Big Data for the Elderly
Using Digital Data to Enhance the Well-being of the Elderly
The Design Incubation Centre (DIC) is a design research laboratory which investigates and develops new tools of design, in order to find new possibilities for the practice of design.

As a design probe, the centre addresses and explores three spheres of research involving human needs, emerging technology and social trends. We seek to create new ideas and products that are intuitive and enriching without losing sight of the experience and encounter.

The workshops developed by the centre are framed around businesses and involve academic researchers, professionals from the industry, as well as policymakers and stakeholders from the government. These workshops take on a "phase zero" approach where it is structured to examine contexts without presumption – to make fresh observations and develop new insights so as to generate relevant, innovative concepts.

The Design Incubation Centre is part of the Division of Industrial Design. It was proposed by the School of Design and Environment as a result of a strategic initiative by the National University of Singapore for each school or faculty to develop its own centre of excellence.

The Centre has run several workshops, two of which involved the Elderly, and one on the topic of Big Data. Our workshops aim to discover new insights on probe topics and to encourage new potential design outcomes.

More information can be found on our website:
www.designincubationcentre.com
“BIG DATA [mobile phones and pervasive sensors] will revolutionize health management and support for chronic patients.”

Cincinnati Children's Hospital / Collaborative Chronic Care Network
MICHAEL SEID

As data and sensors proliferate into our lives, how can we use them for useful design outcomes? In today's Big Data context, we often use data to improve systems and build better cities. But how often are they used to significantly improve one's lives?

In this project, we aim to use Digital data to enhance the well-being of the elderly.

Data has helped cities make informed decisions. Let’s use data to help improve the lives of the elderly, streamline the workflow of their caregivers and provide a peace of mind to family members.

This project is a continuation of DIC’s efforts to discover the potential of Digital Data for Design.
WHAT IS BIG DATA?

Big data is data that is too large, complex and dynamic for any conventional data tools to capture, store, manage and analyse. It is dynamic, changing and continuous. Facebook feeds, GPS routes, Purchases, Photos, Videos and Sensors are just some examples of sources of Big Data. With the amount of data mankind produce every day, Big data can now provide us with billions of opportunities, which makes it the frontier for innovation today.

It has been observed that there hasn’t been much attention given to Big Data in the field of creative applications and industrial design. As such, the centre is putting its efforts to explore Big Data from a design perspective. In this workshop, the elderly is centered as the focus.
**THEMES**

We chose the Elderly as the user to design for because their many needs, wishes and wants provide a fertile platform and opportunity for design. Below are three themes we have identified.

1) **Ageing In Place**

- Independent Living. Helping the elderly grow old in their own homes by allowing them to live independently.
- Using data & sensors to help family members, caregivers and their own selves to track their health.
- Warning of any impending health problems.
- Tracking Diabetics etc.

Ageing In Place

In Singapore, it is estimated that the number of elderly living alone is likely to increase from 35,000 to 83,000 by 2030, because of Singapore’s ageing population. Some common problems they face at home include, the lack of emotional and physical support from others, the lack of immediate assistance or suicide due to depression. This potentially pose a danger to themselves, which eventually affects both family and society. Since 2007, more than 50 elderly have been found dead in their homes.

By helping the elderly live longer in their own homes, we help them **reduce their cost of spending and government’s spending**. These elderly can also **live longer, safely and happily in their own communities**, without institutionalization. We also hope that our design outcomes would benefit their children that aren’t living with them by assuring them that their elderly parents are alright.

There are other needs, such as health and social, that needs to be further addressed. We hope to discover more of such needs during our user observations.

2) **Healthcare**

- Using data to help patients, and even doctors, manage their health.
- Sensors can alert elderly or family members of potential health problems, manage their current health problems or even simply to remind them to take their medications.

Healthcare

In 2012, we see the rise of the use of data for healthcare. From medical phone applications, tracking devices to health systems, tons of systems have been designed to use data to help patients, and even doctors, manage their health.

In the same way, Data can be used to help the elderly manage their own health. Sensors can alert elderly or family members of potential health problems, manage their current health problems or even simply to remind them to take their medications. By understanding the needs of the elderly and designing a seamless system for them, we can help them manage their health better and live longer.

3) **Active Ageing**

- How can data play a role in keeping the elderly active? How can the tech savvy elderly continue to be informed as they age?

Active Ageing

The elderly of the future are becoming more and more tech savvy and receptive to technology. As these elderly grow old, **how can we use Data to help prepare them for their old age? How can data assume a role to assist them in their daily life?**

*http://app.mfs.gov.sg/Details/Summary?pressrelease=MediaCoverageZip&zip=20130104224825%20%7CN%20%7G003%20%7C%20%7C%20%7C.pdf*
1) Improving communication between elderly and their children

2) Using data to manage health

3) Using data to provide assistance to their daily lives
The workshop would be held over a period of 3 days. The first day would focus on allowing participants to gain a deeper insight of Data & the Elderly. The second would focus on evaluating these findings and ideation on concepts. And finally, concepts would be shared on the last day.

**Day 1**
- understanding data

**AIM:** Understanding what data can do
- Success examples on data
- Listen to talks on Data

**Day 1**
- understanding users

**AIM:** Discover problems & insights
- Interviewing of elderly
- Visitation to elderly homes
- Listen to talks about elderly

**Day 2**
- analyse findings

**AIM:** Synthesising observations

**Day 2**
- ideation

**AIM:** Brainstorming & prototyping concepts

**Day 3**
- sharing

**AIM:** Presentation of ideas
During our pre-research, we interviewed several elderly and visited their living conditions to understand their needs and wants. We also spoke with several social workers to understand the common problems they face with the elderly as well. With these understanding, we generated a few quick concepts that could be potential outcomes of the workshop.

1) Elderly Locator
We learnt that a common problem family members face is the issue of locating their lost elderly parents due to cases of dementia. Many of these elderly do not own a cellphone too. One observation we picked up is that most elderly bring out a key with them. The elderly locator is to attach a GPS keychain onto their keys that sends us their location to family members in an emergency.

2) Refrigerator Sensor
"The first thing my grandmother does every morning is to open the fridge", commented one of our interviewees. By putting a sensor into their fridge, we can understand the patterns of the user opening and closing the fridge everyday. With this data, once the fridge has not been opened for a certain time, an sms can be sent to family members to alert them to give their elderly a call, in the case of an emergency.

3) Medicine Reminder
Another problem elderly face is that they don’t remember how many times they’ve taken their medicine, or if they’ve taken at all. This might lead them to eat twice or not eat at all. Perhaps data can intervene to inform them of their medicine intake and also to help manage their health as well.
1) Elderly Home Monitoring System

Wireless motion sensors installed at home to track resident’s movements. Once an unusually long motionless period is detected, the system sends an SMS to a caregiver or volunteer. They can then give the elderly a call or make a trip down to check if they are alright. Such a system gives both family members and elderly a peace of mind. This system has rescued several elderly who have fallen down at home.


2) Flush Tracking

Sensors are installed in toilet bowls to track how many times an elderly flushes the toilet. By tracking this data, it alerts if an anomaly arises, indicating any potential health issues. One such example is to curb Urinary Tract Infection, which is a common problem among elders that arises because of the lack of passing of urine. By tracking flushes, we can not only warn them but also encourage them to use the bathroom more often as well.

3) Parkinson’s Voice Initiative

The Parkinson’s Voice Initiative determines if an elderly is getting Parkinson’s disease by detecting it through a phone call. This solution is low cost, accurate and only a short time needed.

http://www.parkinsonsvoice.org

4) Ginger.io

This phone application collects and analyzes passive and active cellphone data to help people track their moods and health of their patients. It can tell if users are moody, unwell or if they are in danger of an illness soon. It also helps patients monitor their own health.

http://ginger.io
The Centre emphasizes strongly on a multidisciplinary collaboration for effective learning. Listed below are the different disciplines we would like to approach and also the individual benefits for participating in the workshop.

Elderly Services
- Elderly Caregivers
- Voluntary Welfare Organizations
- Government Ministries
- Elderly Welfare Agencies

As experts in this area, members of these organizations can share insights and give talks on elderly issues, provide insights to ideas or even provide feedback for the final designs. Participants would also gain understanding of design thinking methods which they can apply in their workplace.

Data Experts
- IDA
- BigData.SG Members
- Participants of Data Hackathons

As data experts, participants can give a sharing on the possibilities and applications of Big Data. Participants can also learn how to apply Data in a user-focused manner which directly impacts someone’s life.

Design
- NUS Industrial Design Students
- Designers from Industry
- Companies focusing on Elderly Design
- A*Star Research

Participants would learn how to work in multi-disciplinary teams, apply user research techniques and design thinking methods.

Others
- Students from other faculties
- Any interested participants
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