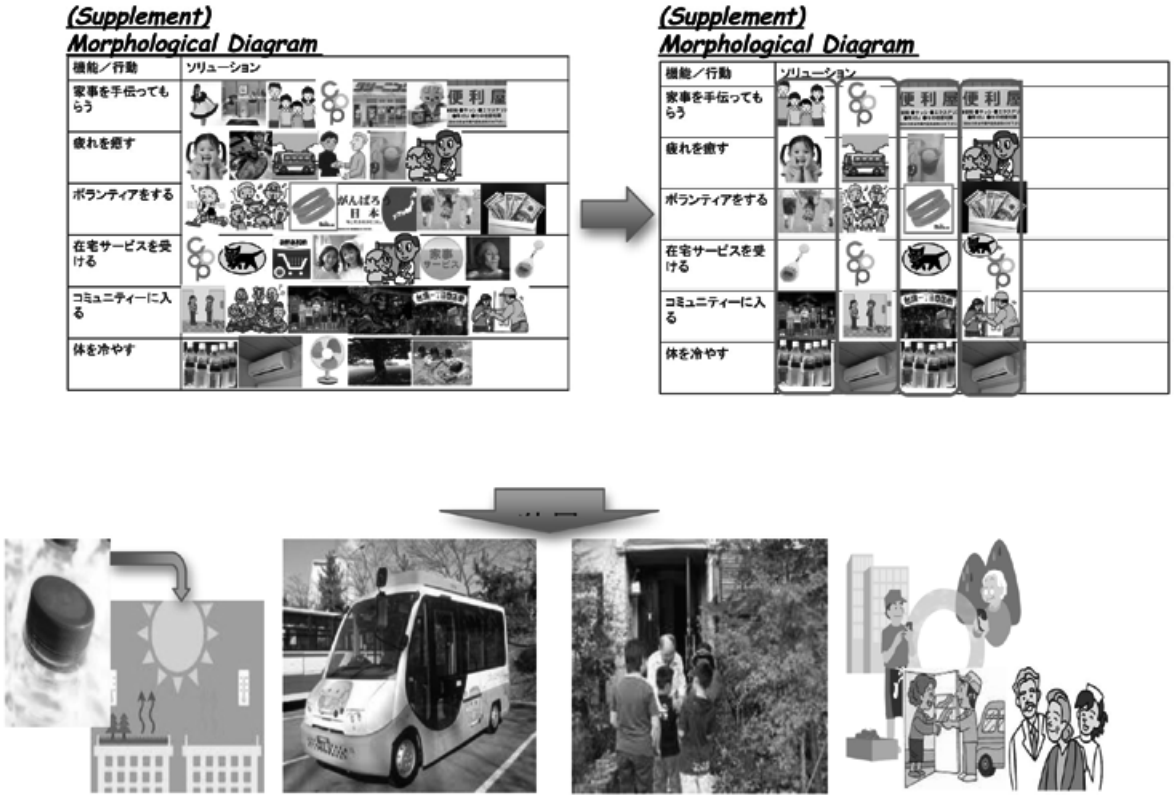
Morphological Analysis was used as shown in Figure 5.8. We newly designed four concepts by freely developing. The content of four concepts is as follows.

①Charity Drive: The elderly people buys the charity plastic bottles, and the capital uses for the heat island phenomenon cancellation.

②Community Bus: It appeals for funds and the transportation to the supermarket is offered.

③Education: The child asks the elderly people for the heat stroke prevention as a school education program in summer.

④Combine the delivering service and health check-up: Deliveryman visits the elderly people's home and performs a health check.



① Charity Drive ②Community Bus ③Education ④Combine Delivery and Health Check-up

Figure5.8 Morphological Analysis and Four Options

We technologically compared these four options by performing the Pugh Selection. (Figure 5.9) As a result, it was comparable including the function that could not be

quantified. Consequently, it has been understood that ④ Combine Delivery and Health Check-up is the most suitable.

(Supplement)
Pugh Method

Requirements	1.教育プログラム	2.マイクロバス	3.チャリティーPETボトル	4.宅配パッケージ
外に出たくない	+	-		+
家事を手伝って欲しい	-	S	D	+
仕事したくない	S	S	A	S
会話が欲しい	+	+	T	+
熱中症を予防したい	S	-	U	+
責任は負いたくない	-	S	M	S
地域貢献したい	S	S	M	-
合計	+2,-2,S2	+1,-2,S4		+4-1,S2
順位	2	4	2	1

Figure 5.9 Pugh Selection

5.2 Concept of Final solution, "MIKAWAYA" System

5.2.1 Feature of Final solution

④Combine Delivery and Health Check-up is different from existing delivery service enterprises. This solution visits the elderly people's home everyday, complies with user's request and not only delivering service but also performs a health checks. The concept is to expand the service functions performed while delivering services to include a health check-up. We call it "MIKAWAYA". "MIKAWAYA" have some features, as follows.

a. To do a health check.
b. To visit daily.
c. To get customer needs.
d. To be a community-based service.
e. To fulfill requests made by customer.
f. To pass the information onto the family, etc.

5.2.2 Advantage of "MIKAWAYA" System

The most advantage point of "MIKAWAYA" System is to visiting to comply with elderly people's needs every day, and to leads directly to heat stroke prevention. Moreover, the interpersonal relationship built by visiting every day have the following advantage.

a. To ask easily for some detail demands.
b. To cancel elderly people's worry and anxiety.
c. To consult about the physical condition other than heat stroke.

d. Notice a bad change of elderly people's health.
e. Relief of elderly people's family, etc.
f. Safety net of the disaster.

5.3 Stakeholder Analysis

This system doesn't achieve only by the profit of service of delivering to home. To provide the service only of this, the substantial cost is generated. By stakeholder analysis, we discuss that who gets most profit from this system. (Figure 5.10)
We propose elderly people's families and the real estate landlord as the CUSTOMER of this service. Elderly people's families worry about their parents' health. The real estate landlord has the elderly people's lonely death and the neighbor's trouble as his problems. Elderly people's families and the real estate landlord get much profit from this service. We should send elderly people their health information to their family and landlord as business targets. We define that the USER is elderly people living alone, and the CUSTOMER is elderly people's families and the real estate landlord.

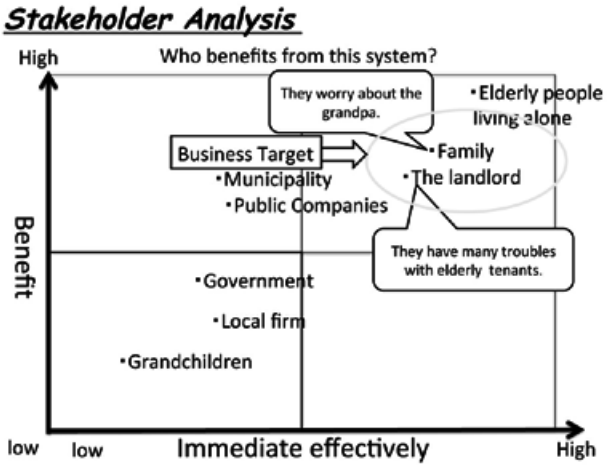


Figure 5.10 Stakeholder Analysis

We included regional medical institutions among stakeholders. The quality of the health check-up is improved by cooperation with regional medical institutions. Most of regional doctors have so many patients to see that they have no time to contribute to the prevention of heat stroke. Regional medical institutions get much profit from this service.

5.4 Architecture Design

To make the concept of the system an embodiment, the architecture of the system was designed. (Figure 5.11) This Architecture Design clarified the function and the interface.

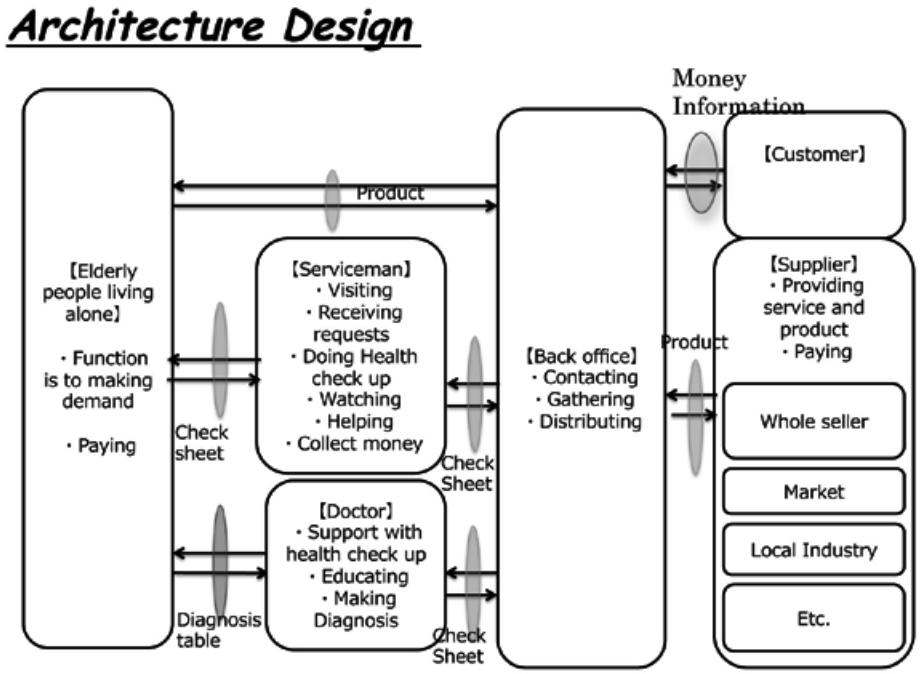


Figure 5.11 Architecture Design

5.5 System Design (CVCA : Customer Value Chain Analysis)

We perform the CVCA in order to define boundary of system and have the relationship between information and money of stakeholders. We found most important relationship between MIKAWAYA and Doctor. We found most important service is to combine delivering service and health check-up. (Figure 5.12) MIKAWAYA visits the user's home every day, complies with user's request and performs a health check-up. The elderly people pay for delivering service fee. We send user's health information for their family and landlord. We make profits from deliveries and from a fee paid by their family and landlord.

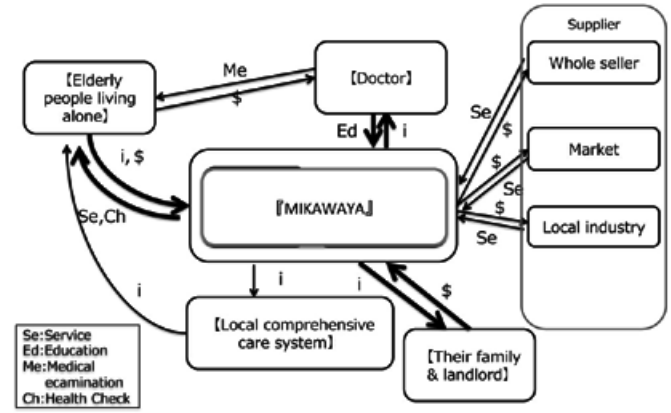


Figure 5.12 CVCA

5.6 Service Process

The detail of Service Process is as follows.

1. MIKAWAYA learns about health check by doctor. MIKAWAYA visit the home of elderly people living alone.

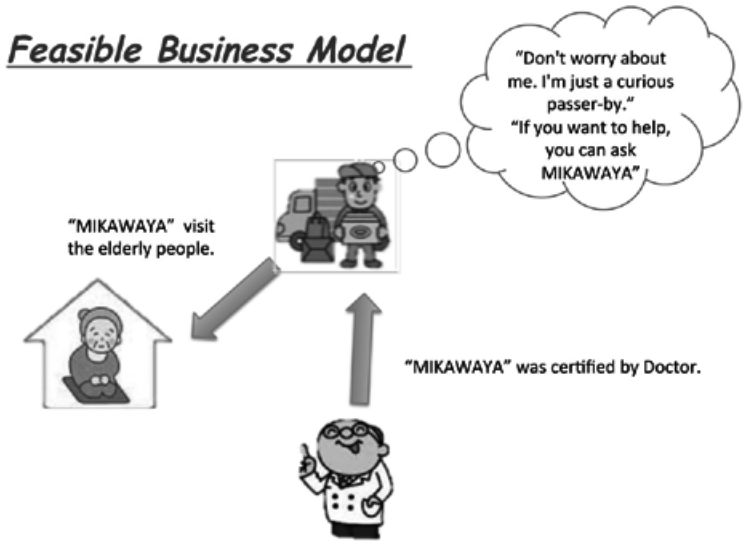


Figure 5.13 Business Model 1

2. MIKAWAYA collects elderly people's needs. (House wife, Service, daily necessities, etc.) Moreover, it perform health check-up them at the same time. Information on a health check-up is sent to elderly people's family and landlord. The family and the landlord pay the contract fee of every month to MIKAWAYA as an information fee. This contract fee is the majority of the profit in this system. (Figure 5.14)

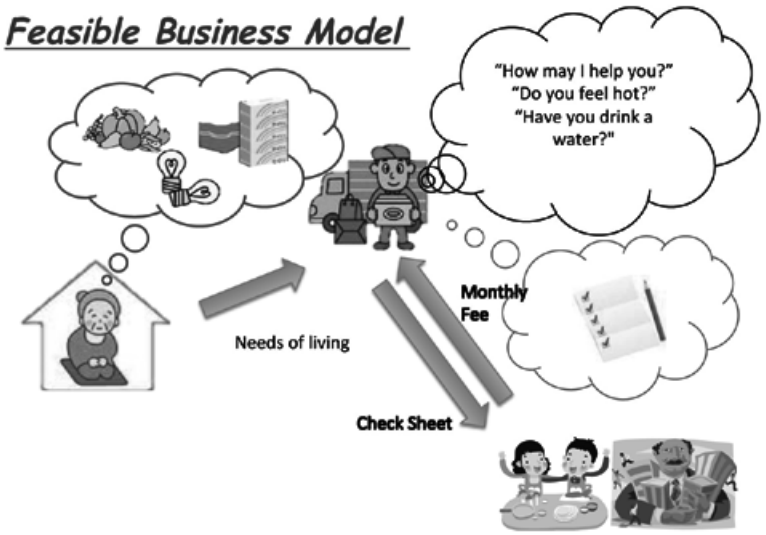


Figure 5.14　Business Model 2

3. MIKAWAYA provides the commodity and the service for which the elderly people asked. A healthy check is done in every case. (Figure 5.15)

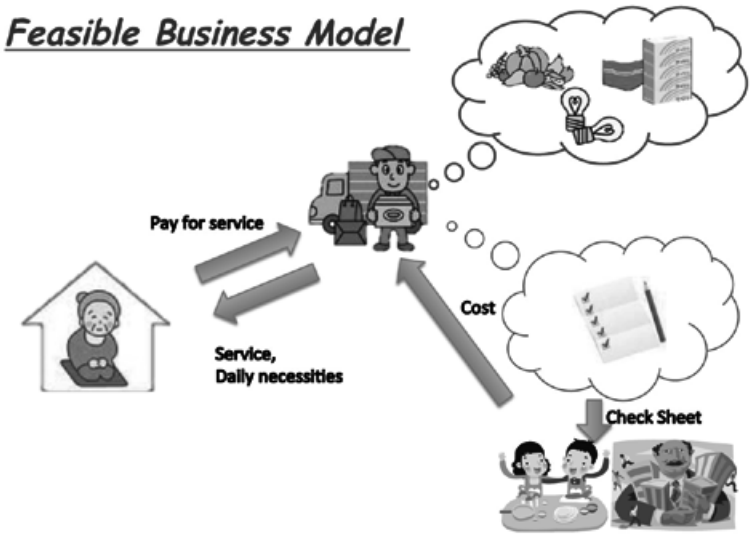


Figure 5.15　Business Model 3

4. When MIKAWAYA finds the problem by a healthy check, they contact the doctor. (Figure 5.16)

Feasible Business Model

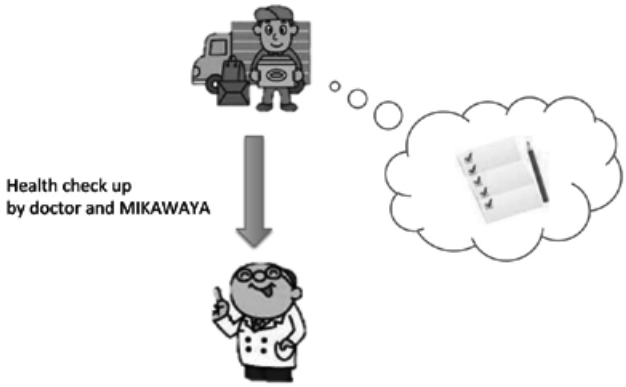


Figure 5.16　Business Model 4

5. The ailing person will receive a diagnosis. We can save the elderly people living alone from heat stroke. (Figure 5.17)

Feasible Business Model

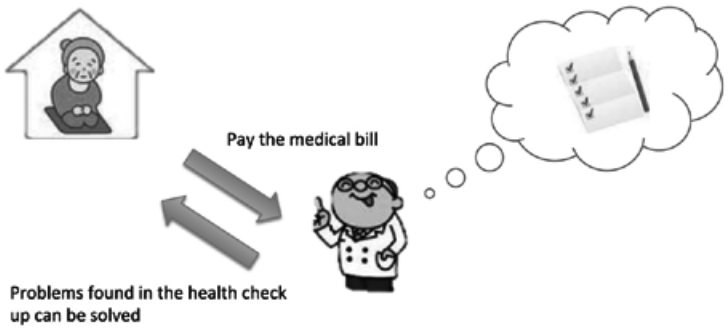


Figure 5.17　Business Model 5

6 Competitive Analysis

This chapter refers to economic value of MIKAWAYA. And also refers to Competitor, Business risk, and Future business expansion.

6.1 Analysis of economic value

Focusing on Hiyoshi district, we did a trial calculation of economic value.

6.1.1 Revenue

Revenue is following. (Table 6.1)

Table 6.1 Revenue

Revenue	¥17,040,000	¥30,240,000	¥43,440,000	¥48,480,000	¥53,520,000	¥58,560,000
SalesVolume	30	60	90	100	110	120
Marketsize	200	200	300	300	300	300
Market geowth	100%	100%	100%	100%	100%	100%
economic trend	100%	100%	100%	100%	100%	100%
UnitPrice	¥108,000	¥108,000	¥108,000	¥108,000	¥108,000	¥108,000
Sales Revenue	¥3,240,000	¥6,480,000	¥9,720,000	¥10,800,000	¥11,880,000	¥12,960,000
Membership	¥9,000,000	¥18,000,000	¥27,000,000	¥30,000,000	¥33,000,000	¥36,000,000
Landload's UnitPrice	¥960,000	¥960,000	¥960,000	¥960,000	¥960,000	¥960,000
Landload's Volume	5	6	7	8	9	10

Revenue is indicated below.

Revenue = Sales Revenue + Membership fee + Landlord's fee

Sales Revenue is indicated below.

*Sales Revenue = Sales Volume * Unit Price*

Sales Volume is estimated 30 people in first year. In Hiyoshi district, there are 200 elderly people living alone. So 15% of all solitary Elderly people will be estimate as user. After this year, Volume is desired value, 60people, 90people, 100people, and so on.

From third year, market size expand to 300people, because it is considered that others (not be elderly living alone) will use MIKAWAYA.

Unit Price is assumed that 300JPY/day and everyday in 1year. It is value for them to buy essential foods (300JPY) everyday. Or, It is value for them to buy something (900JPY) every three days. Considering ordinary home's consumption of food, or daily necessities, this value is appropriate.

Then, Membership fee is indicated below.

Membership fee = membership unit price/month * 12 month *Sales Volume

Sales Volume is same as the above. Membership unit price/month is estimated at 25,000JPY. This price is guided by pricing method be based on Interviews. (Figure6.1)

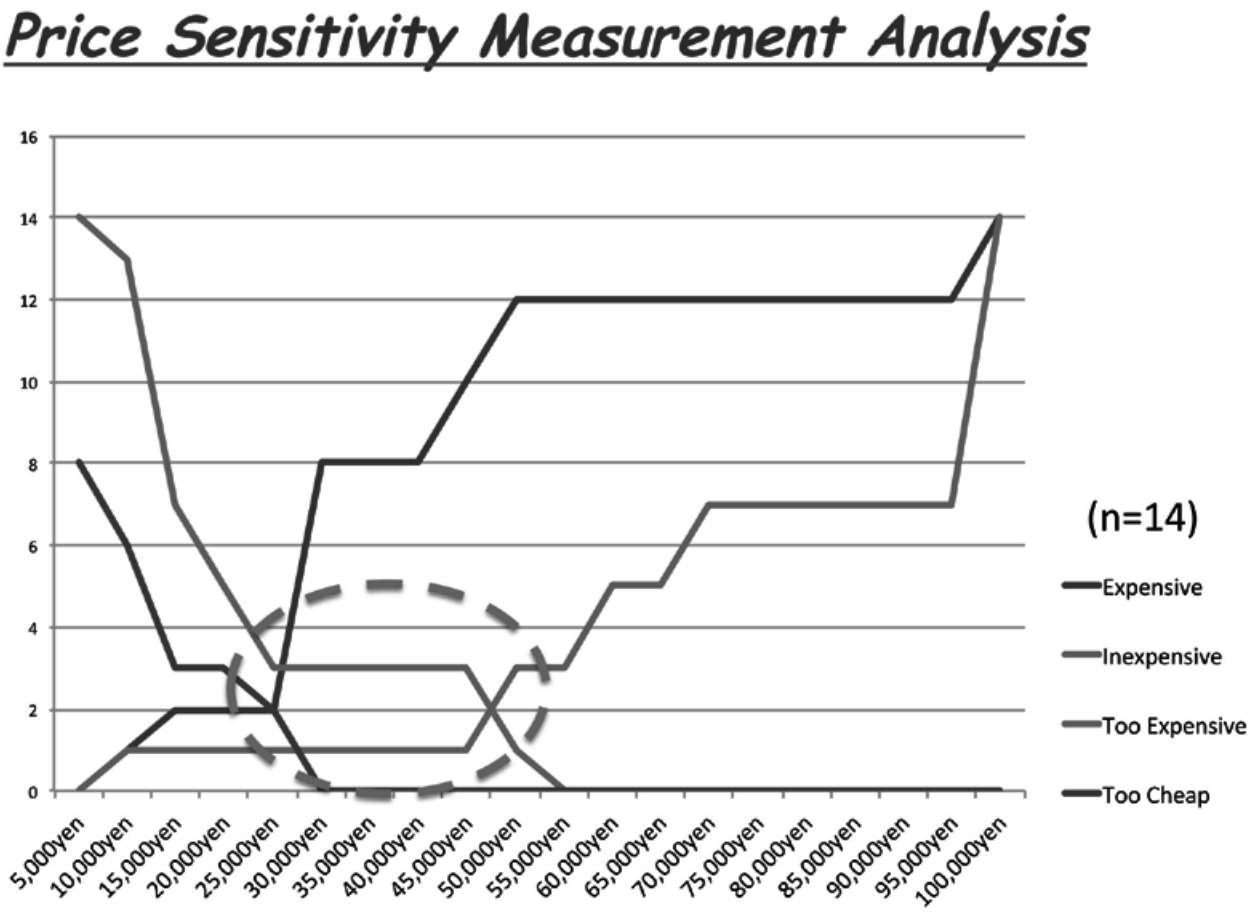


Figure6.1　PSM Analysis

According to Interviews in Hiyoshi district, families having elderly people living alone don't mind paying 27,000JPY~48,000JPY/month for using MIKAWAYA system. So, This Membership unit price/month (25,000JPY) is very appropriate.

Finally, Landlord's fee is indicated below.

Landlord's fee = Landlord's unit price * Landlord's volume.

Landlord's unit price is estimated at 8,000JPY/month. Landlord's volume is estimated at 5people in first year, and adding 1 people to last year's volume (in second year, Landlord's volume is 2 people, in third year 3 people and so on).

6.1.2 Cost

Cost is showed below. (Table 6.2)

Table 6.2　Cost

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cost	¥15,027,200	¥25,094,400	¥35,291,600	¥38,424,000	¥41,956,400	¥45,088,800
Fixed cost	¥12,200,000	¥19,200,000	¥26,600,000	¥28,800,000	¥31,400,000	¥33,600,000
Machinery	¥200,000		¥200,000		¥200,000	
Real estate	¥4,800,000	¥4,800,000	¥4,800,000	¥4,800,000	¥4,800,000	¥4,800,000
Labor cost	¥7,200,000	¥14,400,000	¥21,600,000	¥24,000,000	¥26,400,000	¥28,800,000
Variable cost	¥2,827,200	¥5,894,400	¥8,691,600	¥9,624,000	¥10,556,400	¥11,488,800
Material	¥2,527,200	¥5,054,400	¥7,581,600	¥8,424,000	¥9,266,400	¥10,108,800
shipping	¥0	¥540,000	¥810,000	¥900,000	¥990,000	¥1,080,000
Advertising	¥300,000	¥300,000	¥300,000	¥300,000	¥300,000	¥300,000

Cost is indicated below.

Cost = Fixed cost + Variable cost

And Fixed cost is indicated below.

Fixed cost = Machinery + Real estate + Labor cost

In this case, Machinery is estimated at 200,000JPY/every two years because of buying two delivery motorcycles every two years. In 6th year, a delivery motorcycle per 20 elderly people. It is appropriate. Real estate is estimated at 500,000JPY/month because of a warehouse. Labor cost is estimated at 200,000JPY/month per person. The number of staff is the president and employees. Employees are add one per 10 users. For example, if there are 30 users, the number of staff is four, the president and three employees. So, Labor cost is 800,000/month.

Variable cost is indicated below.

Variable cost = Material Cost shipping Cost + Advertising Cost

In this case, Material Cost is 78% of Sales Revenue. It is the same as the Cooperative of Tokyo. So, It is appropriated. Shipping Cost is estimated at 50JPY/a delivery service. And advertising Cost is estimated at 300,000JPY/year.

In addition, it is estimated that Project Period is 6 year, Discount Rate is 10%, Initial Investment is 8,000,000JPY, and Tax is 40%.

Project Period	6	year
Discount Rate	10%	%
Initial Investment	¥8,000,000	$
Tax	40%	%

According to the above, Net Present Value is indicated below (Table 6.3).

Table 6.3 Net present value 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Revenue	¥17,040,000	¥30,240,000	¥43,440,000	¥48,480,000	¥53,520,000	¥58,560,000
Cost	¥15,027,200	¥25,094,400	¥35,291,600	¥38,424,000	¥41,956,400	¥45,088,800
Profit	¥2,012,800	¥5,145,600	¥8,148,400	¥10,056,000	¥11,563,600	¥13,471,200
Tax	40%	40%	40%	40%	40%	40%
Depreciation		¥0	¥0	¥0	¥0	¥0
Investment	¥8,000,000					
Δworking Capital		¥0	¥0	¥0	¥0	¥0
Free Cash Flow	¥-5,987,200	¥3,087,360	¥4,889,040	¥6,033,600	¥6,938,160	¥8,082,720
Discount Factor	1.00000	0.90909	0.82645	0.75131	0.68301	0.62092
Present Value	¥-5,987,200	¥2,806,691	¥4,040,529	¥4,533,133	¥4,738,857	¥5,018,733
accumulationPV	¥-5,987,200	¥-3,180,509	¥860,020	¥5,393,153	¥10,132,009	¥15,150,743

Net Present Value	¥13,137,943	¥
Internal Rate of Return	72%	%
Payback Period	3	Year

The economic value of MIKAWAYA is estimated at below.

Net Present Value (NPV) is 13,137,943JPY.

Internal Rate of Return (IRR) is 72%.

Pay back period is 3 years.

Table 6.4 Net present value 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Revenue	¥17,040,000	¥30,240,000	¥43,440,000	¥48,480,000	¥53,520,000	¥58,560,000
Cost	¥15,027,200	¥25,094,400	¥35,291,600	¥38,424,000	¥41,956,400	¥45,088,800
Profit	¥2,012,800	¥5,145,600	¥8,148,400	¥10,056,000	¥11,563,600	¥13,471,200
Tax	40%	40%	40%	40%	40%	40%
Depreciation		¥0	¥0	¥0	¥0	¥0
Investment	¥16,000,000					
Δworking Capital		¥0	¥0	¥0	¥0	¥0
Free Cash Flow	¥-13,987,200	¥3,087,360	¥4,889,040	¥6,033,600	¥6,938,160	¥8,082,720
Discount Factor	1.00000	0.90909	0.82645	0.75131	0.68301	0.62092
Present Value	¥-13,987,200	¥2,806,691	¥4,040,529	¥4,533,133	¥4,738,857	¥5,018,733
accumulationPV	¥-13,987,200	¥-11,180,509	¥-7,139,980	¥-2,606,847	¥2,132,009	¥7,150,743

Net Present Value	¥5,137,943	¥
Internal Rate of Return	26%	%
Payback Period	5	Year

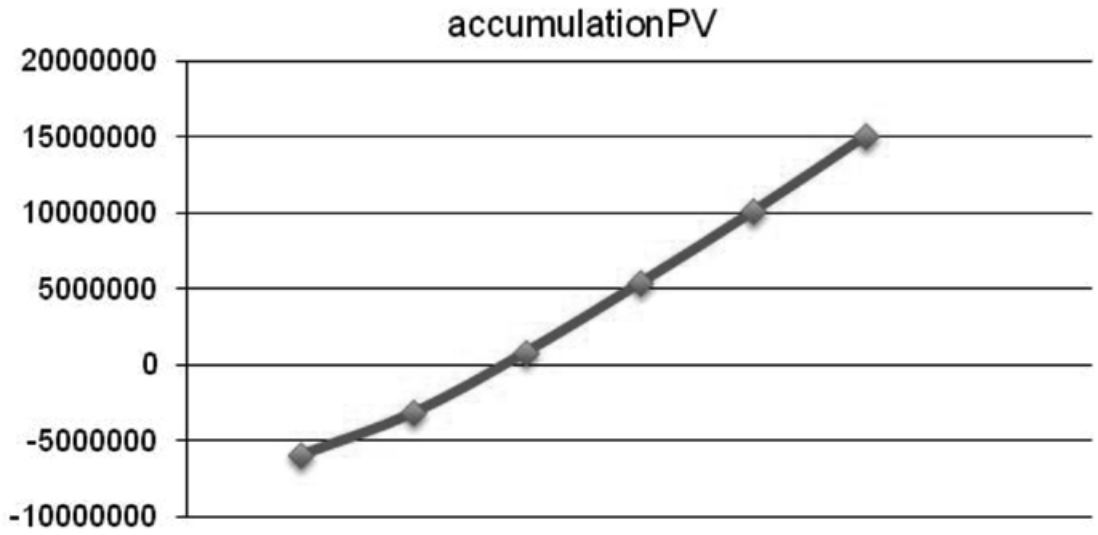


Figure6.2　Accumulation PV

Also, main function of MIKAWAYA is distribution system. So development phase is estimated less than 1 year.

Considering risk of sales slump, If Initial Investment is estimated at 16,000,000JPY (This Investment can cover all of the cost in first year.), NPV is indicated as below (Table6.4). In this case, NPV is also the black, but pay back period is moved to 5 years.

6.2 Competitor

Competitors of MIKAWAYA system are cooperative, present shipping carrier and so on.Order-taking service of present shipping carrier is done by Sagawa express and Yamato Transport Co. In addition, delivery of medical treatment is done by Sugi Holdings. As stated above, some parts of MIKAWAYA system is already precedence. But, combination of those systems is unprecedented. Order-taking service is done by Cooperative of Hiyoshi Kanagawa. They do similar service, but membership fee is expensive for elderly. So that service is not succeeded.

Common feature of present service is that elderly people is not only user but also customer. Many elderly people is not rich. They live on a pension. So It is difficult to make a profit by focusing on elderly people.

So, in MIKAWAYA system, user and customer are separated. And MIKAWAYA system makes profit by a fee charged to their family and landlord. It is Business Feature of MIKAWAYA system. Thereby as it has been mentioned above (Figure6.1) , MIKAWAYA system can take many fee, and make a profit.

6.3 Risk

There are two Business risks. 1. MIKAWAYA is forced price war for many competitors. 2. MIKAWAYA can't manage for government's public service like a MIKAWAYA system.

About 1, it is important to be followed making profit by a fee charged to their family and landlord. So it is need to be protection of intellectual property or do branding in an early stage.

About 2, MIKAWAYA would rather make government admit. And MIKAWAYA is authorize as supporting project.

6.4 Future business expansion

MIKAWAYA system make a profit by a fee charged to elderly people's family and landlord. But stakeholder getting benefit is not only their family and landlord. For example, the city working these systems will raise the value of city's property. Thereby the city and local government will take a benefit. Finally, people living in this city are increase. Thereby the company being this city will take a benefit, too.

It has been mentioned above, there is many stakeholder getting benefit by MIKAWAYA system. So, If they support this system (like a grant or donation) , MIKAWAYA system can expand. , And MIKAWAYA system can provide discounted and broad-based support service that solves a local problem in a scalable manner.

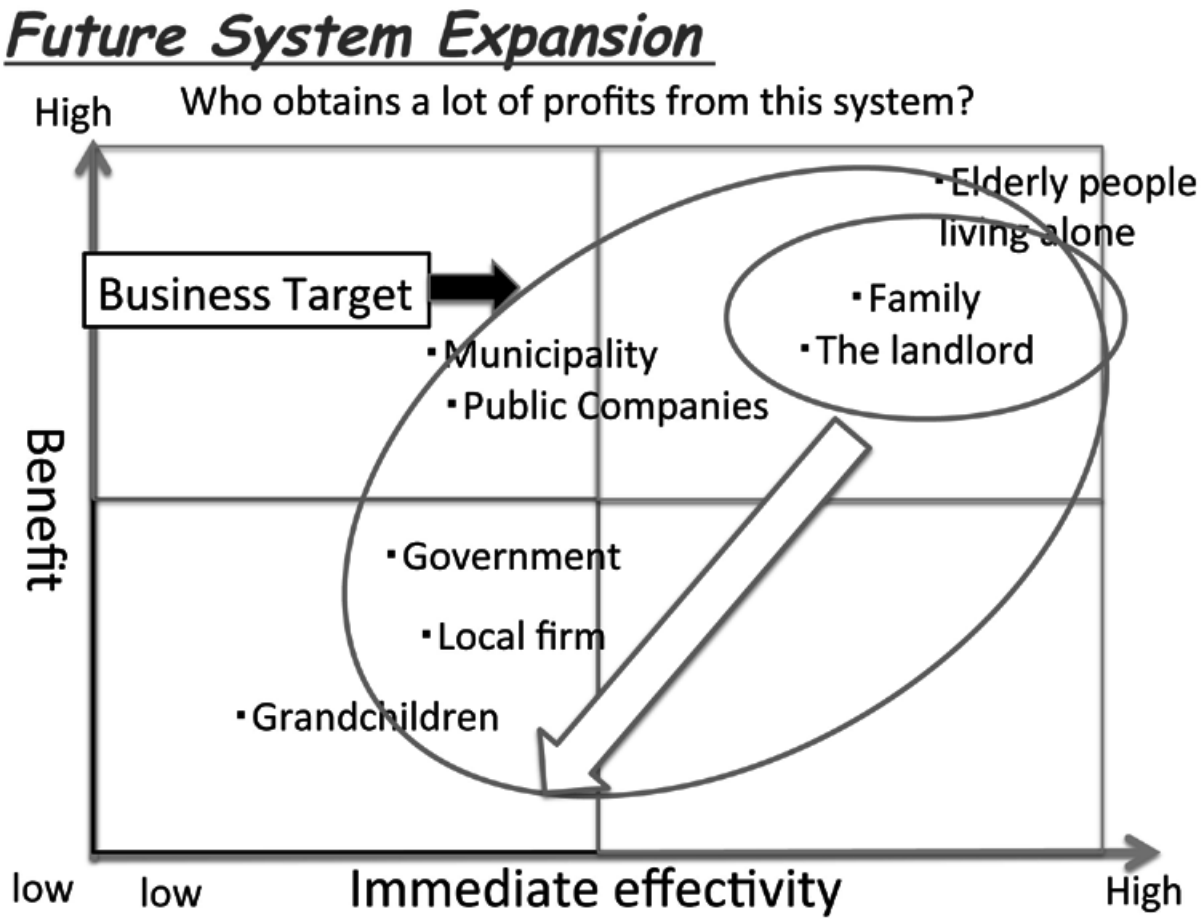


Figure 6.3 Future System Expansion

7. ALPS Roadmap and Reflections

This Table refers to our Roadmap of ALPS.

Our roadmap is below (figure7.1).

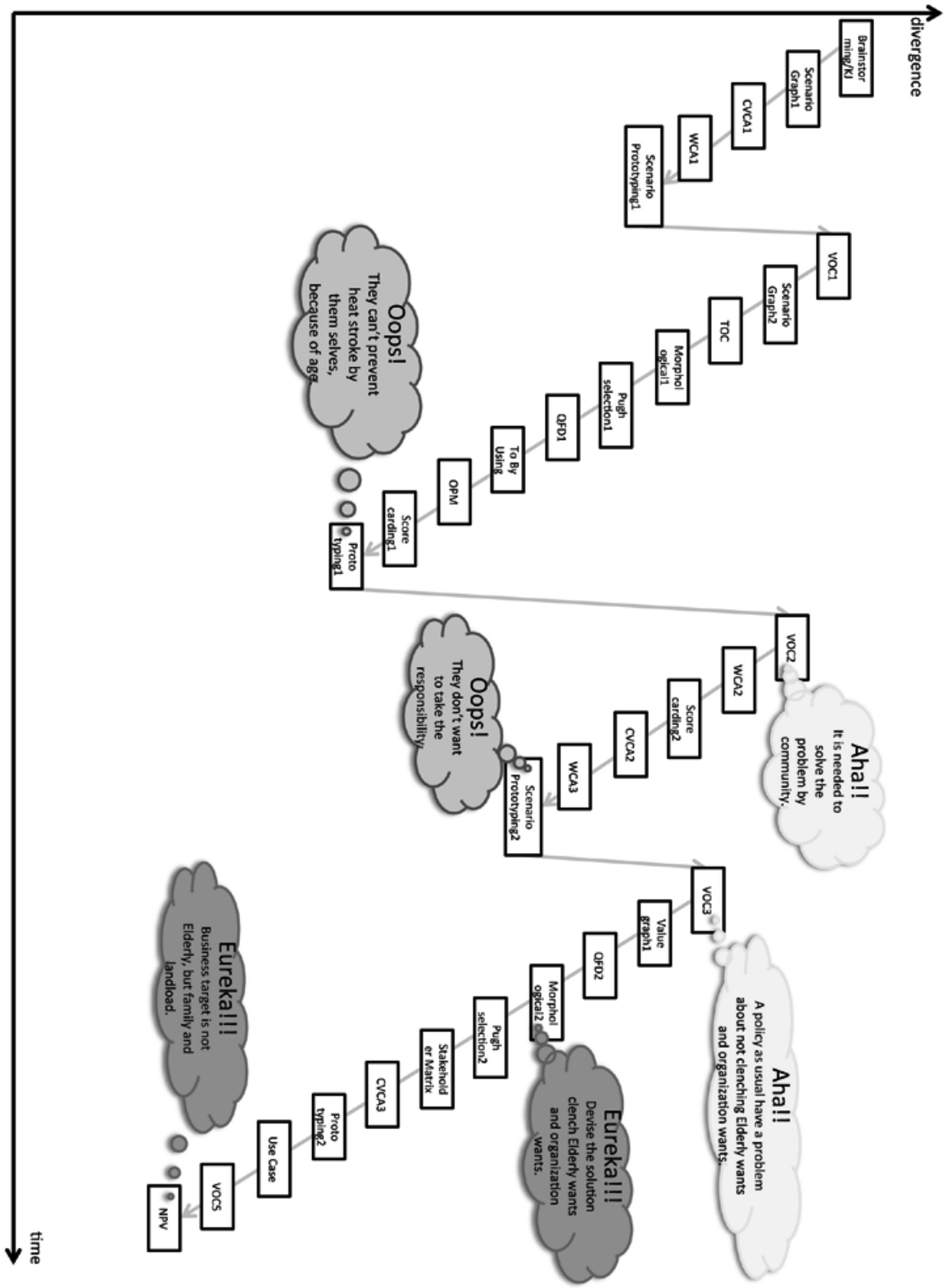


Figure 7.1 Roadmap

Table 7.1 Input, Output and Label of Roadmap

Tool	Input	Output	Label
Brainstorming/KJ	Information by internet, Initial requirement	Various compornent about C&C	Cool&comfortable ideas
Scenario Graph1	Variosu ideas	selected idea & prototype	Devise the Cool Foot bath
CVCA1	selected idea & prototype	Stakeholder's interrelation and money flow	If there is cool place, heat stroke will be prevented.
WCA1	Stakeholder's interrelation and money flow	Stakeholder WANTS	Utility of frozen plastic bottle.
Scenario Prototyping1	Stakeholder WANTS & prototype	Validation of our system	Failure of Cool Foot bath.
VOC1	prototype	User requirement	It is not easy eldery doing outside.
Scenario Graph2	Failure of Cool Foot bath & User requirement	Decide boundary of system	we focus on Eldery living alone, and Inside the their house.
TOC	User requirement, Interviews and observation	Root cause	Elderly people can't keep track of themselve's health.
Morphological1	Root cause	Solution opposing root cause	Spot Air Conditionoer, Small Private School, Aire Conditioner Coupled WBGT, and Frozen Health Drink.
Pugh selection1	Some solutions	One best solution.	We Decide Frozen health Drink!
QFD1	One best solution.	Which compornent is more important?	Plastic bottle is most important!
To By Using	Concept of our system	Clear purpose and means.	Frozen Plastic Bottle prevent heat stroke.
OPM	Ambiguous system	Clear function, form, object, and process.	Architecture Design of Frozen Plastic Bottle.
Score carding1	Project purpose and system	Quantitated project purpose and system	We can't control wealth and power restriction.
Prototyping	Ssytem architecture and prototype	Verification of our system	Frozen Plastic Bottle is effective!!
VOC2	Prototype and result of Verification	Validation and User requirement	Failure of Frozen plastic bottle. And We found that It is difficult for Eldery to prevent a heat stroke by themselves.
WCA2	Failure of Frozen plastic bottle & User requirement	Elderly people's WANTS	Children and Eldery in same place is best idea!!
Scorecarding2	Project purpose and system	Quantitated project purpose and system	Can't help who don't want to join the community.
CVCA2	Quantitated system	Stakeholder's interrelation and money flow	Mother is also stakeholder.
WCA3	Stakeholder's interrelation and money flow	Stakeholder WANTS	This WCA probabily work.
Scenario Prototyping2	Stakeholder WANTS & prototype	Validation of our system	Failure Children approch.
VOC3	Stakeholder WANTS & prototype	User requirement	Not clench The present policy and Elderly's WANTS.
Value graph	To Be situation and stakeholder requirement	Measurable index, function and Action to solve the problem	Our solution should include a home service or helping housework or community etc…
QFD2	Measurable index, function and Action to solve the problem	Key function and action	Helping housework and healing and volunteer is very important
Morphological2	Key function and action	Solution including key function and action	Charity Drive, Community Bus, Education, Combine Delivery and Health Check-up
Pugh selection2	Some solutions	One best solution	We Decide Combine Delivery and Health Check-up!!!!
Stakeholder matrix	Our system	Stakeholders of our system	Costomer is family and landlord!!!!!
CVCA3	Our system	System boundary, stakeholder's interrelation and money flow	MIKAWAYA system's design
Prototyping2	MIKAWAYA system	Validation of our system	MIKAWAYA system is validated!!!!!
Use Case	How do we make economic/business value?	Specify market, stakeholder, scenario	What is cost? What is revenue?
VOC4	Our assumption of business model	Validation of cost and revenue	Our business model is validated!!!!!
NPV	Validated cost and revenue	Concretable business model and profit	We can pay back in 3 years!

Our Turning point

Twice two significant notices changed our solution.

One is that aging make elderly be difficult preventing heat stroke. First of all, we tried many alternatives for improving the physical comfort of elderly people.(e.g. Cool Foot Bath, Frozen Plastic Bottle, etc.) But, according to interviews and observations, it is found they never use any physical solution! Because they put too much confidence in

their health, they are patient with hot, or aging make elderly be difficult preventing heat stroke.

So, we change idea from physical solution to community solution including other people's supporting. This change was success. If we had not changed our idea, we would have thought about only physical solution. Then, Elderly people never accept our any alternatives.

The other significant notice is Elderly people have some marked wants. For example, there is some wants as follows. They want to go outside but they can't go because of bad legs, or they want someone to help housework. Those wants are characteristic of elderly people living alone.

Those two significant notices are reason for their not preventing heat stroke (even though preventing heat stroke is very easy!!), and local government not affecting to prevent heat stroke.

As a result, we devised that there is a gap between Elderly people's wants and no effectiveness of present effort preventing heat stroke by local government, and if our idea can address the gap as well as, this idea make the elderly people living alone Cool & Comfortable.

Then, we change idea to HOW connect with elderly wants and preventing heat stroke.

Finally, our solution is validated by stakeholder (of course Elderly, family, landlord, local government). It means that our twice change was successful!

8. Conclusions and Future Work

8.1 Overcome in order (GANTT-chart)

No.	Work	Start	end	Duration(days)	2011	2012									Remarks
					12	1	2	3	4	5	6	7	8	9	
					▼End of ALPS (11/19)		▼Permitted by Kohuku ward				▼Permitted by Ministry				▼starting operation
1	Overall	12/1	9/1	274											
1	Fineancing														
	Application of Subvention	4/10	5/31	51											
	Permission of Subvention	6/1	6/1	0											
2	Renewal of closed-down school														
	Field explanation to teleted company	2/1	2/8	7											
	Making quartation	2/9	4/9	59											
	Construction	6/2	9/1	91											
3	Contact with partners														
	Kohoku ward	12/1	1/31	61											
	Infrastructure Innovation Institute Inc.	2/1	6/1	120											
	Fukushi Club customer cooperative association	2/1	6/1	120											
	medical corporation	2/1	6/1	120											
4	Recruting														
	Recruting	6/1	7/31	60											
	Education	7/1	8/31	61											
5	Establishing operation company														
	Reistration	4/1	4/15	14											
	Operation	9/1												★	
6	Advertisement														
	Advertisement	6/1	8/31	91											

8.2 Verification

We defined important key words of our themes, cool, comfortable, and community as index of verification by the following items.

-cool measure

- Decreasing the number of heat strokes patient (elderly people living alone)

-comfortable measure

- Decreasing the number of housework of elderly people living alone
- Increasing the number of request from elderly people living alone

-community measure

- Increasing the number of opportunity of contact with supporter and elderly people

・Increasing the number of quantity of talk
・Increasing the number of supporting elderly people living alone

8.3 Validation

Our proposed solution was validated by the following people.

-Dr. Ito: Kyoritsu Hospital

・The overall judgement: I think it is a very good idea. You will be able to build the informal relation that connects the region that the post office performed in delivering before. Moreover, the clinic in the region will also cooperate.

・problem1: health check should receive the pointed advice from the community physician master, and the consolidating window of information on a simple examination made by the care manager and a region inclusive center.
・countermeasure1: The community physician master's advice is taken to the training of the person who healthily checks it, and the consolidating window of information is made the care manager and a region inclusive center.

・problem2: How is the balance of the goodness of service as the goodness of informal service and the business kept, and it enforceable?
・countermeasure2:
The business is executed as a nonprofit organization.

・problem3:If the registry fee is high, a really embarrassed person might not put it though the person with a high risk of Heat strokes is chiefly three of the people of ① senior citizen ② low-income person ③ living alone.
・countermeasure3:As for the registry fee, the landlord in the housing complex where not the elderly person of living alone himself who uses service but senior citizen's family and senior citizen live can become a payer. The future, the municipality should be likely to help the subsidy.

・problem4: Do other service providers cooperate though it is necessary to visit as much as possible every day to prevent heat stroke?
・countermeasure4:The environment that works easily is made by giving the incentive to

other service providers and clarifying the locus of responsibility.

・problem5: It is difficult to increase enrollees, because of treating individual information under restriction.
・countermeasure5: The number of enrollees is increased by improving reliability by the doctor in the region and cooperation with the municipality.

-Mr. Hasegawa: The administration manager of Fukushi Club customer cooperative association

・The overall judgement: It is an idea that a lot of making person's connection through the service of the region sticking the idea of welfare club Coop and common features, and is very good, and sympathy is remembered. Neither a regular watch function nor the healthy check function limit to Heat strokes, the solitary elderly people's sick prevention and the change in the physical condition are discovered at the early stage, and it is likely to be able to become an adviser, too.

・problem1: The medical fraternity might dislike healthy check function.
・countermeasure1: It cooperates closely as medical personnel, the care manager, and the region inclusive center.

・problem2: There is a possibility that the cost rises considerably, and the number of enrollees doesn't increase.
・countermeasure2: The landlord in the housing complex where not the elderly person of living alone himself who uses service but senior citizen's family and senior citizen live can become those who pay about the registry fee.

・problem3:It is not enough under the present situation though it is a volunteer that can answer senior citizen's detailed needs. However, it is costly if this is made a business, and restricts individual information.
・countermeasure3: The business executes non-profit-making, and improves reliability by medical personnel in the region and cooperation with the municipality.

-Elderly people living alone in Yokohama city

The overall judgement: The senior citizen has a moderate reason for the person who doesn't go out, and helping the association of the substitution of the lamp and the stroll, the other party of speaking garbage it, and shopping because going out in daily life is only a supermarket survives. It is easy to ask to pay from the volunteer for asking others, and even if the charge is high, I want to use this service again.

・problem1: The charge of high priced cannot be paid in case of the low income because there is no relative.
・countermeasure1: It becomes possible to press the registry fee at a low price by obtaining the subsidy of the local government.

・problem2: Trust and the greeting are important.
・countermeasure2: Reliability is improved to recognition with the service provider by cooperation with the doctor.

Ms. Miura: CEO, Matoba Real Estate Agency

・The overall judgement: Because there are a lot of senior citizen refusal articles, and the solitary elderly people in the housing complex has uneasiness in the neighbor trouble and the lonely death, it is a very attractive solution.

・problem : Who does an economical load such as senior citizens who do not have the relative when this system of each housing complex is taken?
・countermeasre : The registry fee is reduced by the municipality's the private organization's cooperating with the surety company and helping the subsidy.

8.4 The problems to be overcome

Our proposed solution, “MIKAWAYA” that combines service of delivering to home and a healthy check answers senior citizen's detailed needs and the simple diagnostic one of Heat strokes. It is thought that there are chiefly two evils to make this service a business, and to operate it continuing.

First of all, the capital side is enumerated. The registry fee of the service subscriber cannot help needing vast funds to operate our business continuing, and rising. Because the thing that the landlord in the dwelling which the family who has the senior citizen

of living alone as introduced ahead and the senior citizen of living alone move in positively does expense of high priced by short odds has been expected of course as for the way that collects this capital, it solves it. However, it is clear that the thing set to the charge of high priced makes low-income person's action on the family insufficient in one side. We think that the construction of the mechanism that the subsidy by the municipality is helped helps this evil because damage by the heat wave is one of the natural damages such as floods and earthquakes, and the one that it is necessary to help everyone originally. It is thought that the registry fee inevitably falls by that, and a lot of people can use our service. Moreover, the beginning of the solution to individual information with a difficult treatment will be able to be found in not only the capital side but also the one thing industry by the thing that the support of the municipality joins.

Next, correspondence in a healthy check is enumerated. Those who get healthy check information to window should enhance prior training only though the medical practice is not done, and he or she checks the health condition simply to the end, and it is necessary to receive advice of the community physician master. There is a problem that you may think those who deliver it to home do the act of checking the health condition in this case. An integrated medicine visits the home, and the enthusiasm syndrome prevention preventive care is tried in Italy for instance. It might be severe due to recent doctor shortage though is the best if this technique is achieved in Japan. Then, we supported those who delivered it to home by the healthy check, and paid attention to the existence of the care manager or the region inclusive center. It is thought that it is possible to work on service not only the customer side where service is used but also the employee's cooperation's with the doctor becoming smooth because it makes them a window, and being relieved.

Thus, it is assumed the maximum problem in our service, and can say that it is possible to solve it by the problem of individual information on the capital side and the method of the description of the action in a healthy check furthermore above.

8.5 View of Future

Our proposed solution doesn't only help elderly people living alone though the service that we propose provides the simple diagnosis service that checks service of delivering to home and health answering elderly people's needs.

If it is possible to make this service succeed in one region, it will take it also in other regions. And, it is regarded that a solitary elderly people decreases, and decreases the number also of enthusiasm syndrome patients from a lot of regions. As a result, the

number of energetic senior citizens is expected to reduce the burden of medical expenses of the municipality, and to increase. Moreover, a lot of people are sure to come the solitary elderly people increases shopping, and the economic effect in the region is able not only to be expected but also for the value of the region to want to rise, and to live in the region.

The largest advantage of our service is that an active thing can be expected when it peels off and a big earthquake like, East Japan great earthquake occur. It will be able to be said that this service can be able not to limit to the solitary elderly people in a word, to become service that saves the region and all people, and to hide big potential.

8.6 Contingency plan/guidance

Though our solution of purpose is to build cool and comfortable community by prevention intervention of heat strokes, it is necessary to take steps to meet the situation on chiefly two sides because of having a medical treatment side.

First of all, to protect the solitary elderly people who uses our service, it is necessary to build in the easy information system that can be operated one-touch to contact the doctor directly instantaneously in the emergency if there is one solitary elderly people. Next, to protect the employee engaged in service, when it faces extraordinary happenings when the mistake of a healthy check by the employee comes to light or it visits, it is necessary to prepare for the case that develops into the lawsuit problem in addition to medical treatment measures. Therefore, the cooperation to the legal faculty body to both should be closely done as the medical treatment group.

Thus, we are contemplating the defense of both on the user side of service and the side in which it engages it in the emergency.

9. Acknowledgments

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Finally, we wish sincerely to express my gratitude to our mentor, professor Haruyama and to the family who supported the ALPS team member and, to the member of ALPS team get over the way to here.

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11. Appendix

11.1 Result of Interviews and Observation

(1)The women who have children

Table 11.1 shows what the women who have children do to prevent heat stroke and what they know about elderly people who live alone. They tend to go outside to save energy and go to some place which has an air conditioner with their children. When they are in their home, they do not hesitate to use an air conditioner and a fan under energy saving. They have no opportunity to communicate with elderly people who live alone.

These results means that the women is very conscious of preventing heat stroke because of their children. People including the women have no opportunity to communicate with elderly in daily life.

Table11.1 Questions and answers (Respondents :the women who have children)

Respondents	Questions	Answers
Women who have children	1. We have to save energy in this summer. What do you plan to do for preparation for battle with the heat?	• We go out for public space which has air conditioner in order not to use air conditioner in our house. • I use shading curtain in my house to prepare for battle with the heat
	2. How often did you use an air conditioner last summer?	• We used air conditioner during daylight in conjunction with electric fan for our children's health. • I used air conditioner all day.
	3. If there are some water place under energy saving, would you like to go there instead of using air conditioner in your house?	•I want to go water place with my children.•I want to go some public places which has air conditioner. • I want to go water place under sanitary environment, if I pay money for the place.
	4. Where do you want to go in summer expect water place?	• I prepare an inflatable pool in my house yard. My children play in the pool.• We go to support center for children in Kanagawa frequently.• I want to go to public facility near my house.
	5. Do you have any idea to prevent heat stroke?	• wear a hat • drink water and take salt • use ice pack • avoid midday sun
	6. Other opinions	• If elderly people have some friends the older would not die in their house alone. Elderly people who might die alone in their house would not be go to public space. Some of elderly people are poor in communication and hesitate to get involved in a new relationship. Others have physical problems and be difficult to go out. To prevent elderly people die alone, we pass a notice around from house to house in the neighborhood and confirm elderly people 's safety.

(2) Elderly people

Table 11.2 shows what elderly people want to do and what they do to prevent heat stroke. Information from these interviews are that elderly people feel tired to do everything because of physical problems. They do not want to go outside and not want to communicate with people, especially with young people. They feel comfortable to live alone. On the other hands, elderly people needs someone to enjoy an active life because of physical problem. They feel difficult to go shopping by themselves and they cannot do yard maintenance. They feel tired to communicate with someone but sometimes they want to talk with someone. They need someone who helps their daily life by paying some fee.

Table11.2 Questions and answers(Respondents :the elderly people)

Respondents	Questions	Answers
Elderly people	1. We have to save energy in this summer. What do you plan to do for preparation for battle with the heat?	I do not prepare for battle with the heat. I am saving energy in my house. I will not use air conditioner as possible.
	2. How often did you use an air conditioner last summer?	I used it all day.
	3. If there are some water place under energy saving, would you like to go there instead of using air conditioner in your house?	• I want to cool oneself in water place where I can do my hobby. • I do not go outside. I go to place which has air conditioner, greenery.
	4. Where do you want to go during summer expect water place.	I want to go to cooler space or hot spring trip to draw picture. I do not go to public facilities, like a library.
	5. Do you have any idea to prevent heat stroke?	I drink a plenty of water. I suffered from heat stroke when I was playing golf.
	6. If you can work again, do you want to work?	. • I don't want to work again • I cannot work because of the age. • If I can do, I will do. • I have joined some volunteer activities for decades.
	7. Is there enough volunteer activities which people can do regional contribution?	Yes. If people want to join the activities, they can join easily.
	8. If municipality ask you to do regional contribution as a job, do you accept it?	• I don't accept it. • I don't want to have responsibilities and obligations • What I can do now is to live by myself and live with my partner. • I just don't have the strength to work. • I want to get money, but it is difficult for me to work.
	9. What do you think if you have to take care of children in your house during summer vacation?	• I don't accept it. • I don't want to have responsibilities and obligations for children. • I cannot live with someone, I am comfortable to live alone. • I'm afraid about "Monster Parents." • I am enough to meet my grand children.
	10. What do you think about community network in your place?	There are no community network. But, it is a traditional custom.
	11. What is really bothering you in your life?	• I want to have a conversation with someone. • Nothing • I don't have what's bothering me. • I cannot live with the young.
	12. Why some of elderly people suffer heat stroke?	Because elderly people tend to be tired of doing everything. When I was young, I was interested in everything, but now, I don't want to meet and talk with someone. Some of the older is hardheaded person.

	13. Do you want to collect contributions for region?	I want to pay it if I can understand the aim and who is doing it.
	14. What do you ask people if they help you as volunteers?	• I ask them to go shopping. • I ask someone for a lift to supermarket. • yard maintenance • I ask them to have a conversation with me. • I offer them to take out the garbage. • I offer someone to replace a light bulb.
	15. What kinds of service do you want to pay a large fee?	• I don't want to pay a large fee, but I feel easy to ask someone to help me by paying money. • Delivery service of daily necessaries • Shopping service
	16. Where do you usually go to?	• I feel tired to go outside. • When I go outside, I just go to supermarket.
	17. Other opinion	Elderly people have to ask someone's help by themselves

(3) the electric company

Table11.3 shows what the electricity company wants people to do for save energy.

People, especially infant and elderly people should not stop to use an air conditioner in their home to prevent heat stroke. One of the best solution to save energy is people gather into one place and use the minimum number of air conditioner.

Table11.3 Questions and answers(Respondents :the electricity company)

Respondents	Questions	Answers
electricity company	1. Do you think that the people come to water-place (like a cold footbath) if they are given by the municipality?	Yes
	2. Do you think that the number of lonely death decreases if there are places where the local populaces can gather into?	Yes
	3. It is expected that we cannot use air conditioner as usual in this summer. Then, do you think that it is useful way if there are cool and comfortable places where the people can gather into?	Yes
	4. In this summer, it is expected that consumer has to save electric power, what measures do you want them to take?	Want people to effort to save electric power for example is • To gather into one place like a living room when they are at home. • To go to public place using air conditioner like a shopping mall and so on. • To set the temperature of air conditioner 28 degrees, and to use watering when they feel hot.
	5. Last summer, there generated a number of heat enthusiasm syndrome patients, and the death of lonely elderly people became the problem. Then, what problem happens do you think if this summer also is intense heat as last summer?	According to radioactivity problem, it is expected that the number of those who going to the pool and the sea will decrease especially in metropolitan area ,therefore, the number of children who become enthusiasm syndrome patients will increase. • It is expected that the number of elderly people who become not only enthusiasm syndrome but also dehydration will increase. We must consider infant and elderly people as administration.

(4)the staffs of Hiyoshi Regional Center

Table11.4 shows that the important thing is people go to elderly people's place and communicate with them. This helps elderly people to prevent heat stroke.

Table11.4 Questions and answers(Respondents :the staffs of Hiyoshi Regional Center)

Respondents	Questions	Answers
Assistant Director of Hiyoshi Regional Center	1. We have to save energy in this summer. What do you do for saving energy?	We use the minimum amount of lights in regional center, We have a rolling temporary closing.
	2. What do you plan to do for preparation for energy saving during this summer?	• Use the minimum amount of lights • We use air conditioners as per normal.
	3. What do you want people to do for preventing heat stroke as a regional center?	• Come regional center to cool themselves. • Wear light-colored clothing that is light weight and loose-fitting.
	4. There were many heat-related patients last summer because of the extremely hot temperature. What is the problem during this summer if this summer become extremely hot?	• The problem is the death of elderly people who live alone. We have to communicate with elderly people.
	5. Do you think elderly people who live alone wouldn't died of heat stroke if elderly people can join the regional community?	Yes, but elderly people have some reason why they wouldn't go outside. They may have physical problem. We have to go their house
	6. Were there many people who use regional center because of the extremely temperature in last summer?	No, because most of people who come to regional center are the repeaters.
Director of Hiyoshi Regional Center	1. Do you want to pay money for regional contribution?	Because of the TSUNAMI, I don't want to pay money for regional contribution. I pay money for the TSUNAMI.
	2. What is the problem of municipality?	It often seems that municipalities lag behind.(earthquake disaster)
	3. Other opinions	Mayor and executive would pay money for regional contribution.
		By paying fee for service, some people might be on the scrounge.
		The healthy people who retired their work have to do regional contribution.
		The most important thing is cost. The older who have enough money to live have to do something as a volunteer activity. Elderly people have experienced a lot in life. They have to draw on their previous experience.

(5) Kumagaya municipality and citizens

Kumagaya city has a lot of measures to prevent heat stroke. The measures are especially for infant and elderly people. The Kumagaya municipality doesn't know how effective it is, because they don't communicate with infant and elderly people directly. People who live in Kumagaya city are very conscious of preventing heat stroke because of the municipality's measure.

Table11.5 Questions and answers(Respondents :Kumagaya municipality and citizens)

Respondents	Questions	Answers
Public Information Division of Kumagaya City office	1. Please talk about the municipality's action in Kumagaya to prevent heat stroke.	• Set up a heat stroke meter at municipal office and elementary school. • Gave people the information which got from the heat-stroke checker by the Internet • Gave the information about heat stroke through Kumagaya TV so that people can take care of their health. The information was changed 2times/day. • Gave the information about heat stroke through Kumagaya TV so that people can take care of their health. The information was changed 2times/day. • Supplied heat-stroke checker and cold scarf to the elder people who live alone(2009) • Supplied the batteries for heat-stroke checker to the elder people who live alone.(2010) • Supplied leaflets about heat stroke with all citizen. • Provided a consultation service for heat stroke. • Put posters about heat stroke in city official car, public offices, stations and supermarkets ,and so on.
	2. What is the most important thing for elderly people to prevent heat stroke ?	• Visit elderly people at risk at least twice a day and watch them for signs of heat exhaustion or heat stroke. • Encourage them to increase their fluid intake by drinking cool water.. • Take them to air-conditioned locations if they have transportation problems.
	3. If there are some water place like ashiyu, do you think people use it to prevent heat stroke?	People shouldn't go outside when the temperature is extremely high. And, they wouldn't use the water place.
	4. What is the most popular municipality's action to prevent heatstroke for people?	Cold scurf and green wall are popular among the citizens.
	5. Under saving energy, how can heat stroke be prevented??	• Open the window to ventilate the room in early morning. • Use an air conditioner • Clean an air conditioner
	6. Why are Kumagaya's citizens very conscious of heat stroke?	Some people died of heat stroke last year. Before that, we wanted Kumagaya to become a famous city in hot temperature. But after 2010,we've changed to promote not only as the hot temperature area but also as the area which people can prevent heat stroke
	7. What do you think about the idea that elderly people who live alone teach children a lit of things in elderly people 's house?("TERAKOYA", small private school)	Such idea has already existed. If elderly people were teacher, they could have joined regional community.
	8. Other opinions	• The most important problem is elderly people don't have a consciousness of being old. • It is difficult for children to contact with elderly people because the children's parents might not allow their children to communicate with someone she or she doesn't know. • The idea might be able to be done by Mass Communication.
Citizens in Kumagaya	Other opinions	• Fine mist around the station is nice as the municipality's action. • I use an air conditioner all day. • I drink water every day to prevent heat stroke. • I have a physical problem, so I cannot go outside. • To drink water and stay home is the best way to prevent heat stroke. • Mail delivery service about heat stroke is very useful.

(6)Hospital staffs

Table11.6 shows that elderly people who live alone tend to die of heat stroke. It is important to think elderly people 's heat stroke problem as regional community problem. The people who tend to get heat stroke is elderly people who live alone and is poor.

People who really need someone's help cannot use fee-based service because of the fee.

Table11.6 Questions and answers(Respondents :Hospital staffs)

Respondents	questions	Answers
Nakano Kyoritu Hospital, Doctor Ito (Director),Doctor Matsumoto(Chief clerk)	1. How do you think about our project?	We have to think elderly people 's heat stroke problem as regional community problem. Today's media emphasize only how to prevent heat stroke. The media should say that why elderly people tend to die of heat stroke.
	2. Elderly people cannot understand their health condition and they need someone's help. And attenuation of human relations causes elderly people 's heat-related death. What do you think about that?	Today, we have to pay money for everything. even in taking care of the sick elderly people and children. The poor cannot use the service. The poor cannot use a public nursing care insurance system. Even the people who use a public nursing care insurance system and get support from care manager sometimes dies of heat stroke.
		During working, I sometimes see that elderly people stay his or her home without an air conditioner. Municipality wouldn't know elderly people 's lifestyle. The most important thing is to communicate with elderly people. Doctors and care managers know elderly people 's lifestyles well.
		Studies designed to investigate why some people died during the 1995 and 1999 heat waves in Chicago found that the strongest risk factor was living alone, particularly for those who did not leave home daily (Semenza et al., 1996 ; Naughton et al., 2002). O'Neill et al. (2003) found a nearly ten-fold increase in heat-related deaths for deaths occurring outside of a hospital compared with those in hospital, suggesting that people living alone without someone to check on them regularly are at particular risk. Similar risks were found in the 2003 heat wave in Paris and other regions of Europe, with many deaths of elderly adults occurring outside of a hospital (Kosatsky, 2005).
		We ask our patients and their family to do what they can do by themselves to prevent heat stroke. But, the heat-related problem is not individual problem but social problem. All people should help the older elderly people to prevent heat stroke.
	3. How can we take care of elderly people who live alone?	Elderly people need help from various sectors, like their family, government, doctors, home helpers, and so on. Doctor have to communicate with elderly people as personal friendship.
	4. What do you think about that elderly people and children take care of each other?	It is difficult for elderly people and children to take care of each other because of ility issues.
	5. How does people take care of elderly people who live alone before the Japanese government started a public nursing care insurance system?	In the past, government employee took care of elderly people.
	6. What kind of elderly people do you think would need our help to prevent heat stroke?	It is elderly people who live alone and doesn't get care manager's help because he or she doesn't have a public nursing care insurance system. The problem is that we cannot share the information about elderly people who need someone's help. Because Japan has law dealing with personal information.
	7. What do you think about the system that delivery staff give simple diagnosis of heat stroke to elderly people?	In the past, the post officer communicated with elderly people and took care of them. People have to communicate with elderly people without profit. There are a lot of clinic, so it is better to corporate with clinic than with hospital. Everyone can make a simple diagnosis of heat stroke objectively. This function helps elderly people to keep their health. The problem is that there are not so many hospital in Japan. It is difficult for doctors to corporate with delivery staffs because of the number of doctors.
	8. What do you think about a members-only	Problem1: Compared with volunteer service, members-only service might be more closed.

	service?	Problem2: People who really need someone's help cannot use this service because of the fee. The people who tend to get heat stroke is elderly people who live alone and is poor.
		Problem3:To prevent heat stroke, elderly people need someone's help every day. How can the service provide elderly people with someone's help every day?
		Ploblem4. How can the doctor and delivery staffs share elderly people 's personal information?
	9. Other opinions	・Children have to join their regional community to know a lot pf things and how to communicate with others.
		・The older can prevent aging by going outside, so to arrange the necessary transportation for elderly people is good idea.
		"Charity plastic bottle is not good idea. People who waste energy should pay the money for energy.

(7)the Fukushi Club staffs

Tabla11.7 shows that elderly people need to communicate with someone and take a regular health checkup to keep their health. If there are some service which elderly people can take a regular health checkup, the cost of the service might be expensive. Elderly people who is poor would not use such an expensive service. Therefore, the service should be reasonable.

Table11.7 Questions and answers(Fukushi Club staffs)

respondents	Questions	Answers
Fukushi Club Mr.Hasegawa(division head), Mr.Kodou(department chief)	1. What do you think about the system that delivery staff give simple diagnosis of heat stroke to elderly people?	This system helps elderly people to keep their health and get trusted counselor.
		Problem：It is difficult for doctors to corporate with delivery staffs because of the costs.
	2. What are Fukushi Club's activities?	The member of Fukushi Culb can be not only worker but also customer. We have service like your ideas. We deliver something which elderly people need and take care of elderly people. In the past, we have another service which helps elderly people to do everything. The fee was very expensive, so there are only two people who used the service.
		Problem: If the cost is very expensive, no one wants to use the service.
	3. What is the problem of the business for elderly people?	Today, only volunteers activities can support elderly people 's needs. But, it is not enough. If elderly people have to pay for the service, there are a lot of problem. The service should be provided for elderly people for non-profits.
	4. What kind of person work for Fukushi Club?	Some of the workers who work for Fukushi Club and have some technical skills provide the customer with their skills. Other of the worker who have license to drive the customers where they want to go.
	5. Other opinions	Problem: By the service for elderly people, elderly people might grow apart from their family.

Group E’s Final Presentation Slides

Cool & Comfortable Community under the Restriction of Energy Supply

～Synergy and Symbiosis by Delivery Service and Community health～

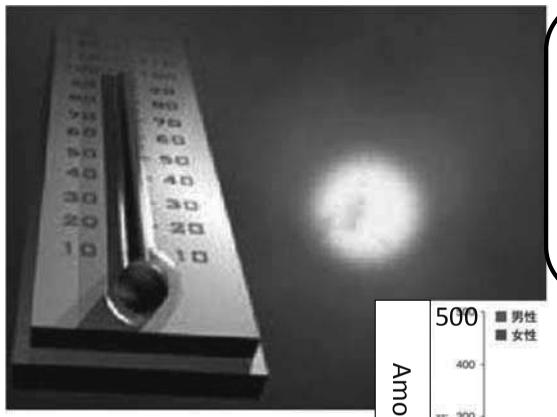
ALPS Final Presentation

-GROUP E-

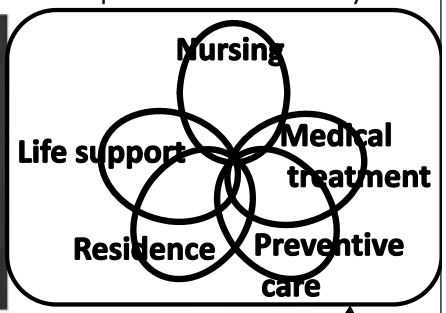
Masahiko Ito, Takafumi Shinya

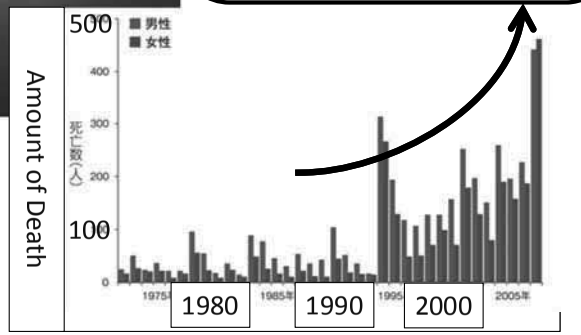
Yu Sakuma, Rumiko Oshima, Akiko Rai

Heat Wave-in Summer



Local Comprehensive Care System



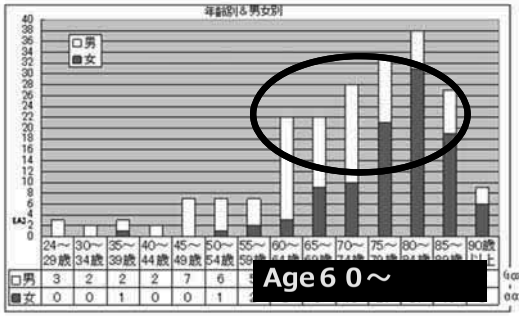


Problem Statement

(Proposer : Infrastructure Innovation Institute, Inc.)

・Most Significant Problem :
Elderly people are affected by heat stroke in their homes.

～Elderly people that live alone are more likely to be victims of heat waves.



Breakdown of Death by Heat Stroke

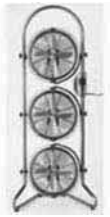
The elderly who have house mate ３２．９%

Living alone ６７．１%

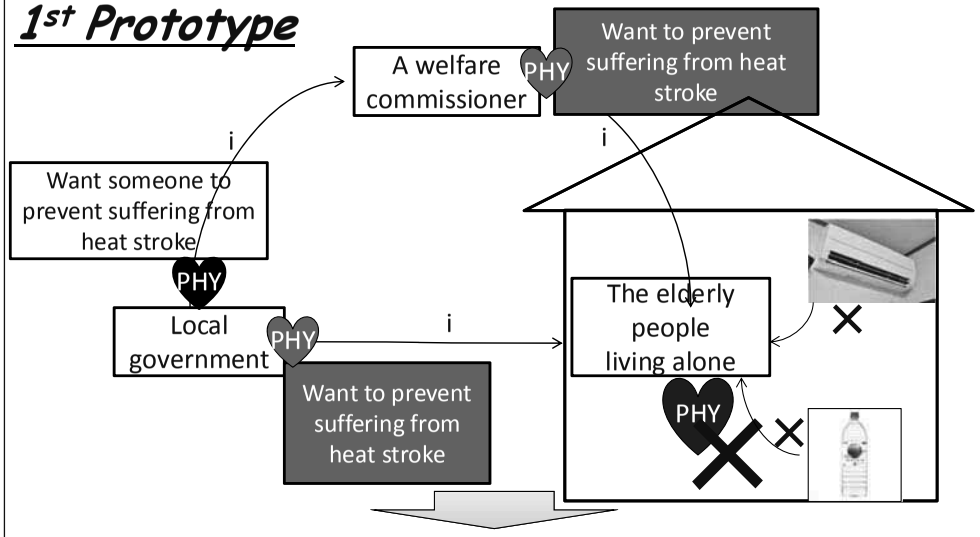
出典：Death Toll by Heat Stroke (The Ministry of Health, Labour and Welfare)

1st Prototype

We devised many methods for letting elderly people feel physically cool & comfortable.



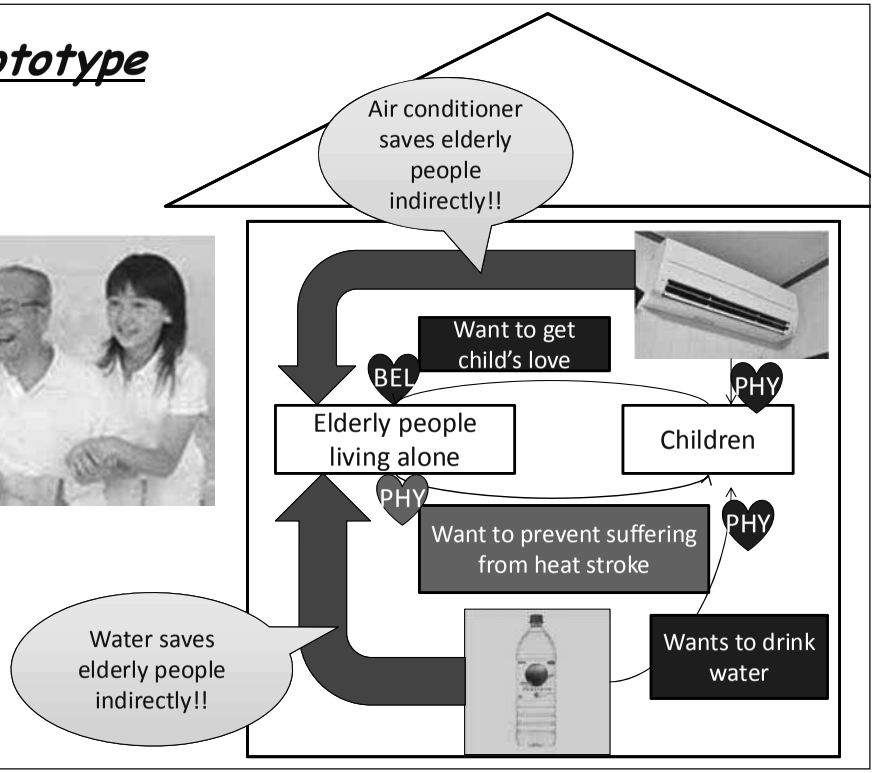
1st Prototype



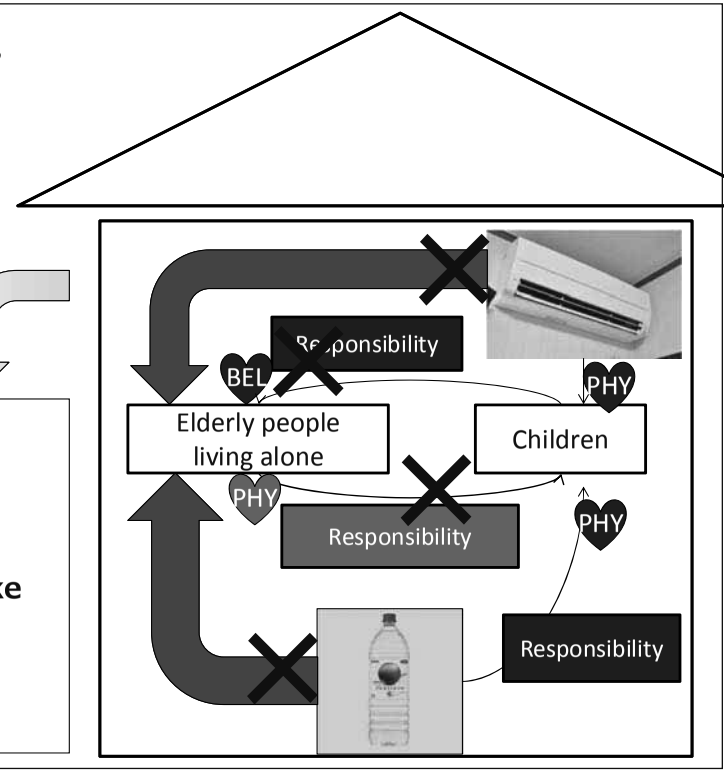
Elderly people living alone cannot prevent Heat Stroke by themselves.

- Aging
- Careless

2nd Prototype



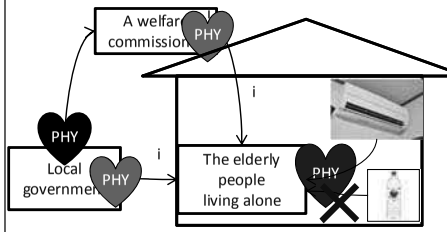
2nd Prototype



・Elderly people don't want to change their lifestyle.
・Elderly people don't want to take personal responsibility for looking after children.

Ahah! New Problem Recognition

【Preventive measures against heat stroke】



【Needs of the elderly people】

・There is a mismatch between preventive measures against heat stroke and needs of the elderly people living alone.

Requirement RE-Development

AS IS

Elderly people are affected by heat stroke in their home.

TO BE

Elderly people live healthy, feeling

Cool & Comfortable in their home.

Cool Measure

・Decrease the number of heat stroke patient (elderly people living alone)

Comfortable Measure

・Increase the number of support staff
・Increase the number of requests from elderly people living alone

Community Measure

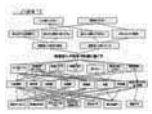
・Increase the number of opportunities for contact with supporters and elderly people
・Increase the number of requests from elderly people living alone
・Increase the number of people supporting elderly people living alone

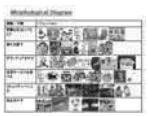
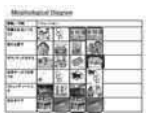
Restriction of energy supply Measure

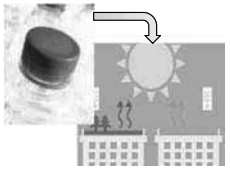
・It can even work in time of disaster

Concept of Final Solution

Interviews
Observations

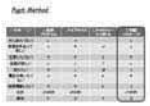




①To resolve heat island through charity.


②To help shopping by community bus.


③To develop a curriculum about heat stroke


④To deliver packages from a convenience store and do a health check.


Pugh


④To deliver packages from a convenience store and do a health check.

Concept of Final Solution

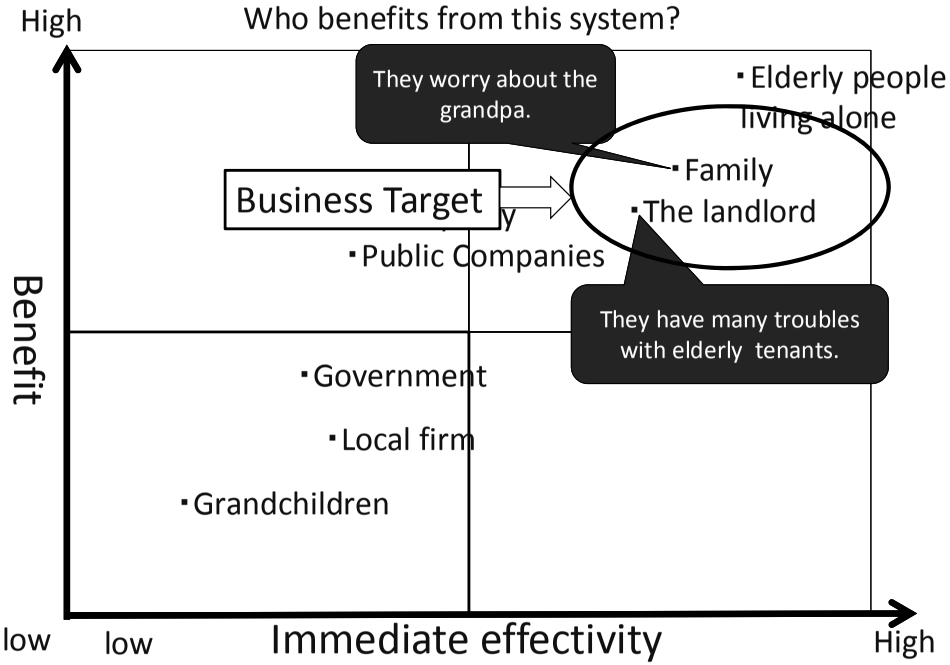

To deliver packages from a convenience store and do a health check.


home delivery service in existence is not enough.

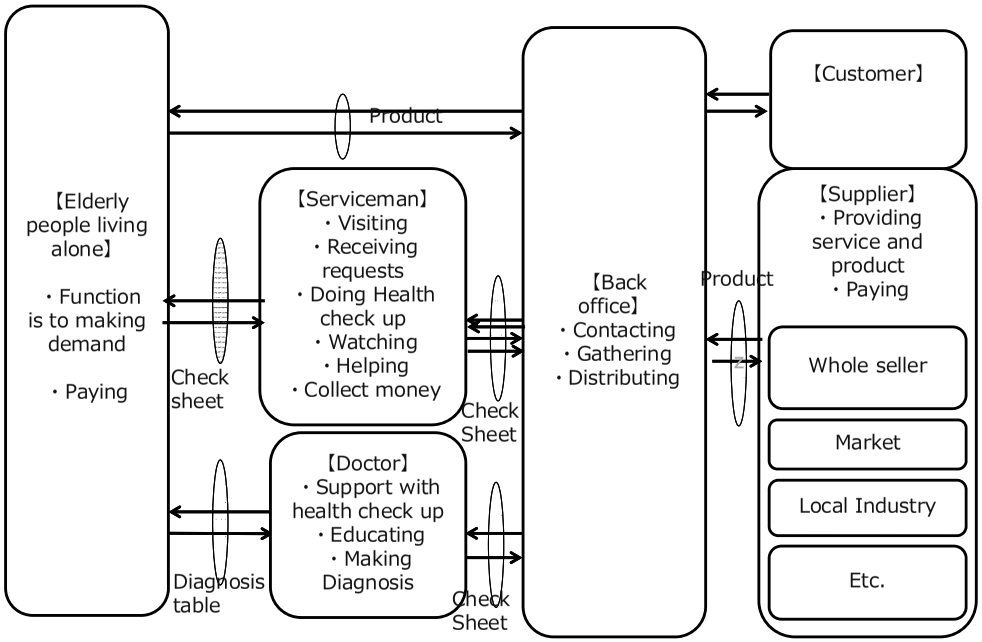
Concept is “Collaboration of Doctor and Mikawaya”

・To do a health check.
・To visit daily.
・To get customer needs.
・To be a community-based service.
・To fulfill requests made by customer.
・To pass the information onto the family

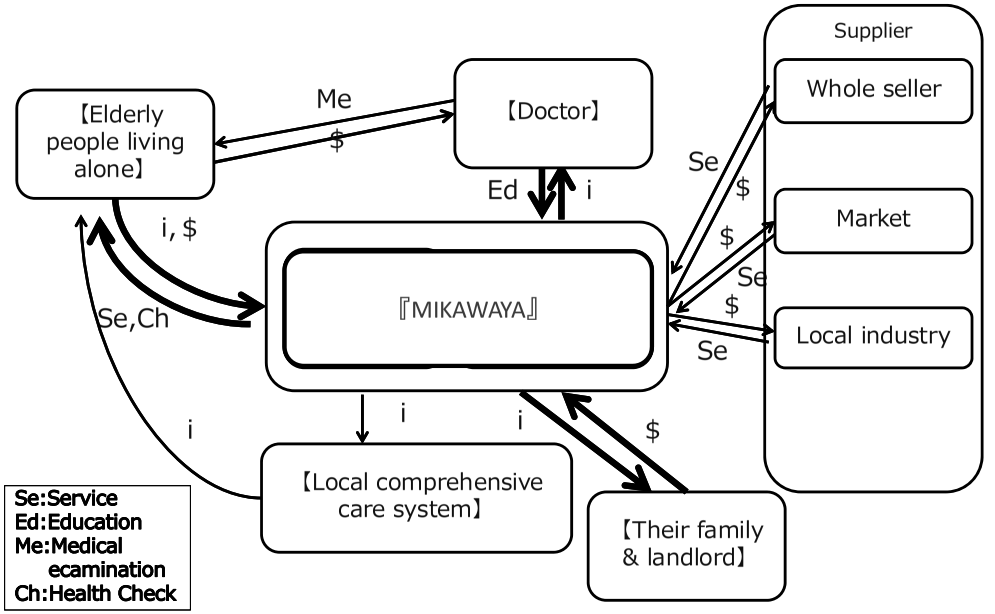
Stakeholder Analysis



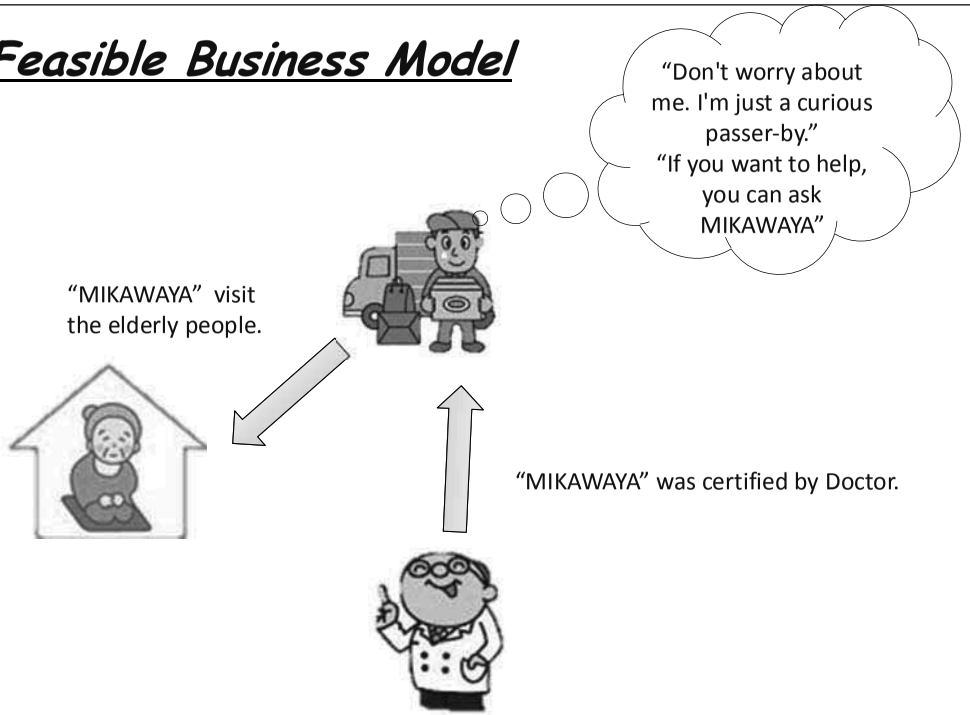
Architecture Design



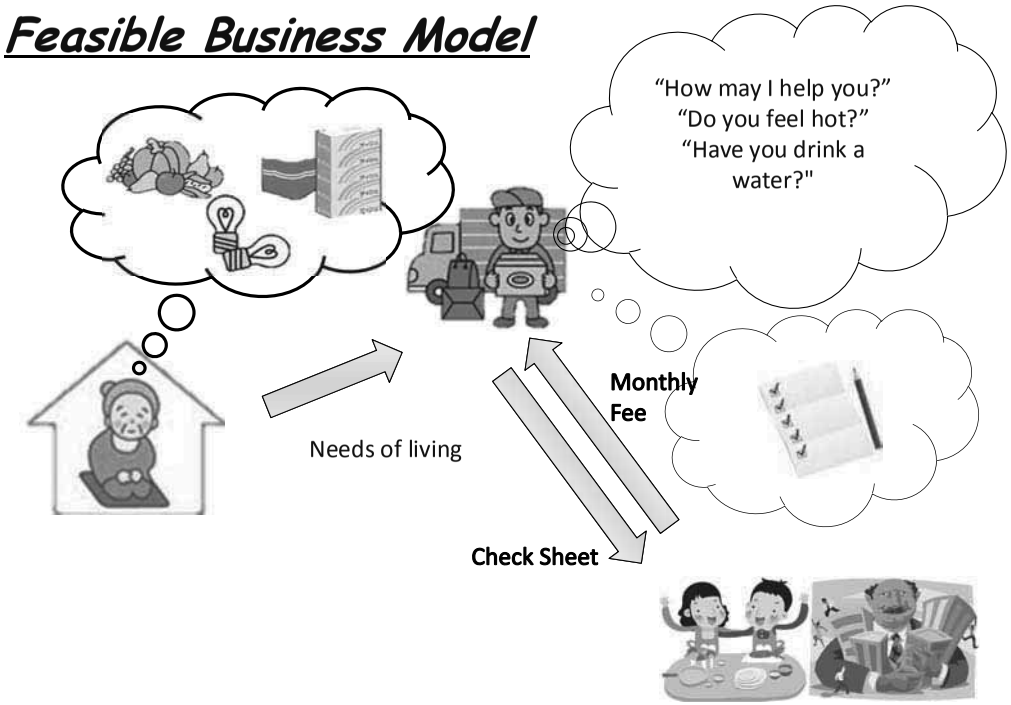
System Design(CVCA)



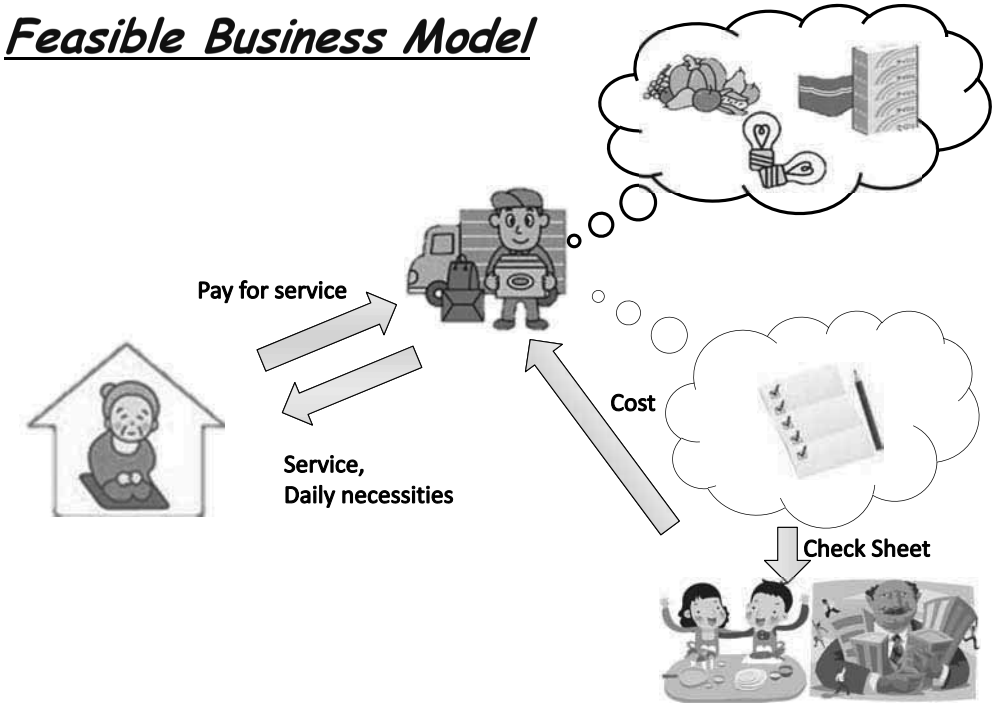
Feasible Business Model



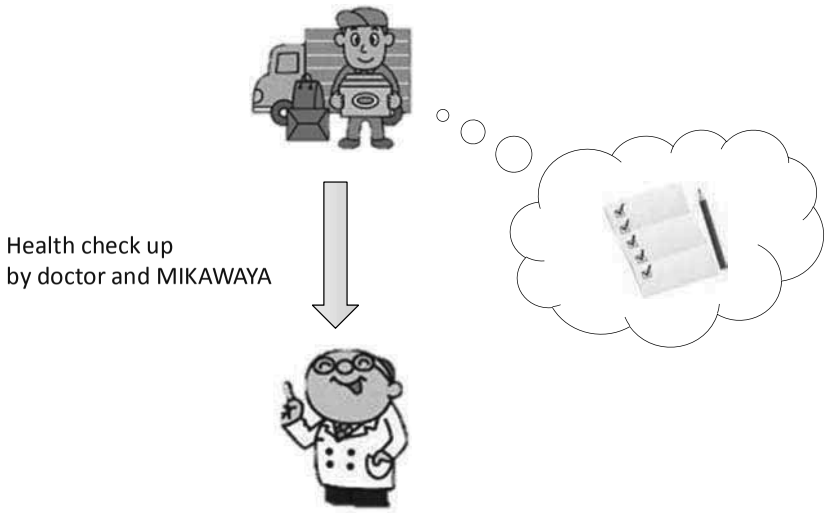
Feasible Business Model



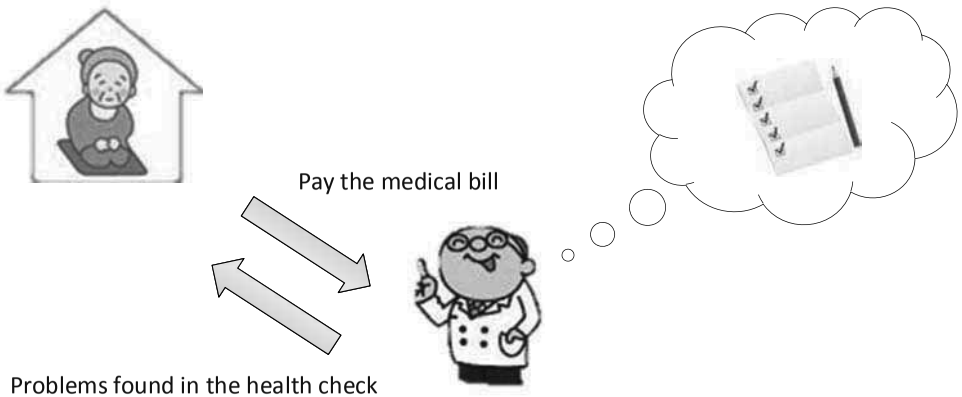
Feasible Business Model



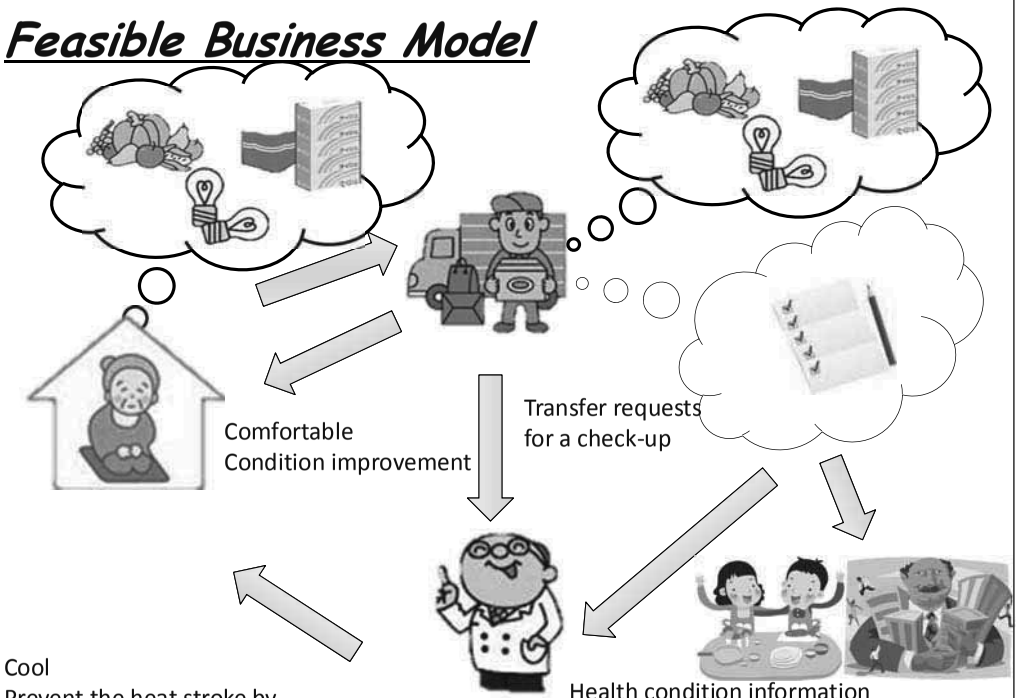
Feasible Business Model



Feasible Business Model

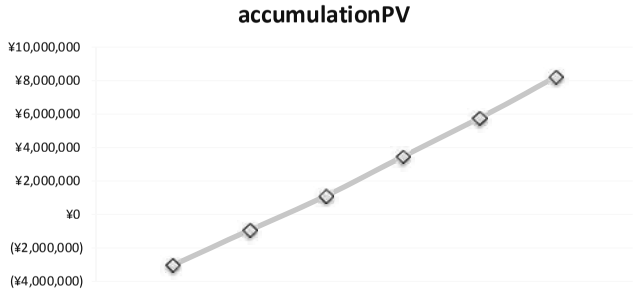


Feasible Business Model



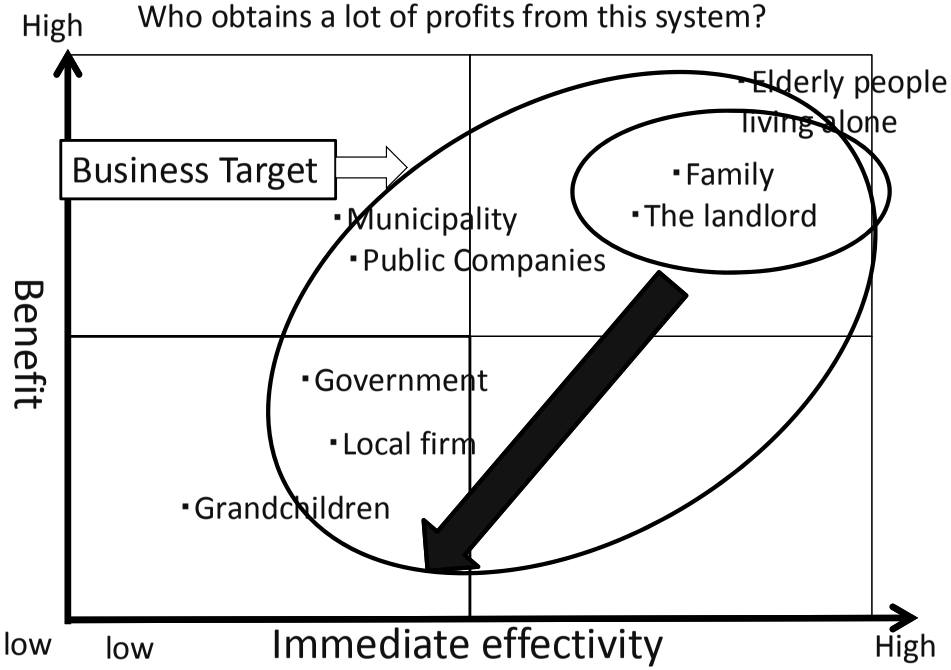
Economic Analysis

- **Revenue**
  1. Service of delivery
     108,000yen/year*Sales Volume
  2. Membership
     25,000yen/month*Sales Volume
  3. Insurance to landlords
     8,000yen/month*Sales Volume
- **Cost**
  1. Labor
     200,000yen/month*people
  2. Material
     Net Sales*53%
     (Cost of sales)



NPV: $ 81,339
IRR: 82%
Payback Period: 3years

Future System Expansion



V & V for Final Solution

Verification

Cool Measure

- Decrease the number of heat stroke patients (elderly people living alone)
  Function of Doing health check, Watching, Supporting with health check up, Educating, Making Diagnosis.

Confortable Measure

- Increase the number of support staff
  Function of Visiting, Gathering & Distributing.
- Increase the number of requests from elderly people
  Function of Visiting, Receiving a request.

Community Measure

- Increase the number of contact times with support staff
  Function of Visiting, Supporting.
- Increase the number of requests from elderly people living alone
  Function of Visiting, Receiving a request, Supporting.
- Increase the number of supporting elderly people living alone
  Function of Visiting, Receiving a request, Supporting.

Restriction of energy supply Measure

- It can work even in the time of disaster
  Function of Visiting, Gathering & Distributing, Watching.

V & V for Final Solution

Validation

Review of experts

- Dr. Ito : The director of Nakano Kyouritsu Hospital
- Mr. Hasegawa : The administration manager of Fukushi Club customer cooperative association
- Mr. Sato : former Yokohama City Office welfare division service service and the present Hiyoshi community center superintendent
- Ms. Ohki : Yokohama former welfare commissioner

Acceptance Review

- Proposer has ACCEPTED our system

Problems of the System & View of Future

Problem of the system

- This system meets the needs of the low income earner who cannot go into the nursing care. However, there are probably some elderly people who cannot pay the fee of this system.

The future view of a system

- Gain government support to provide financial support for the lowest earners in society.

- Fully implemented home-delivery company in the stricken area affected by the East Japan great earthquake (Soma-shi, Fukushima, Otsuchi-cho, Iwate, Ishinomaki-shi, Miyagi).

- If the system proves to be successful, then in the event of a great earthquake occurring in a metropolitan area;

- This system will function as a safety net, providing safety checks, medical treatment, food and water support in a state of emergency.

Special Thanks

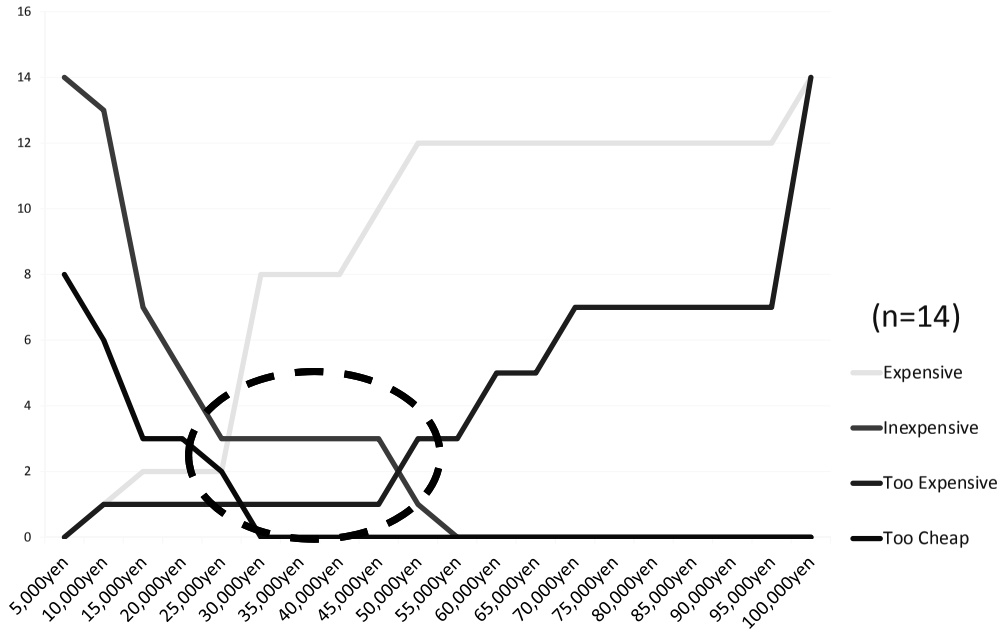
Proporser : Infrastructure Innovation Institute, Inc.

Thank you for interviews

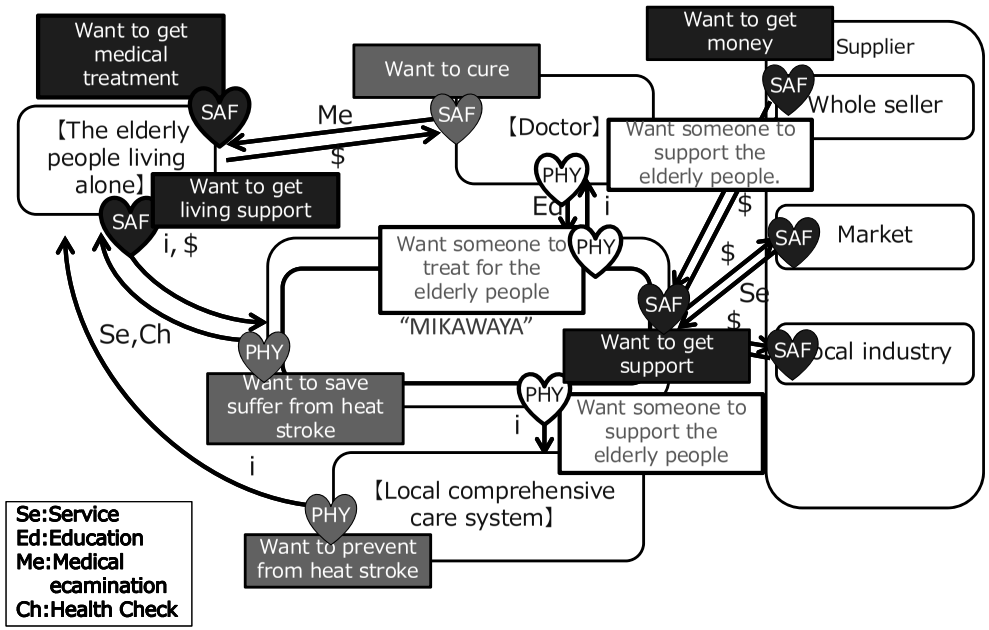
Mr. Sato :Yokohama City Hiyoshi Community Center
Ms. Oki : Community General Support Center
Ms. Shiratori : Vice president of Yokohama welfare commissioner society welfare commissioner
Dr. Ito : The director of Nakano Kyouritsu Hospital
Mr. Hasegawa : The administration manager of Fukushi Club customer cooperative association
Mr. Hatori : Vice councelor of the community action office, policy planning department of Kumagaya city office
Mr. Takahashi : Vice councelor of the division of Global Warming, policy planning department of Kumagaya city office
Mr. Kadokura : Vice director of the Health Service Office, policy planning department of Kumagaya city office
Mr. Miwa : Assistant Project Manager, Advanced Technology Incubation and Mechatronics Group Kajima Technical Research Institute
Mr. Takagi : Chief Research Engineer, Advanced Technology Incubation and Mechatronics Group Kajima Technical Research Institute
Kansai Electric Power Co, Inc.
The elderly people in Kumagaya City
The elderly people in Hiyoshi City
Mr. Ogawa : Medical Journalist

Supplement

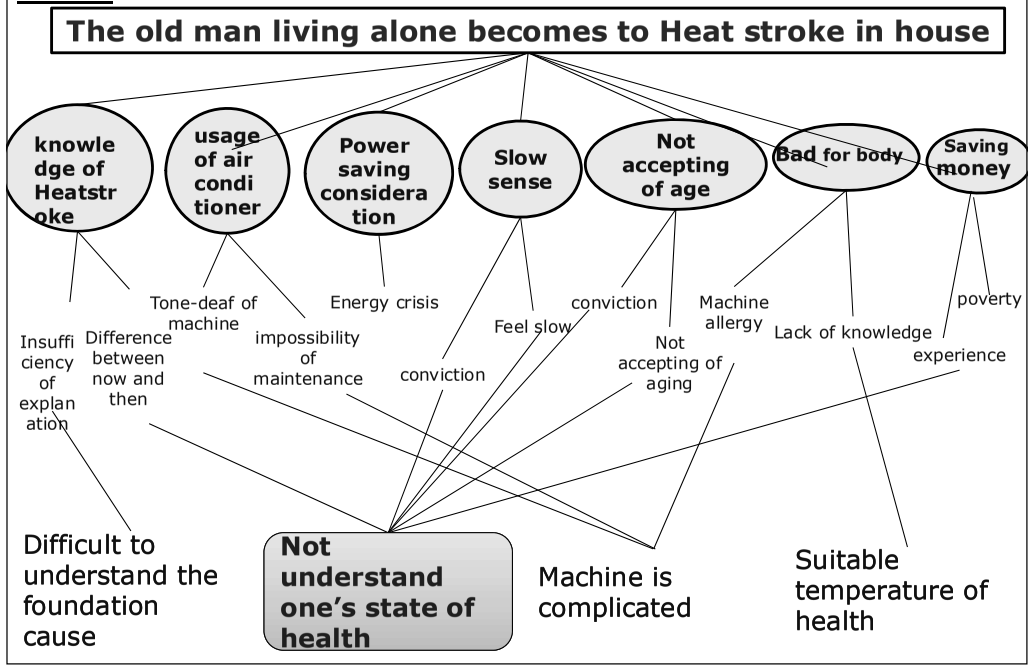
(Supplement) Price Sensitivity Measurement Analysis



(Supplement) System Design(WCA)

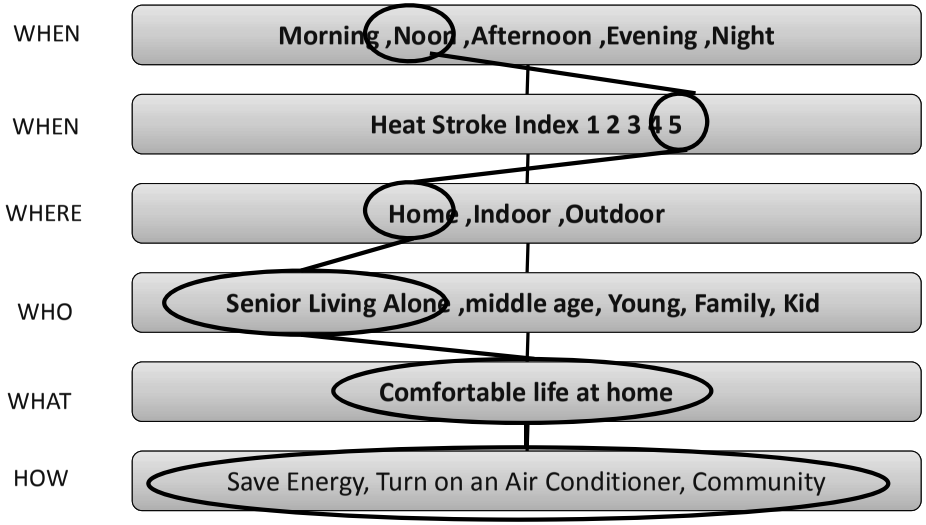


(Supplement) TOC

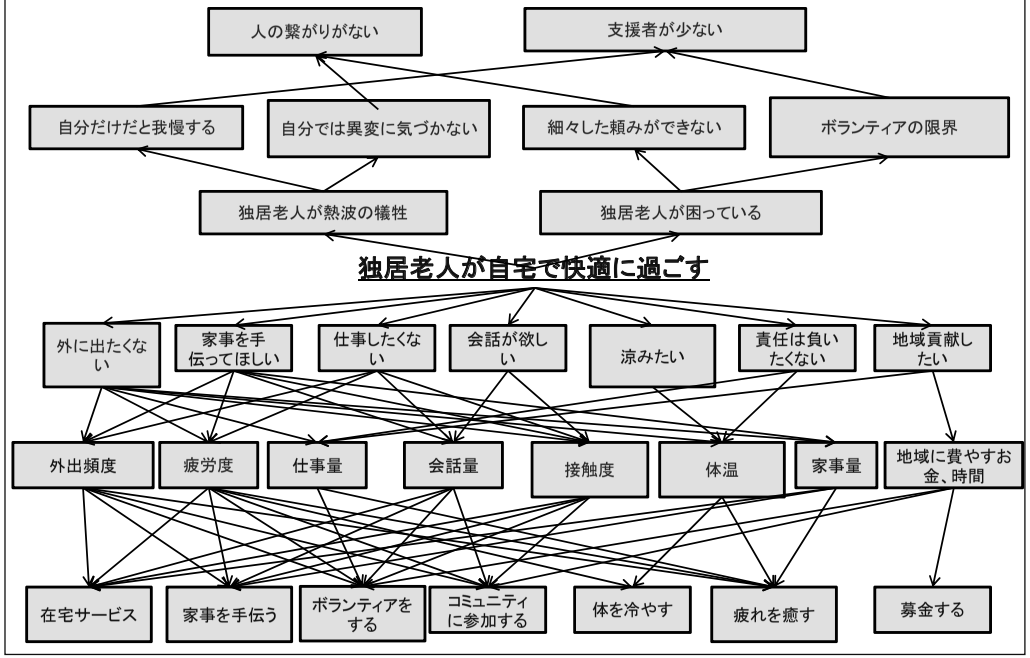


(Supplement) Use Case Scenario

This Scenario was selected , as follow.



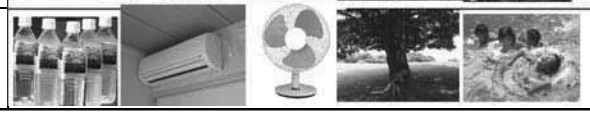
(Supplement) Value Graph



(Supplement)
QFD

順位	機能/行動	割合
1	家事を手伝ってもらう	22%
2	疲れを癒す	19%
3	ボランティアをする	18%
4	在宅サービスを受ける	17%
5	コミュニティに入る	14%
6	体を冷やす	6%
7	募金する	4%

(Supplement)
Morphological Diagram

機能／行動	ソリューション
家事を手伝ってもらう	
疲れを癒す	
ボランティアをする	
在宅サービスを受ける	
コミュニティーに入る	
体を冷やす	

(Supplement)
Morphological Diagram

機能／行動	ソリューション
家事を手伝ってもらう	
疲れを癒す	
ボランティアをする	
在宅サービスを受ける	
コミュニティーに入る	
体を冷やす	

(Supplement)
Pugh Method

Requirements	1.教育プログラム	2.マイクロバス	3.チャリティーPETボトル	4.宅配パッケージ
外に出たくない	+	-		+
家事を手伝って欲しい	-	S	D	+
仕事したくない	S	S	A	S
会話が欲しい	+	+	T	+
熱中症を予防したい	S	-	U	+
責任は負いたくない	-	S	M	S
地域貢献したい	S	S	M	-
合計	+2,-2,S2	+1,-2,S4		+4-1,S2
順位	2	4	2	1