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ANEXO A — Informação a recolher

REGISTRATION INFORMATION

Welcome to the Future Mobility Survey!
If you are a new user, please create an account before starting the survey.

[textbox] Username:
[textbox] Password:
[textbox] Confirm password:

(Once a user has created an account, the system should generate a unique household ID that gets displayed at the top).

If you are **an existing user**, please log in to continue with the survey.

[textbox] Username:
[textbox] Password:

WELCOME INFORMATION

This survey is being conducted as part of a mobility study conducted by the Future Urban Mobility Group at the Singapore-MIT Alliance for Research and Technology (http://smart.mit.edu/research/future-urban-mobility/future-urban-mobility.html).

This is the first survey in the study which should be filled out only once by the head of your household. If you are not the head of the household, please do not answer this survey.

The survey is expected to take 15 minutes to complete. The questions in the survey are about the basic characteristics of your household (Part 1), the individuals living in your house (Part 2) and some of your residential preferences (Part 3). They are used to ensure that we have a representative sample of households participating in this study.

All information collected will be used for research purposes only and will remain strictly confidential. If you have any questions about the survey, please contact Dr. Francisco Pereira (camara@smart.mit.edu; telephone: xxx).

To start the survey, please press on the "Next" button below.

PRE-SURVEY INFORMATION

The first part of the survey contains general questions about your dwelling unit, the composition of your household, the vehicles / bicycles / transit passes available to your household, and your household's most frequently visited grocery stores or markets.

Your Dwelling Unit

[text box] What is the address of the dwelling unit you currently live in?
Block_____Unit No.#_____Street_____Postal code_____

[radio button] How long have you lived at your current address?
Less than 1 year
More than one year (please indicate the number of years)**[text box]**

[radio button]What is the type of your dwelling unit?
HDB 1-room
HDB 2-room
HDB 3-room
HDB 4-room
HDB 5-room and executive flat
Landed property
Private flat / condominium
HDB other than flats
HUDC flat
Government executive flat
Other public flat
Shophouse
Floor of shophouse
Attap/Zinc roofed

[radio button] What is the ownership status of your dwelling unit?
Owned
Inherited
Rented
Occupied without payment of rent
Other (Please specify) **[text box]**

[radio button] What is the approximate floor area of your dwelling unit in square meters?
Less than 50 m^2
50-99 m^2
100-149 m^2
150-199 m^2
200-249 m^2
250-299 m^2
300 or more m^2

Household Composition

[radio button] What is the ethnic group (race) of the head of your household?
Chinese
Malay
Indian
Other (Please specify)**[text box]**

[Drop-down list, one option] How many people (of all ages) normally live in your house (including yourself)? (options are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10+)

(The size of the table in question 1.8 (number of rows excluding the headers) should be equal to the value selected in question 1.7).

Please indicate in the table below the name, gender, age, relationship to you, status, and highest level of educational attainment of each member living in your house. Each member should be in a separate row. Please fill out this information about yourself in the first row.

[text box] Name	**[drop-down list, one choice]** Gender (options: Male, Female)	**[drop-down list, one choice]** Age (options: 1, 2, 3, …, 100)	[drop-down list A, one choice] Relationship of each member to you	[drop-down list B, one choice] Current status	**[drop-down list C, one choice]** Highest level of educational attainment

List A	List B	List C
Spouse	Employed Full Time	Primary education or less
Son/daughter (including adopted)	Employed Part Time	Secondary education
Son-in-law/ Daughter in law	Self-Employed	Undergraduate / bachelor's degree
Parent/guardian	Homemaker	Graduate or post-graduate degree (master's, PhD)
Parent-in-law	Full Time Student	Other (Please specify) **[text box]**
Brother/sister (including adopted)	Worker-Student	
Brother-in-law/ sister-in-law	National Service	
Grandchild	Retired	
Grandparent	Unemployed	
Other relative	Voluntary Worker	
Non-relative	Domestic Worker	
	Other (Please specify)**[text box]**	

Household Vehicles, Bicycles, and Transit Passes

[Drop-down list, one option] How many motorized vehicles were available to your household yesterday? (options are: 0, 1, 2, 3, 4, 5, 6+)

(If the answer to question 1.9 is 1, 2, 3, 4, 5 or 6+, question 1.10 will appear and the number of rows excluding the headers should be equal to the value selected in question 1.9; otherwise, if the answer to question 1.9 is 0, the next question to appear is question 1.11).

For every vehicle available, please indicate the make, model, year of manufacturing, type, properties, and person in your house that is the primary user of the vehicle. Please fill out the details of every vehicle on a separate row in the table below.

Vehicle Number	[text box] Make	[text box] Model	**[text box]** Year of Manufacturing	Fuel Type [drop-down list C]	[drop-down list A, one choice] Type	[drop-down list B, one choice] Properties	**[drop-down list, one choice]** Primary User (options: names entered in question 1.8.1)
1							
2							
...							

List A	List B	List C
Car (normal) Car (off-peak) Light goods vehicle Motorcycle/scooter	For car (normal) and car (off-peak): - Individual registered - Company registered - Lease/Rental For lights goods vehicle: - Goods only vehicle - Goods passenger vehicle For motorcycle/scooter: - Individual registered - Company registered	Gasoline Diesel Hybrid Electric Biodiesel Compressed Natural Gas Other

[text box] When was the first time your household ever owned a vehicle? Please specify the year.

[Drop-down list, one option] How many bicycles were available to your household yesterday? (options are: 0, 1, 2, 3, 4, 5, 6+)

(If the answer to question 1.12 is 1, 2, 3, 4, 5 or 6+, question 1.13 will appear and the number of rows excluding the headers should be equal to the value selected in question 1.12; otherwise, if the answer to question 1.12 is 0, the next question to appear is question 1.14)

For every bicycle available, please indicate the person in your house that is the primary user of the bicycle. Please fill out the information for every bicycle on a separate row.

Bicycle Number	**[drop-down list, one choice]** Primary User (options: names entered in question 1.8.1)
1	
2	

[Multiple choice, list D] Please specify the type of transit card(s) (if any) each household member owns. You may select more than one type for each member. (*The number of rows in this table, excluding the headers, should equal the number of household members entered in question 1.8.1, and the names should appear in the column "Household Member", each on a separate row).*

Household Member	Card type

List D
EZ-Link
EZ-Link Season Pass
Fevo mastercard
Singapore tourist pass
Other (Please specify)**[text box]**

The second part of the survey contains a few additional questions related to every member of the household you listed above. After clicking the "Next" button below, you will be directed to fill out some information about every member of the household, starting by yourself.

(Questions 2.1-2.7 below will appear for every member of the household, as appropriate, on a separate page / tab)

Please answer the questions below about household member *[Insert name of household member]*.

[radio button] What driving/riding licenses does this member currently hold?
None
Motorcycle
Car
Van/Lorry/Bus (Class 4 and above)

[radio button] Can this member move outdoors independently?
Yes
Yes, with help
No

(If the answer to question 2.2 is "Yes, with help" or "No", the next question to appear is question 2.3; otherwise, proceed according to the answer to question 1.8.5 (see below))

[radio button] What type of physical aid does this member need to get around?
Walking stick / frame / crutches for body support
Non-motorised wheelchair
Motorised wheelchair
Stick / cane to detect obstacles to movement
Other (Please specify) **[text box]**

If the answer related to this member from question 1.8.5 is:
Employed Full Time, Employed Part Time, Self-Employed, National Service, Voluntary Worker, or Domestic Worker, the next question to appear is question 2.4.1.
Full Time Student, the next question to appear is question 2.5.1.
Worker-Student, the next question to appear is question 2.6.1.
Homemaker, Retired, Unemployed, or Other, the next question to appear is question 2.7.

Employed Full Time, Employed Part Time, Self-Employed, National Service, Voluntary Worker, or Domestic Worker

[radio button] What is this member's MAIN occupation?
Legislator, Senior Official & Manager
Professional
Associate Professional and Technician
Clerical Worker
Service & Sales Worker
Agriculture & Fishery Worker
Production Craftsman & Related Worker
Plant/Machine Operator, Assembler
Cleaner, Labourer & Related Worker
Armed Forces Personnel
Other (Please describe) **[text box]**

[radio button] Does this member have a fixed workplace?
Yes, and not work at home
Yes, work at home
No

(If the answer to question 2.4.2 is "Yes, and not work at home", the next question to appear is question 2.4.3; otherwise, the next question to appear is question 2.4.4).

[text box] What is the address of this member's workplace?
Block_____Unit No.#_____Street_____
Postal code_____

[radio button] Which of the following best describes this member's working arrangement?
Fixed hours
Flexible hours

(Go to question 2.7)

Full Time Student
[radio button] What type of educational institution is this member attending?
Preschool
Primary
Secondary
Post secondary (JC/CI,ITE)
Polytechnic
University
International school
Private School
Special education school
Other (Please specify) **[text box]**

[text box] What is the name of this member's school?

[text box] What is the address of this member's school?
Block_____Unit No.#_____Street_____
Postal code_____
(Go to question 2.7)

Worker-Student
[radio button] What is this member's MAIN occupation?
Legislator, Senior Official & Manager
Professional
Associate Professional and Technician
Clerical Worker
Service & Sales Worker
Agriculture & Fishery Worker
Production Craftsman & Related Worker
Plant/Machine Operator, Assembler
Cleaner, Labourer & Related Worker
Armed Forces Personnel
Civil Servant
Other (Please describe) **[text box]**

[radio button] Does this member have a fixed workplace?
Yes, and not work at home
Yes, work at home
No

(If the answer to question 2.6.2 is "Yes, and not work at home", the next question to appear is question 2.6.3; otherwise, the next question to appear is question 2.6.4)

[text box] What is the address of this member's workplace**?**
Block_____Unit No.#_____Street_____
Postal code_____

[radio button] Which of the following best describes this member's working arrangement?
Fixed hours
Flexible hours

[radio button] What type of educational institution is this member attending?
Preschool
Primary
Secondary
Post-secondary (JC/CI,ITE)
Polytechnic
University
International school

Private School
Special education school
Other (please specify) **[text box]**

[text box] What is the name of this member's school?

[text box] What is the address of this member's school?
Block_____Unit No.#_____Street_____
Postal code_____

(Go to question 2.7)

[radio button] Which of the following categories best describes this member's monthly pre-tax personal income?
No income
$1 - $1,000
$1,001 - $1,499
$1,500 - $1,999
$2,000 - $2,499
$2,500 - $2,999
$3,000 - $3,999
$4,000 - $4,999
$5,000 - $5,999
$6,000 - $6,999
$7,000 - $7,999
$8,000 and above
Other (please specify) **[text box]**

ATTITUDINAL QUESTIONS

In this section we will ask you about your satisfaction levels with your residence and neighborhood, as well as your attitude towards certain residential and neighbourhood features.

3.1 **[Dropdown list – one option. Options are 1,2,3,4,5,6,7]** Please indicate how satisfied you are with your current neighborhood using a scale of 1 to 7 where 1=Not at all satisfied and 7=Very Satisfied.

3.2 **[Dropdown list – one option. Options are 1,2,3,4,5,6,7]** Please indicate how satisfied you are with your current dwelling unit (apartment, flat, condo, house, etc.) using a scale of 1 to 7 where 1=Not at all satisfied and 7=Very satisfied.

3.3 **[Dropdown list – one option per statement. Options are 1,2,3,4,5,6,7]** Please indicate to what extent you agree with each of the following statements using the following scale:
Strongly disagree
Disagree
Somewhat disagree
Neither agree nor disagree
Somewhat agree
Agree
Strongly agree

Locations and activities	I want to have shops and restaurants in walking distance of my home.
	High density residential development should be encouraged.
	I prefer to have close neighbours whom I trust.
	I need to live in proximity to good schools
	I would only live in a multiple family unit as a last resort.
	Children should have a large backyard for playing.
	I am willing to live in a smaller dwelling unit if I have access to more neighborhood amenities such as shopping, restaurants, and clubs
	I prefer to have lots of nearby outdoor recreational opportunities, such as parks and facilities for walking and bicycling
	I prefer to live close to family and friends
	I am willing to have a longer commute if it means I can spend less money on my home.
Travel modes, travel behaviour, and driving behaviour	Buses and trains are pleasant to travel in.
	Driving allows me to get more done.
	I can read and do other things when I use public transportation.
	I like driving
	I prefer to bike or walk rather than drive or take transit when possible
	I try to use the telephone or internet to avoid having to travel
	Public transportation is unreliable.
	Ridesharing saves money.
	The only good thing about traveling is arriving at your destination
	The trips to and from work provide a useful transition between home and work
Exposure to safety levels and impact of externalities	Too many people drive alone.
	Fuel efficiency is an important factor for me in choosing a vehicle
	Getting stuck in traffic doesn't bother me too much.
	Traveling by car is safer than walking
	I try to limit my driving to help improve air quality
	I would be willing to pay a toll to drive on an uncongested road.
	The price of gasoline should be raised to reduce congestion and air pollution.
	Traffic congestion will take care of itself because people will adjust.
	Traveling by car is safer than riding a bicycle
	Public transit is the safest way to travel.

ACTIVITY DIARY: WELL-BEING QUESTIONS

1. [radio button] Thinking about this day, how satisfied were you overall with the way you traveled, the places you went to (including staying at home), and the things you did at these places?
Available options: 1 (very dissatisfied), 2, 3, 4, 5, 6, 7 (very satisfied)

2. [radio button] In general, would you say that this day was a typical day for you? i.e. To what extent did your activities and travel happen as you expected?
Available options: 1 (much worse than expected), 2 (worse than expected), 3 (as expected), 4 (better than expected), 5 (much better than expected).

3. [radio button] Did you change any of your activity and travel plans as the day progressed?
Available options: Yes/No
(If the answer to question 3 is "Yes", question 3b should appear; otherwise, questions 4-6 should appear if the user made no trips on the selected day (as detected by the Smartphone application); otherwise, the user clicks on a Next button to go to the following page of the survey.)

3b. [text box] What happened that caused the change in plans?
(Questions 4-6 should appear if the user made no trips on the selected day (as detected by the Smartphone application); otherwise, the user clicks on a Next button to go to the following page of the survey.)

ACTIVITY DIARY: NO DATA QUESTIONS

4. [drop-down list, single choice] What type of place did you stay at on this day?

Residential (your home)
Residential (other's home)
Market/food center/restaurant
School
Office
Industrial/factory/workshop premise
Shops or shopping centre
Hospital/polyclinic/specialist center/nursing home
Place of worship
Park/open space
Sports/recreation
Civic and community institution
Other (please specify) - If this is selected, a **text box** should appear in order for the user to add a new place

5. [list with check boxes, multiple selections possible] Please indicate which of the following activities you did at this place. You can select more than one activity. Please select an activity only if it occupied more than 30 minutes of your time.
Available options:

Work
Work-related business
Education
Shopping
Recreation
Medical/dental (self)
Social visit/gathering
Meal/eating break
Entertainment
Sports/exercise
Personal errand/task (pay bill, banking)
Accompany someone
Drop-off/pick-up someone
Change transportation mode or transfer
Other (please specify) - If this is selected, a text box should appear in order for the user to add a new activity.

6. [drop-down list, single choice] Why did you NOT make any trips on this day?
No need to go out
Medical reasons (self)
Medical reasons (other household member)
Doing things at home
Had visitors at home
No transportation available
I forgot my phone
I don't have a phone
Other (please specify) – If this is selected, a **text box** should appear in order for the user to add his/her reason

ACTIVITY DIARY: STOPS/PLACES QUESTIONS

(For STOP 0, ask only questions 1-3.)
1. [text boxes] Please validate the location of this place (address, landmark, or nearest intersection)

2. [drop-down list, single choice] What type of place was this?
Residential (your home)
Residential (other's home)
Market/food center/restaurant
School
Office
Industrial/factory/workshop premise
Shops or shopping centre
Hospital/polyclinic/specialist center/nursing home
Place of worship
Park/open space
Sports/recreation
Civic and community institution
Other (please specify) - If this is selected, a **text box** should appear in order for the user to add a new place

3. [list with check boxes, multiple selections possible] Please indicate which of the following activities you did before you left [insert name of stop 0] at [insert departure time]. You can select more than one activity. Please select an activity only if it occupied more than 30 minutes of your time.
Available options:

Work
Work-related business
Education
Shopping
Recreation
Medical/dental (self)
Social visit/gathering
Meal/eating break
Entertainment
Sports/exercise
Personal errand/task (pay bill, banking)
Accompany someone
Drop-off/pick-up someone
Change transportation mode or transfer
Other (please specify) - If this is selected, a text box should appear in order for the user to add a new activity.

(For all stops other than STOP 0, start with question 4.)

4. [text boxes] Please validate the location of this place (address, landmark, or nearest intersection)

5. [drop-down list, single choice] What type of place did you go to?
Residential (your home)
Residential (other's home)
Market/food center/restaurant
School
Office
Industrial/factory/workshop premise
Shops or shopping centre
Hospital/polyclinic/specialist center/nursing home
Place of worship
Park/open space
Sports/recreation
Civic and community institution
Other (please specify) - If this is selected, a **text box** should appear in order for the user to add a new place

(If the answer to question 5 is "Residential (your home), the next question to appear is question 6. Otherwise, the next question to appear is question 7.)
6. [list with check boxes, multiple selections possible] Please indicate which of the following activities you did when you returned home at [insert arrival time]. You can select more than one activity. Please select an activity only if it occupied more than 30 minutes of your time.

Available options:

Work
Work-related business
Education
Shopping
Recreation
Medical/dental (self)
Social visit/gathering
Meal/eating break
Entertainment
Sports/exercise
Personal errand/task (pay bill, banking)
Accompany someone
Drop-off/pick-up someone
Change transportation mode or transfer
Other (please specify) - If this is selected, a text box should appear in order for the user to add a new activity.

(If question 6 appears, the next question to appear after it is question 9).

7. [drop-down list, single choice] What was the activity that occupied most of your time at this place?

Available options:

Work
Work-related business
Education
Shopping
Recreation
Medical/dental(self)
Social visit/gathering
Meal/eating break
Entertainment
Sports/exercise
Personal errand/task(pay bill, banking)
To accompany someone
Drop-off/pick-up someone
Change transportation mode or transfer
Other (please specify) - If this is selected, a text box should appear in order for the user to add a new activity.

8. [select-box, multiple choice + scroll] What else were you doing at this place?

Available options:

LTA	FMSurvey
Return home	Home
Go to work	Work
Work-related business	Work-related business
Education	Education
Shopping	Shopping
Recreation	Recreation
Medical/dental(self)	Medical/dental(self)
Social visit/gathering	Social visit/gathering
Meal/eating break	Meal/eating break
Entertainment	Entertainment
Sports/exercise	Sports/exercise
Personal errand/task(pay bill, banking)	Personal errand/task(pay bill, banking)
To accompany someone	To accompany someone
To drop-off/pick-up someone	Drop-off/pick-up someone
For some other reason	Change-mode
	Other (please specify) - If this is selected, a text box should appear in order for the user to add a new activity.

9. [drop-down list, single choice] How many other persons traveled *with you* to this place?
Available options: 0, 1, 2, 3, 4+
If the answer is 1 or more, then question 10 (next question) will be available.
If the answer is 0, then question 10 (next question) should not appear.

10. [drop-down list, multiple choices] If you traveled with household members, please select them below. *(The available options are from the household survey).*

11. [drop-down list, single choice] How did you reach this place?
Available options:

Public bus
MRT
LRT
Company bus
School bus
Shuttle bus
Taxi
Car driver
Car passenger
Van / Lorry driver
Van / Lorry passenger
Motorcycle rider
Motorcycle passenger
Bicycle
Other

If the Mode of transportation: **Public bus**
[text box] How long did you take to walk to the bus stop? (minutes)
[text box] What was the bus number you took?
[text box] How long did you wait for the bus? (minutes)
[text box] How long was the bus journey? (minutes)

If the Mode of transportation: **MRT**
[text box] How long did you take to walk to the MRT station? (minutes)
[text box + select box + drop box list, single choice] Which MRT station did you board? (For this question, we allow the user to enter part of the name of the station in a text box and the system locates the full name of the station in a drop box list automatically. The names of stations are in the appendix)
[text box + select box + drop box list, single choice] Which MRT station did you alight? (For this question, we allow the user to enter part of the name of the station in a text box and the system locates the full name of the station in a drop box list automatically.)
[text box] How long did you wait for the train? (minutes)
[text box] How long was the train journey? (minutes)

If the Mode of transportation: **LRT**
[text box] How long did you take to walk to the LRT station? (minutes)
[text box + select box + drop box list, single choice] Which LRT station did you board? (For this question, we allow the users to enter part of the name of the station in a text box and the system locates the full name of the station in a drop box list automatically.)
[text box + select box + drop box list, single choice] Which LRT station did you alight? (For this question, we allow the users to enter part of the name of the station in a text box and the system locates the full name of the station in a drop box list automatically.)
[text box] How long did you wait for the train? (minutes)
[text box] How long was the train journey? (minutes)

If the Mode of transportation: **Company Bus**
[text box] How long did you take to walk? (minutes)
[text box] How long did you wait for the bus? (minutes)
[text box] How long was the bus journey? (minutes)

If the Mode of transportation: **School Bus**
[text box] How long did you take to walk? (minutes)
[text box] How long did you wait for the bus? (minutes)
[text box] How long was the bus journey? (minutes)

If the Mode of transportation: **Shuttle Bus**
[text box] How long did you take to walk? (minutes)
[text box] How long did you wait for the bus? (minutes)
[text box] How long was the bus journey? (minutes)

If the Mode of transportation: **Taxi**
[text box] How long did you take to walk before you get a taxi? (minutes)
[text box] Total number of passengers (including yourself):
[text box] How long did you wait for the taxi? (minutes)
[text box] How long was your taxi journey? (minutes)
[text box] How much was your total taxi fare? ($, include surcharges and ERP)
[radio button] Was the taxi fare reimbursed? Available options: Yes/No

If the Mode of transportation: **Car driver**
[drop box list, single choice] Which car from your household did you use? (ask this question only if the household has more than one vehicle – from the household survey response; also add the option "None")
[text box] How long did you take to walk to your car? (minutes)
[text box] How long was your car journey? (minutes)
[text box] How much were your ERP charges? ($)
[radio button] Were the ERP charges reimbursed by your employer? Available options: 1.Yes/2.No
[drop box list, single choice] Where did you park? Available options: garage, driveway, on the street, in a parking lot, other (please specify) **[text box]**

[radio button] How much were your parking charges? Available options: 1. one-off payment 2.monthly/season. **[text box]** *($, to put how much it was)*.
[radio button] Were the parking fees reimbursed by your employer? Available options: 1.Yes/2.No

If the Mode of transportation: **Van/Lorry driver**
[drop box list, single choice] Which van/lorry from your household did you use? (ask this question only if the household has more than one vehicle – from the household survey response; also add the option "None")
[text box] How long did you take to walk to your van/lorry? (minutes)
[text box] How long was your van/lorry journey? (minutes)
[text box] How much were your ERP charges? ($)
[radio button] Were the ERP charges reimbursed by your employer? Available options: 1.Yes/2.No
[drop box list, single choice] Where did you park? Available options: garage, driveway, on the street, in a parking lot, other (please specify) - If this is selected, a **text box** should appear in order for the user to add a new place.
[radio button] How much were your parking charges? Available options: 1. one-off payment 2.monthly/season. **[text box]** ($, to put how much it was).
[radio button] Were the parking fees reimbursed by your employer? Available options: 1.Yes/2.No

If the Mode of transportation: **Motorcycle rider**
[drop box list] Which motorcycle from your household did you use? (ask this question only if the household has more than one motorcycle – from the household survey response; also add the option "None")
[text box] How long did you take to walk to your motorcycle/scooter? (minutes)
[text box] How long was your motorcycle journey? (minutes)
[text box] How much were your ERP charges? ($)
[radio button] Were the ERP charges reimbursed by your employer? Available options: 1.Yes/2.No
[drop box list, single choice] Where did you park? Available options: garage, driveway, on the street, in a parking lot, other (please specify) **[text box]**
[radio button] How much were your parking charges? Available options: 1. one-off payment 2. monthly/season. **[text box]** ($, to put how much it was).
[radio button] Were the parking fees reimbursed by your employer? Available options: 1.Yes/2.No

If the Mode of transportation: **Car passenger**
[drop box list, single choice] Which car from your household did you use? (ask this question only if the household has more than one vehicle – from the household survey response; also add the option "None")
[text box] How long did you take to walk to the car? (minutes)
[text box] How long was your car journey? (minutes)

If the Mode of transportation: **Van/Lorry passenger**
[drop box list, single choice] Which van/lorry from your household did you use? (ask this question only if the household has more than one vehicle – from the household survey response; also add the option "None")
[text box]How long did you take to walk to the van/lorry? (minutes)
[text box] How long was your van/lorry journey? (minutes)

If the Mode of transportation: **Motorcycle passenger**
[text box] How long did you take to walk to the motorcycle/scooter? (minutes)
[text box] How long was your motorcycle journey? (minutes)

If the Mode of transportation: **Bicycle**
[text box] How long did you take to walk to get your bicycle? (minutes)
[text box] How long did you cycle? (minutes)

If the Mode of transportation: **Other**
[text box] Other transportation means (please describe):
[text box] How long did you take to walk? (minutes)
[text box] How long was your journey? (minutes)
[text box] How much were your ERP charges? ($)
[radio button] Were the ERP charges reimbursed by your employer? Available options: 1.Yes/2.No
[drop box list, single choice] Where did you park? Available options: garage, driveway, on the street, in a parking lot, other (please specify) **[text box]**
[radio button] How much were your parking charges? Available options: 1. one-off payment 2.monthly/season. **[text box]** *($, to put how much it was).*
[radio button] Were the parking fees reimbursed by your employer? Available options: 1.Yes/2.No

ANEXO B — Documentação

Carta de recrutamento

RECRUITMENT LETTER

FUTURE MOBILITY SURVEY >>>

Hello!

We need your help.

You are being asked to participate in a household travel survey sponsored by the Future Urban Mobility group in the Singapore-MIT Alliance for Research and Technology (SMART). This survey will collect data about where Singaporean residents and families go and how they get there. Results from this survey will be provided to the Land Transport Authority (LTA) so that they may use the data to enhance their transportation planning processes.

What are your responsibilities?
We will first ask one member of your household (referred to as the HHR - "household responsible") to fill out a questionnaire about your current household members (both related and not). Next, we will ask you and other members of your household to respond to some questions about your housing and transportation preferences.

The next portion of the survey will involve collecting your travel data. We will ask you to download and install the application on your smartphone, and leave it running in the background as you participate in your daily activities. Travel data from the application will periodically be uploaded to our secure server in an unobtrusive manner that respects your data plan and battery life. At the end of each survey day, we will ask you and your other household members to sign into our site to fill in data on your day's activities.

What if I don't have a smartphone?
In some cases, we can loan you one for the duration of the survey.

What do I get out of it?
We're offering you $30 to take part.

What risks or benefits should I expect to receive?
You will not experience any discomfort as a result of participating in this study. Other than receiving the payment noted above in exchange for your participation, you will not receive any direct benefits from participating in this research. The most direct benefit you will receive from your participation is that you can acquire first-hand knowledge of the research process.

How many members of my household should take part?
We're asking all household members over the age of 12 to take part. If household members are between the ages of 12 and 17, we will ask the HHR to fill in their travel data or give permission for them to fill in their own data.

Will you keep my data confidential?
Confidentiality is critical to the success of our survey. We want you to feel secure in providing candid responses to our questions and in providing us with your travel information. All information will be held in strict confidence. For more information, please see our Privacy Policy.

What if I wish to withdraw my participation, or would prefer not to answer some of the survey questions?
You may withdraw from the study at any time and for any reason. Should you choose not to respond to a question on the survey, simply choose the option for "Don't know/would prefer not to respond" or skip the question entirely.

Who should I contact if I have questions about the survey and my rights as a research participant?
If you have any questions regarding your rights and participation as a research subject, please contact Caitlin Cottrill at caitlin@smart.mit.edu. Dr. Cottrill will answer your question if possible, or will direct you to the appropriate contact. If you feel uncomfortable with contacting a person involved in the study, please contact the Massachusetts Institute of Technology's Committee on the Use of Humans as Experimental Subjects at jadams@mit.edu.

For more information on the survey, please visit the survey website at **http://mobile.isc.ntu.edu.sg/**.

Thank you!
Your participation
will really make a difference!

SMART

Acordo de participação (>17 years old)

FUTURE MOBILITY SURVEY >>>

>17 years old

CONSENT TO PARTICIPATE IN NON-BIOMEDICAL RESEARCH

SMARTPHONE BASED INTEGRATED TRANSPORTATION ACTIVITY-TRAVEL SURVEY

You are being asked to participate in a research study conducted by Moshe Ben-Akiva, Ph.D., Chris Zegras, Ph.D. and Francisco Pereira, Ph.D., with the Singapore-MIT Alliance for Research and Technology's Future Urban Mobility (FM) Interdisciplinary Research Group (IRG). You were selected as a possible participant in this study because you responded to the advertisement for the study. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

Participation and withdrawal

Your participation in this study is completely voluntary and you are free to choose whether to be in it or not. If you choose to be in this study, you may subsequently withdraw from it at any time without penalty or consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

Purpose of the study

Effective transportation planning and decision making depend in large part upon access to reliable and detailed transportation data. Traditional transport surveys, which rely upon the participant to recall detailed information on his or her trips to record in a paper or online diary, may not provide the most reliable data. Thus, we are working to make use of emerging location-aware devices to assist with the process of data collection. This study aims, first, to develop a reliable, consistent, and easy-to-use application with which participants may log their daily travel for survey purposes; and, second, to collect useful information from participants via the use of this application.

Procedures

The smartphone application gathers a variety of location-sensing information from your smartphone, including GPS, GSM, Wi-Fi and accelerometer information, to allow us to determine your activity locations and the travel paths between them. If you volunteer to participate in this study, we would ask you to do the following things:

—Download and install the smartphone application from a link which will be sent to you via email;

— Register yourself and your household at our online site, and respond to the initial survey questions;

— Run the application on your phone for a period of two weeks; and

— Periodically (at least five times over the course of the two weeks) validate your activity traces at our online site.

Potential risks and discomforts

You should not experience any physical discomfort as a result of participating in this study.

Potential benefits

Other than receiving the payment noted below in exchange for your participation, you will not receive any direct benefits from participating in this research. The most direct benefit you will receive from your participation is that you can acquire first-hand knowledge of the research process.

The study's greatest societal benefit is in the use of collected data to improve transport planning and operations in the Singapore environment.

FUTURE MOBILITY SURVEY >>>

>17 years old

Payment For Participation
You will receive $30 for your participation in the project once completed. Should you wish to withdraw from the project, this amount will be prorated based on your degree and time of participation.

Confidentiality
Confidentiality is critical to the success of our survey. We want you to feel secure in providing candid responses to our questions and in providing us with your travel information. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. For more information, please see our Privacy Policy at http://mobile.isc.ntu.edu.sg/pages/recruit.

Identification of investigators
If you have any questions or concerns about the research, please feel free to contact
– Moshe Ben-Akiva (mba@mit.edu),
– Chris Zegras (czegras@mit.edu),
– Caitlin Cottrill (+65 6601-1634, caitlin@smart.mit.edu),
– Francisco Pereira (+65 6601-1547, camara@smart.mit.edu).

Emergency care and compensation for injury
If you feel you have suffered an injury, which may include emotional trauma, as a result of participating in this study, please contact the person in charge of the study as soon as possible.

In the event you suffer such an injury, MIT may provide itself, or arrange for the provision of, emergency transport or medical treatment, including emergency treatment and follow-up care, as needed, or reimbursement for such medical services. MIT does not provide any other form of compensation for injury. In any case, neither the offer to provide medical assistance, nor the actual provision of medical services shall be considered an admission of fault or acceptance of liability. Questions regarding this policy may be directed to MIT's Insurance Office, (617) 253-2823.
Your insurance carrier may be billed for the cost of emergency transport or medical treatment, if such services are determined not to be directly related to your participation in this study.

Rights of research subjects
You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you feel you have been treated unfairly, or you have questions regarding your rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253 6787.

SMART

Acordo de participação (<17 years old)

FUTURE MOBILITY SURVEY >>>

<17 years old

MINOR CONSENT TO PARTICIPATE IN NON-BIOMEDICAL RESEARCH

SMARTPHONE BASED INTEGRATED TRANSPORTATION ACTIVITY-TRAVEL SURVEY

Your child is being asked to participate in a research study conducted by Moshe Ben-Akiva, Ph.D., Chris Zegras, Ph.D. and Francisco Pereira, Ph.D., with the Singapore-MIT Alliance for Research and Technology's Future Urban Mobility (FM) Interdisciplinary Research Group (IRG). Your child was selected as a possible participant in this study because you responded to the advertisement for the study. You should read the information below, and ask questions about anything you or your child do not understand, before deciding whether or not to participate.

Participation and withdrawal

Your child's participation in this study is completely voluntary and he or she is free to choose whether to be in it or not. If your child chooses to be in this study, he or she, or you on behalf of him or her, may subsequently withdraw from it at any time without penalty or consequences of any kind. The investigator may withdraw your child from this research if circumstances arise which warrant doing so.

Purpose of the study

Effective transportation planning and decision making depend in large part upon access to reliable and detailed transportation data. Traditional transport surveys, which rely upon the participant to recall detailed information on his or her trips to record in a paper or online diary, may not provide the most reliable data. Thus, we are working to make use of emerging location-aware devices to assist with the process of data collection. This study aims, first, to develop a reliable, consistent, and easy-to-use application with which participants may log their daily travel for survey purposes; and, second, to collect useful information from participants via the use of this application.

Procedures

The smartphone application gathers a variety of location-sensing information from the smartphone, including GPS, GSM, Wi-Fi and accelerometer information, to allow us to determine activity locations and the travel paths between them. If you volunteer your child to participate in this study, we would ask him or her, or you on behalf of him or her, to do the following things:

—We will ask you to register your child as part of your household at our online site;

— Your child will receive an email from our survey team asking him or her to respond to initial survey questions (he or she may choose not to respond to any asked question for any reason);

— Download and install the smartphone application onto his or her smartphone;

— Run the application on his or her phone for a period of two weeks; and

— Periodically (at least five times over the course of the two weeks) validate his or her activity traces at our online site.

Potential risks and discomforts

Your child should not experience any physical discomfort as a result of participating in this study.

Potential benefits

Other than receiving the payment noted below in exchange for his or her participation, your child will not receive any direct benefits from participating in this research. The most direct benefit your child will receive from his or her participation is that he or she can acquire first-hand knowledge of the research process.The study's greatest societal benefit is in the use of collected data to improve transport planning and operations in the Singapore environment.

SMART

FUTURE MOBILITY SURVEY >>>

<17 years old

Payment For Participation
Your child will receive $30 for his or her participation in the project once completed. Should your child, or you on behalf of your child, wish to withdraw from the project, this amount will be prorated based on his or her degree and time of participation.

Confidentiality
Confidentiality is critical to the success of our survey. We want your child to feel secure in providing candid responses to our questions and in providing us with his or her travel information. Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission or as required by law. For more information, please see our Privacy Policy at http://mobile.isc.ntu.edu.sg/pages/recruit.

Identification of investigators
If you have any questions or concerns about the research, please feel free to contact
— Moshe Ben-Akiva (mba@mit.edu),
— Chris Zegras (czegras@mit.edu),
— Caitlin Cottrill (+65 6601-1634, caitlin@smart.mit.edu),
— Francisco Pereira (+65 6601-1547, camara@smart.mit.edu).

Emergency care and compensation for injury
If you feel your child has suffered an injury, which may include emotional trauma, as a result of participating in this study, please contact the person in charge of the study as soon as possible.

In the event your child suffers such an injury, MIT. may provide itself, or arrange for the provision of, emergency transport or medical treatment, including emergency treatment and follow-up care, as needed, or reimbursement for such medical services. M.I.T. does not provide any other form of compensation for injury. In any case, neither the offer to provide medical assistance, nor the actual provision of medical services shall be considered an admission of fault or acceptance of liability. Questions regarding this policy may be directed to MIT's Insurance Office, (617) 253-2823. Your child's insurance carrier may be billed for the cost of emergency transport or medical treatment, if such services are determined not to be directly related to your participation in this study.

Rights of research subjects
Your child is not waiving any legal claims, rights or remedies because of his or her participation in this research study. If you feel your child has been treated unfairly, or you have questions regarding your child's rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253 6787.

Informação sobre a participação

FUTURE MOBILITY SURVEY >>>

PARTICIPANT INFORMATION SHEET

Project title
Future Mobility Survey

Principal Investigator and co-investigator(s)
— Dr. Moshe Ben-Akiva, MIT (principal investigator, mba@mit.edu)
— Dr. P. Christopher Zegras, MIT (czegras@mit.edu)
— Dr. Francisco Pereira, SMART (camara@mit.edu)
— Dr. Caitlin D. Cottrill, SMART (caitlin@smart.mit.edu)

Research purpose
You are invited to participate in a research study.
This information sheet provides you with information about the research. The Principal Investigator (the research doctor or person in charge of this research) or his/her representative can also describe this research to you and answer all of your questions. Read the information below and contact us with questions about anything you don't understand before deciding whether or not to take part.

The Smartphone Based Integrated Transportation Activity-Travel Survey is a novel transport survey designed to take advantage of the ubiquity of smartphones and their associated technologies (such as GPS, GSM, WiFi, and accelerometers). The survey will augment and expand the usefulness of traditional household travel surveys by integrating standard questions (regarding household demographics, activities, and travel modes) with a web-based prompted-recall survey that makes use of smart-phone location-tracking abilities. It is hypothesized that the use of the smartphone tracking application will: 1) Address issues that have plagued traditional travel surveys, such as missed trips and imprecise trip timing recall, and 2) Provide detailed travel data in a format useful and usable for activity-based transportation modelling.

The survey will consist of three parts, namely: 1) A general individual and household demographic overview (completed online); 2) questions that assess well-being and individual attitudes towards transportation and housing options; and, 3) An online prompted-recall activity diary. Approximately 150 people will be recruited to take part in the pilot survey, each of whom will be asked to install a location tracking application on his or her smartphone, or on a smartphone provided by the project. Each participant will be asked to track his or her location via the application for a period of two weeks, and periodically validate the identified stops and activities. These validated stops and traces will, in turn, be integrated with on-going transport modelling activities, and will be used to provide inputs into long-term modelling activities in development.

Who can participate in the research?
Any person can participate in the research, as long as he or she meets the following criteria:
— Has access to a smartphone (either his or her own, or one borrowed from the project if applicable),
— Is willing to download and run the survey's smartphone application ("app"), and
— Is either over the age of 17 or has obtained parent or guardian's consent for participation.
There is no requirement related to household size, number of participants from individual households, or presence of children.

FUTURE MOBILITY SURVEY >>>

What is the expected duration of my participation?
We will ask you to run the Smartphone app (the survey's smartphone application) on your smartphone for a minimum two weeks. During this time, we will also ask you to sign on to our website and validate your trips a total of five times. Should you wish to participate for longer, you are welcome to do so at your discretion.

What is the duration of this research?
This research study will begin upon approval by the necessary Institutional Review Boards (IRBs) and will continue until such time as we have received the desired number of participants (roughly 150), or we feel that the data we have collected is reasonable for a pilot study.

What is the approximate number of participants involved?
We are aiming to obtain participation from 150 people.

What will be done if I take part in this research?
Should you elect to participate in this study, you will begin by registering at our website (http://mobile.isc.ntu.edu.sg/).
Once you have registered, you will be asked to read and sign a consent form indicating that you have been made aware of and agree to the survey practices. We will then ask you to provide information to us about yourself and, if applicable, your household. The next step of the survey will be to download and install the smartphone application onto your smartphone (you can find out how to do that on our website at http://mobile.isc.ntu.edu.sg/). Once you are running the application, your location data will be recorded and uploaded to our website. We will ask you to sign in periodically to validate your activities and travel behaviours. Your data will be kept confidential. Should you have any questions about the survey, you are welcome to contact us.

How will my privacy and the confidentiality of my research records be protected?
Confidentiality is critical to the success of our survey. We want you to feel secure in providing candid responses to our questions and in providing us with your travel information. All information will be held in strict confidence. For more information, please see our Privacy Policy at http://mobile.isc.ntu.edu.sg/.

What are the possible discomforts and risks for participants?
You should not experience any discomforts or risks as a result of participating in this study.

Will there be reimbursement for participation?
Participants will receive $30 as an incentive to participate in the survey. This figure was chosen based on the typical cost of a one-month data plan for mobile phone subscriptions. Should you choose to withdraw from the survey early, we will pro-rate this amount based on the time of active participation.

What are the possible benefits to me and to others?
Other than receiving the payment noted above in exchange for your participation, you will not receive any direct benefits from participating in this research. The most direct benefit you will receive from your participation is that you can acquire first-hand knowledge of the research process.

Can I refuse to participate in this research?
Yes, you can. Your decision to participate in this research is voluntary and completely up to you. You may also withdraw from the study at any time and for any reason. Finally, should you choose not to respond to a question on the survey, simply choose the option for "Don't know/would prefer not to respond" or skip the question entirely.

FUTURE MOBILITY SURVEY >>>

Whom should I contact if I have any questions or problems?
For an independent opinion regarding the research and the rights of research participants, you may contact a staff member of the relevant Institutional Review Board (IRB) as follows:

— If you are a student, faculty or staff member of the National University of Singapore (NUS), please contact Mr. Chan Tuck Wai, at telephone (+65) 6516-1234 or email at irb@nus.edu.sg
— If you are are a student, faculty or staff member of the Nanyang Technological University (NTU), please contact Ms. Germaine Foo, at telephone (+65) 6592-2495 or email at irb@ntu.edu.sg
— If you are affiliated with neither NUS or NTU, please contact Massachusetts Institute of Technology's (MITs) Committee on the Use of Humans as Experimental Subjects (COUHES) at Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone +1-617-253 6787.

SMART

Política de Privacidade

FUTURE MOBILITY SURVEY >>>

PRIVACY POLICY

This privacy policy governs your use of the "Future Mobility Survey (FMS)" application on your mobile device. The application has been developed for travel survey purposes, and will collect GPS, GSM, Wi-Fi and accelerometer information from your phone in order to determine your location for the duration of your participation. As outlined in the policy below, gathered information will be used solely for purposes of research, transportation modelling, and other associated exercises. We will not share the data we collect with third parties for purposes of marketing.

The application has been developed by a team of researchers affiliated with the Singapore-MIT Alliance for Research and Technology's (SMART) Future Urban Mobility (FM) Interdisciplinary Research Group (IRG). The following policy will outline our practices regarding the collection, use, sharing, and protection of your data.

Data Collection and Opt-Out

The FMS application requires that you register with our site to have access to the application for downloading and installation. The registration information requested includes, but is not limited to, the following:

— First names of you and your household members
— Email addresses for you and your household members
— Information on your home (such as home type and dwelling tenure)
— Information on you and your household members (such as gender, age range, employment status, etc.)
— Information on your household vehicles
— Password

In some cases you will have the option to respond, "Don't know" or "Prefer not to answer" to these questions. We may use the information you provide to contact you with questions regarding your participation in the survey.

In addition, the FMS Application may collect certain information automatically, including the following:

— The type of mobile device on which you have downloaded the application
— The unique ID of your mobile device
— Your mobile device's IP address
— Your mobile operating system
— Information about the way you use the application

This application does collect precise information about the location and movement of your device using GPS, GSM, Wi-Fi and accelerometer data. This location information will be used, first, to create an online map that you may use to validate your activities for survey purposes, and second, for research, modelling and planning purposes. The online map generated from this data will only be made available to you, to those researchers directly involved with the Future Mobility Survey, and as further outlined in this policy.

You may at any time opt-out from allowing us to have access to your location data in three ways:

— Log out of the application via the "logout" screen. This will discontinue all data collection until such time as you log back in.
— Uninstall the Move Application.
— Contact our team at smrbox25@nus.edu.sg to request removal of your data from the database.

We will comply with all requests for data removal.

Data Sharing
We will share your information with third parties only in ways that are described in this privacy statement.
We may disclose User Provided and Automatically Collected Information:
— As required by law or governmental policy, such as to comply with a subpoena, or similar legal process;
— When we believe that disclosure is necessary to protect our rights, protect your safety or the safety of others, investigate fraud, or respond to a government request;
— With our service providers who work on our behalf, do not have an independent use of the information we disclose to them, and have agreed to adhere to the rules set forth in this privacy statement.

We may partner with Singapore public agencies or other research institutions to use collected data for additional research, planning, modelling, and other transportation-related activities. Any parties with whom we enter into such partnerships will be required to abide by the terms of this privacy policy, and will not be allowed to use collected data for commercial or marketing purposes.

Data Retention and Managing Your Information
We will retain all user provided and automatically collected data for as long as you use the application unless you specifically request that this data be removed from our databases. De-identified data (including location data and overall personal and household demographics, among other data) will be retained indefinitely for research purposes, though personally identifying information (such a names, email addresses, and unique IP addresses) will be destroyed within 3/5 months of the survey completion.

Children's Privacy
Users under the age of 18 may use the FMS Application with the consent of a parent or guardian . If a parent or guardian becomes aware that his or her child has provided us with information without his or her consent, he or she should immediately contact us at Smrbox25@nus.edu.sg. We will delete such information from our files within a reasonable amount of time.

Security
We are concerned about safeguarding the confidentiality of your information. We provide physical, electronic, and procedural safeguards to protect information we process and maintain. For example, access to collected data will be limited to authorized employees and contractors who need access to information in order to operate, develop or improve our Application, or for other research and development purposes. Please be aware that, although we endeavour to provide reasonable security for information we process and maintain, no security system can prevent all potential security breaches.

Changes
This Privacy Policy may be updated from time to time for any reason. We will notify you of any changes to this policy by posting the new policy here: http://mobile.isc.ntu.edu.sg/ and by informing you via the email address you provide upon registration.

Consent
By using the FMS Application, you are consenting to our processing of User Provided and Automatically Collected information as set forth in this Privacy Policy now and as amended by us in the future. "Processing," means using cookies on a computer/hand held device or using or touching information in any way, including, but not limited to, collecting, storing, deleting, using, combining and disclosing information.

Contact
If you have any questions regarding privacy while using the FMS Application, or if you have any questions about our privacy practices, please contact us via email at: smrbox25@nus.edu.sg. Should you feel that your data have been mishandled or used inappropriately, you may also contact us at http://mobile.isc.ntu.edu.sg/.

Declaração de confidencialidade

FUTURE MOBILITY SURVEY >>>

CONFIDENTIALITY STATEMENT

The Smartphone Travel Survey team respects your privacy and promises to protect it. The information your household provides will be kept strictly confidential. Your name and personal information will be separated from your question responses for analysis, and your individual travel data will not be shared with anyone outside of the project team. Your individual travel data will not be shared with anyone outside of the project team unless they have agreed to abide by our privacy policy.

The FMSurvey team

SMART

ANEXO C — Posters

Future Mobility Survey: Análise dos dados

FUTURE MOBILITY SURVEY: Data Analysis

MIT: Moshe Ben-Akiva, Chris Zegras, Maya Abou Zeid and Yunke Xiang
Singapore – SMART: Fang Zhao, Francisco Pereira, Jorge Santos and Devendra Goyal
Singapore - IntelliSys: Yu Xiao and Hock Beng Lim

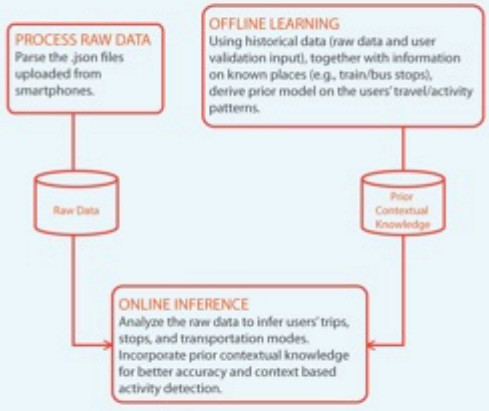
1. OBJECTIVES

The data analysis component in the future mobility survey system processes the data collected from smartphones into the following information:

- Trips people make in their daily lives.
- Stops on each trip, corresponding to transportation mode change, activities such as dining, shopping, etc.
- Transportation mode between stops, such as train, bus, and walking etc.
- Activities performed at each stop.

We develop algorithms for deriving this information from GPS, GSM, accelerometer data from the smartphones, as well as contextual knowledge acquired through offline learning.

2. SYSTEM OVERVIEW



3. PHASE I - IMPLEMENTATION & RESULTS

The first phase of this project (Jan 2011 – Jan 2012) aims at developing a fast prototype of the system. It servers as a bootstrap to test our system structure, and to gather feedback from users through the pilot. In this phase, we have completed the raw data processing part, implemented trace/stop detection algorithms in the online inference part, and tested clustering algorithms in the offline learning part. The offline learning component has yet to be connected with the online inference component.

ONLINE INFERENCE/

Trace creation: Segment raw data into traces that are separated by gaps of at least 1 hour. Use GSM data only if there is no GPS data available.
Stop detection: Detect stops on each trace.

- Step 1: Add stops. Positions within a moving time window are clustered into a stop, if the maximum distance between any two of these positions is smaller than a threshold.
- Step 2: Merge stops based on the interval and distance between stops.
- Step 3: Filter stops based on the context of transport mode.

Transportation mode detection: Extract features such as average speed, maximum speed, and standard deviation of the magnitude of force, etc. from the data points between stops, and use them to determine the transportation mode.

Figure 1. Display of detected traces and stops on the map

OFFLINE LEARNING/

A density based clustering algorithm has been used to extract a user's frequently visited places from his past data (specifically, detected stops). We can then calculate statistics of activities at these places, which can be used in context based activity detection.

Figure 2. Density based clustering successfully captures user's frequently visited places.

4. PHASE 2 - PLAN

Feb 2012 – Apr 2012
Online inference – Modify workflow to enable more sensible trip segmentation based on stop duration. Improve the stop and transportation mode detection algorithms.

May 2012 – Jul 2012
Offline learning – Develop machine learning algorithms to train the system with historical data and the underlying map. Incorporate derived contextual knowledge in online inference.

Aug 2012 – Sept 2012
Extensive testing, system optimization.

5. CONCLUSIONS

- Developed algorithms for trace creation, stop detection and transportation mode identification to support individual user's mobility analysis;
- Basic experiments are conducted, and results proved their first success.
- Next phase of the project focuses on improving inference accuracy and developing the offline learning component.

Acknowledgements
The research described in this project was funded in whole or in part by the Singapore National Research Foundation (NRF) through the Singapore-MIT Alliance for Research and Technology (SMART) Future Urban Mobility (FM) program.

References

Y. Xiao, D. Low, T. Bandara, P. Pathak, H. B. Lim, D. Goyal, J. Santos, C. Cottrill, F. Pereira, C. Zegras, and M. Ben-Akiva, "Transportation Activity Analysis Using Smartphones," to appear in Proc. of the 9th IEEE Consumer Communications and Networking Conference (CCNC 2012), Jan 2012. / Y. Zheng, Y. Chen, Q. Li, X. Xie, and W.-Y. Ma, "Understanding transportation modes based on GPS data for web applications," ACM Transactions on the Web, vol. 4, no. 1, pp. 1–36, Jan 2010.
Martin Ester, Hans-Peter Kriegel, Jörg Sander and Xiaowei Xu, "A density-based algorithm for discovering clusters in large spatial databases with noise", The Second International Conference on Knowledge Discovery and Data Mining (KDD-96), Portland, Oregon, USA, 1996. / Ramaswamy Hariharan and Kentaro Toyama, "Project Lachesis: parsing and modeling location histories", Geographic Information Science, pp 106 – 124, 2004.

Future Mobility Survey: Apresentação do estudo

FUTURE MOBILITY SURVEY
SURVEY DESIGN

MIT: Moshe Ben-Akiva, Chris Zegras and Yunke Xiang
Singapore – SMART: Francisco C. Pereira, Caitlin Cottrill and Maya Abou Zeid
Singapore - IntelliSys: Hock Beng Lim
Portugal - Coimbra: Jorge Santos and Inês Dias

1. OVERVIEW

- Develop an online survey for the smartphone travel survey application that incorporates questions on:
  - Home,
  - Vehicles Available,
  - Shopping,
  - Other members,
  - Transportation and housing preferences.

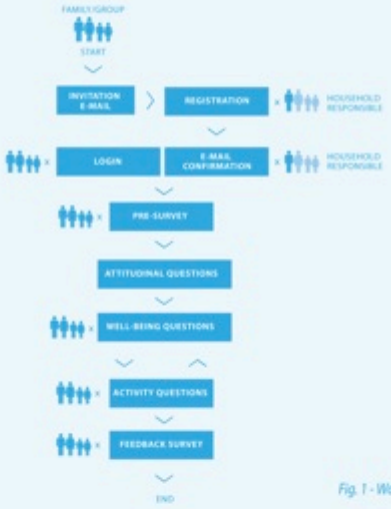


Fig. 1 - Workflow

2. GOALS

- Make the survey **user-friendly**:
  - Easily understood question flow,
  - Simple question language,
  - Not overwhelming in length.
- Make the survey **visually appealing.**
- Use **learning algorithms** to reduce the necessity for user interaction by automatically detecting:
  - Frequent locations,
  - Likely travel mode,
  - Activities.

3. COMPONENT PARTS

The main components of this survey include:

HOUSEHOLD DEMOGRAPHICS/
Information on the household and its members, such as:
- Age,
- Employment,
- Length of housing tenure.

TRANSPORTATION & RESIDENCIAL PREF./
What qualities you look for in the place you live:
- Access to family and friends,
- Access to amenities,
- Commuting preferences.

ACTIVITY DIARY/
Information on your travel, including:
- Where you went,
- How you got there,
- What you did when you got there.

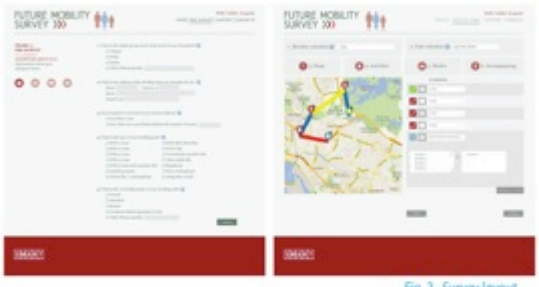


Fig. 2 - Survey layout

4. CURRENT STATUS

- Online survey is in final design stages to be **tested** during pilot implementation in late **January 2012**.
- **Learning algorithms** are being developed to ensure accuracy during pilot test.
- **Scalability** issues are being tested to ensure that no problems will be encountered as the number of users grows.

Future Mobility Survey: Visão Global

SMART

FUTURE URBAN MOBILITY

INTEGRATED ACTIVITY-TRAVEL SMARTPHONE-BASED SURVEY OVERVIEW

MIT: Moshe Ben-Akiva, Chris Zegras, Maya Abou Zeid and Yunke Xiang
Singapore – SMART: Francisco C. Pereira, Caitlin Cottrill, Rui Baltazar, Fang Zhao and Devendra Goyal
Singapore - IntelliSys: Hock Beng Lim, David Low, Yu Xiao, Xiaoming Zhang, Parth Pathak and Thannehene Bandara Asela.
Portugal - Coimbra: Jorge Santos, Inês Dias and Jóni Santos

1. MOTIVATION

- To draw upon **innovations** in communications technologies to enhance travel survey data collection.
- To develop a **non-intrusive** tool that may be widely used by consumers for travel survey purposes.
- To gather data to be used for purposes of transportation modeling in the Simmobility platform and similar projects.

Fig. 1 - Overview

2. BACKGROUND

- Draws upon previous work with MIT, University of Coimbra and IST (Portugal), and EPFL (Switzerland).
- Integrates **recent research on activity-based travel surveys** and use of **GPS/GSM/Accelerometer** technologies for more accurate data collection.
- Addresses survey quality issues, such as trip under-reporting or incorrectly reported times, common in traditional approaches.

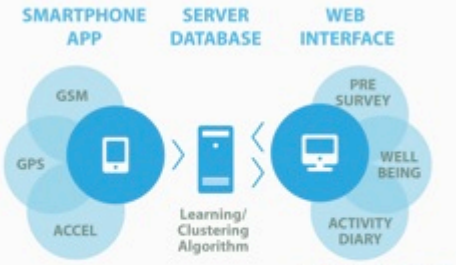


Fig. 2 - Architecture solution

3. GOALS

CONTENT /

- Develop a **non-intrusive application** for Android and iPhone platforms.
- Develop and integrate **learning algorithms** that will be able to identify frequent locations, modes, and activities.
- Evaluate user response to smartphone survey as contrasted with a traditional paper diary.

PROCESS /

- Begin pilot study in late January 2012.
- Integrate with a traditional large-scale household travel survey in 2012.

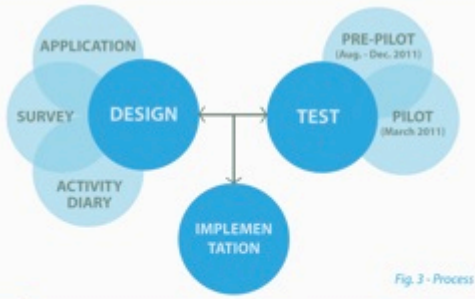


Fig. 3 - Process

4. CURRENT STATUS

CONTENT /

- **Learning algorithms** are in development to accurately identify travel mode based on speed, acceleration, and location.
- **Clustering algorithm** is in development to accurately identify regular activity locations .

PROCESS /

- Pre-pilot study with roughly 20 participants has generated data on: **survey design, application bugs** and **server reliability**.
- Survey interface has undergone extensive revision in terms of form and function, increasing **usability**.

IntelliSys SMART

Future Mobility Survey: Apresentação da estrutura

FUTURE MOBILITY SURVEY SYSTEM DESIGN

MIT: Moshe Ben-Akiva, Chris Zegras, Yunke Xiang and Maya Abou Zeid
Singapore-IntelliSys: Hock Beng Lim, David Low, Yu Xiao, Xiaoming Zhang, Parth Pathak and Thusitha Bandara
Singapore - SMART: Francisco C. Pereira, Caitlin Cottrill, Rui Baltazar and Fang Zhao
Portugal - Coimbra: Jorge Santos, Inês Dias and Jóni Santos

1. OVERVIEW

Web Application:
- Hosts the household survey questionnaire.
- Supports trip validations of survey participants.

Mobile Application:
- Implemented as a background service.
- Collects participants' location and other contextual information.
- Uploads data to the backend server.

Backend Server:
- Supports the web and mobile applications.
- Runs data analysis algorithms, such as stop detection and transportation mode detection.
- Provides backoffice management.

2. SYSTEM

Fig. 1 - Simplified Arquitecture Diagram

3. MOBILE APPLICATION

- Available on Android platforms.
- Implemented as a service to collect sensor data from the smartphone.
- Data collected include location (GPS, WiFi, GSM Cell Triangulation), acceleration, etc.

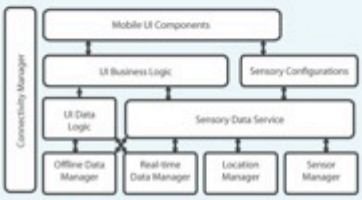


Fig. 2 - Mobile Application Layout Logic

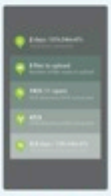


Fig. 3 - Mobile Application Interface

4. WEB APPLICATION

- Simplified user registration with email validation
- Mobile application available online
- User updates/completes the survey questionnaire.
- Update/validate the travel information (trips, stops and activity).

Fig 4 - Web Application: Activity Diary

5. BACKEND SERVER

- Cloud-based backend infrastructure.
- Flexible, scalable and heterogeneous servers.
- Web server, file system server, database server, etc.
- Intelligent, robust and scalable logic layer, integrating machine learning, security, scalability, etc.
- Data logging, data analysis, scalability management, survey, back office, etc.
- Mobile user, administrator and networking interface.
- Friendly and readily interoperable interface.

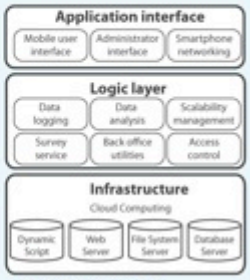


Fig. 5 - Layout structure logic

6. PERFORMANCE & SCALABILITY

- Load testing mechanism using concurrent robot process pool which can simulate the data processing activities associated with thousands of mobile users.
- Scalability tests have been conducted to identify and analyze the performance bottlenecks and memory leaks in the system.

Fig. 6 - Scalability Tests Model Representation

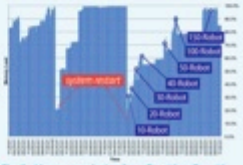


Fig. 7 - Memory evolution from Dec.13 to Dec. 18

7. FUTURE WORK

- Develop iOS5 mobile application.
- External data source integration
- Improve the backend scalability.
- Explore cloud computing backend implementation.
- Improve the stop detection and mode detection algorithms.
- Enhance the system and data security.
- Improve the usability of the web application.
- Collect more types of sensor data.

ANEXO D — Manual de instalação/utilização aplicação móvel (Android)

FUTURE MOBILITY SURVEY ›››

Android User Manual
Last review: April 2012

Welcome!

Welcome to the Future Mobility Survey!
This brief user guide will provide you with information about the android application installation.
Thank you for taking part!

Install the app in your phone

ANDROID INSTALLATION PLAN

Installing apps on Android is relatively straightforward with the Android Market. You search for an app, select it and click install. However, there are often times when you may want to install a newly released app or an app that is not available in the Android Market. In these cases you will usually have to manually download and install an .apk file. An .apk file behaves in a similar manner to an ".exe" file on Windows- you need to copy it to your device and run it.

Option 1: Installing Android App via link

Step 1: Access the link to the app

You can access the app via e-mail.
Please make a request to caitlin@smart.mit.edu or smrbox25@nus.edu.sg.

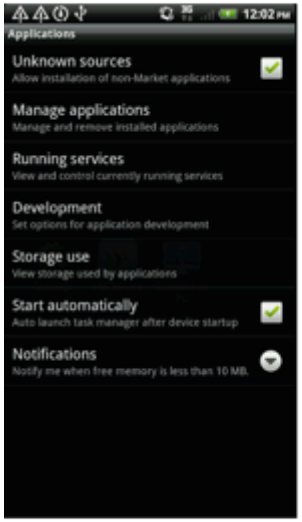
Step 2: Install it.

Step 3: Enjoy it!

Option 2: Installing Android App via File Manager

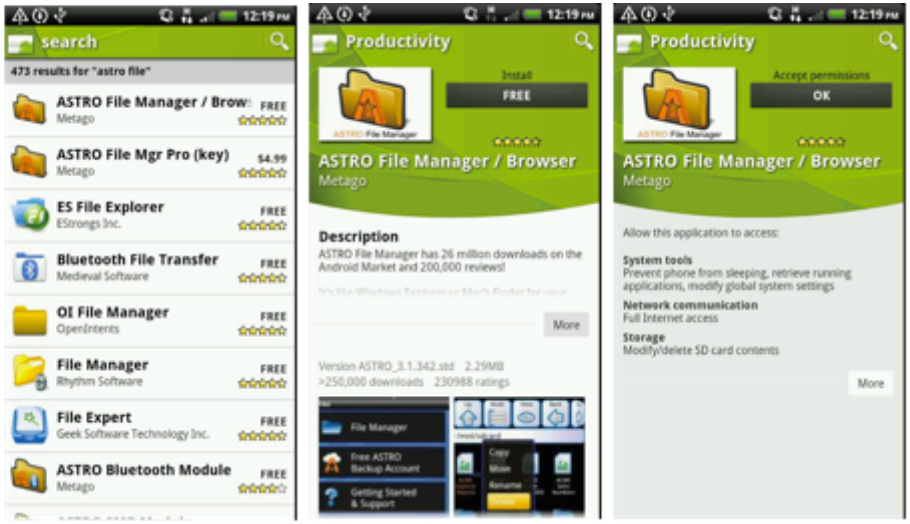
Step 1: Enable unknown sources

Before attempting a manual installation of apps using the .apk files, you must first allow your phone to install from “Unknown Sources” (i.e. non-Market apps). To do this, navigate to Menu > Settings > Applications and check the box marked “Unknown Sources“.



Step 2: Install file manager

Android does not come pre-installed with any method of browsing data on an SD card, so you will need to install a file manager from a market. There are a large variety of file managers available on Android, for example **ASTRO File Manager**.



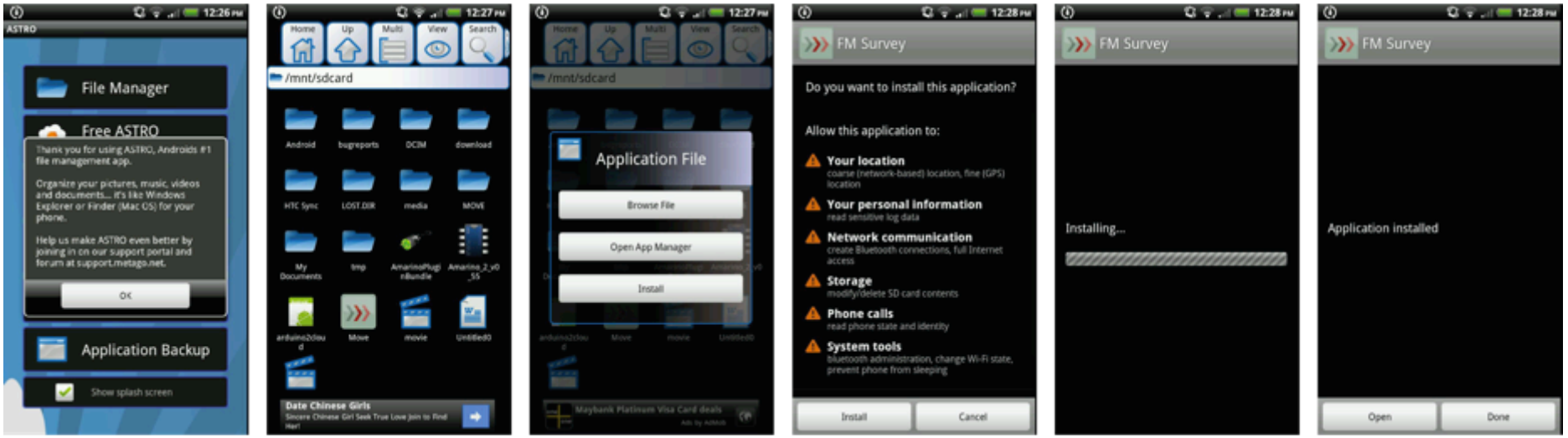
Step 3: Copy .apk file to SD card

Once you have ASTRO File Manager installed, connect your Android device to your computer using your USB cable. Mount the SD card and copy over the .apk file you would like to install (If you have downloaded the .apk already please skip this step).

Step 4: Install the .apk file

On your Android device, navigate to the .apk file using ASTRO File Manager and select it. This will open a dialog box allowing you to install the app. Select “Open App Manager“. On the next two pages, select “Install” and “Install” again to install the .apk. Your new app is now installed!

Step 5: Enjoy it!

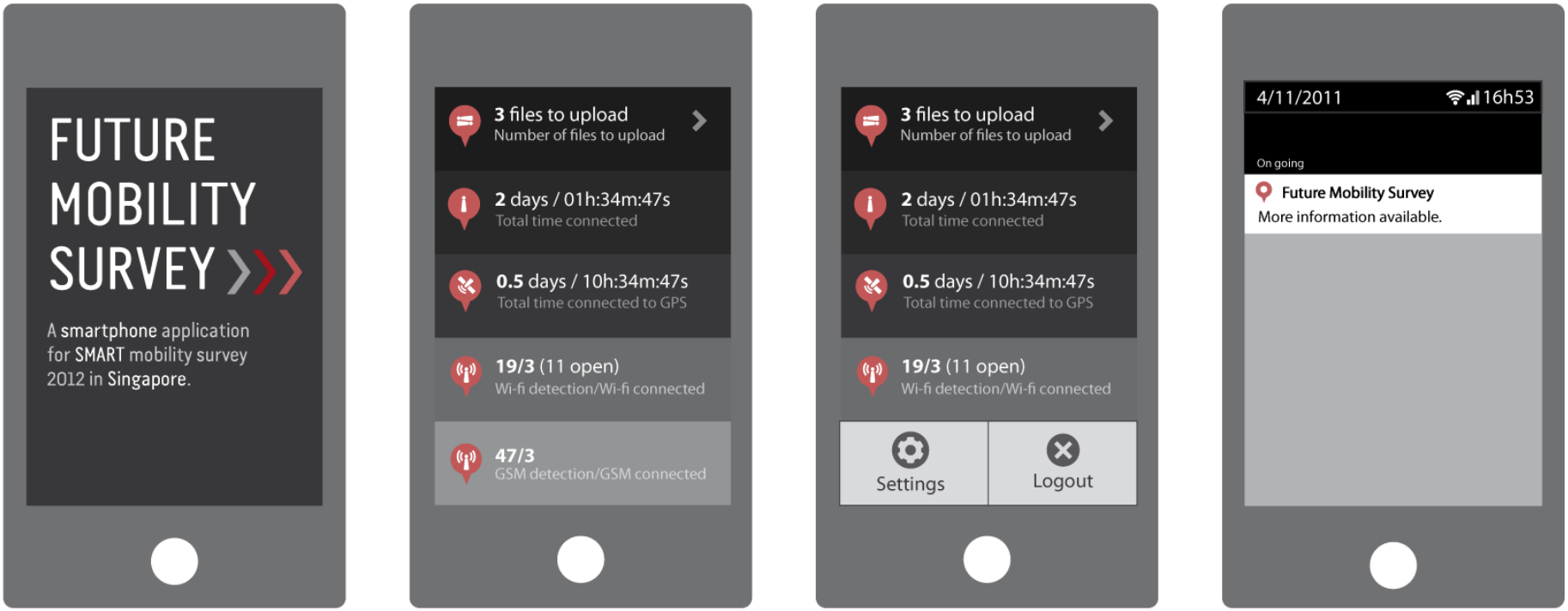


ANDROID APPLICATION

The Future Mobility survey is a non-intrusive application that is used to record your **location data**.

Access to some of the information collected, for example, the amount of data collected and the total time the app and GPS have been running. In addition, you have some options regarding battery and memory preferences.

You may receive a notification from the app if internet connection is lost and/or the GPS is turned off. We need both of these technologies to gather accurate information about your location.



Support and Contacts

SUPPORT

If you have any issues regarding the web or mobile application please contact us from the support menu.

CONTACTS

For other issues, you may contact us via the "Contacts" menu. We want to hear from you!

Please contact the Principal Investigator, Professor Moshe Ben-Akiva or Attn: Caitlin Cottrill at (+65) 6601-1634 or caitlin@smart.mit.edu for all research-related matters.

For an independent opinion regarding the research and the rights of research participants, you may contact a staff member of the relevant Institutional Review Board (IRB) as follows:
— If you are a student, faculty or staff member of the National University of Singapore (NUS), please contact Mr. Chan Tuck Wai, at telephone (+65) 6516-1234 or email at irb@nus.edu.sg
— If you are are a student, faculty or staff member of the Nanyang Technological University (NTU), please contact Ms. Germaine Foo, at telephone (+65) 6592-2495 or email at irb@ntu.edu.sg
— If you are affiliated with neither NUS or NTU, please contact Massachusetts Institute of Technology's (MITs) Committee on the Use of Humans as Experimental Subjects (COUHES) at Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone +1-617-253 6787.

Privacy Policy

The Smartphone Travel Survey team respects your privacy and promises to protect it. The information your household provides will be kept strictly confidential.

Your name and personal information will be separated from your question responses for analysis, and your individual travel data will not be shared with anyone outside of the project team unless they have agreed to abide by our privacy policies. Only aggregated data will be shown for presentation purposes or in research documents.

Glossary

ACCELEROMETER / A device that measures proper acceleration and is incorporated in smartphones. It is used to help validate if the owner of the phone is moving.

ACTIVITY DIARY / The most important phase of the survey; where users are invited to validate the tracks, stops and activities registered by the mobile application.

ANDROID / An operating system for mobile devices such as smartphones and tablet computers. It is developed by the Open Handset Alliance led by Google

FEEDBACK SURVEY / The last step of the survey; where users are invited to share their opinion about the Future Mobility Survey.

GPS / The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites.

GSM / The GSM (Global System for Mobile Communications, originally *Groupe Spécial Mobile*), is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe technologies for second generation (or "2G") digital cellular networks.

HOUSEHOLD RESPONSIBLE / The HHR is responsible for registering the group/family and answering the first phase of the FMSurvey.

MOBILE APPLICATION / The FM Survey is comprised of a web survey and mobile application. In order to be able to participate in the survey, a mobile application is used to register tracks and stop points that you will validate in the activity diary.

MOBILITY MODELS / A model that represents the movement of mobile users, and how their location, velocity and acceleration change over time. Such models are frequently used for simulation purposes when new communication or navigation techniques are investigated.

PRE-SURVEY / The first phase of the FMSurvey. It is the responsibility of the Household Responsible and the main goal is to register information about the group.

SMARTPHONE / A device that lets you make telephone calls, but also adds in features that, in the past, would have been found only on a personal digital assistant or a computer-such as the ability to send and receive e-mail.

WEB SURVEY / The FM Survey is comprised of a web survey and mobile application. The main goal of the web survey is to present users with information registered by the mobile application in order for it to be validated. The information will be used to construct a mobility model in order to improve several aspects of your city.

WI-FI / A mechanism for wirelessly connecting electronic devices. A device enabled with Wi-Fi, such as a personal computer, video game console, smartphone, or digital audio player, can connect to the Internet via a wireless network access point.

ANEXO E — Manual de instalação/utilização aplicação móvel (iPhone)

FUTURE MOBILITY SURVEY

iPhone User Manual
Last review: April 2012

Welcome!

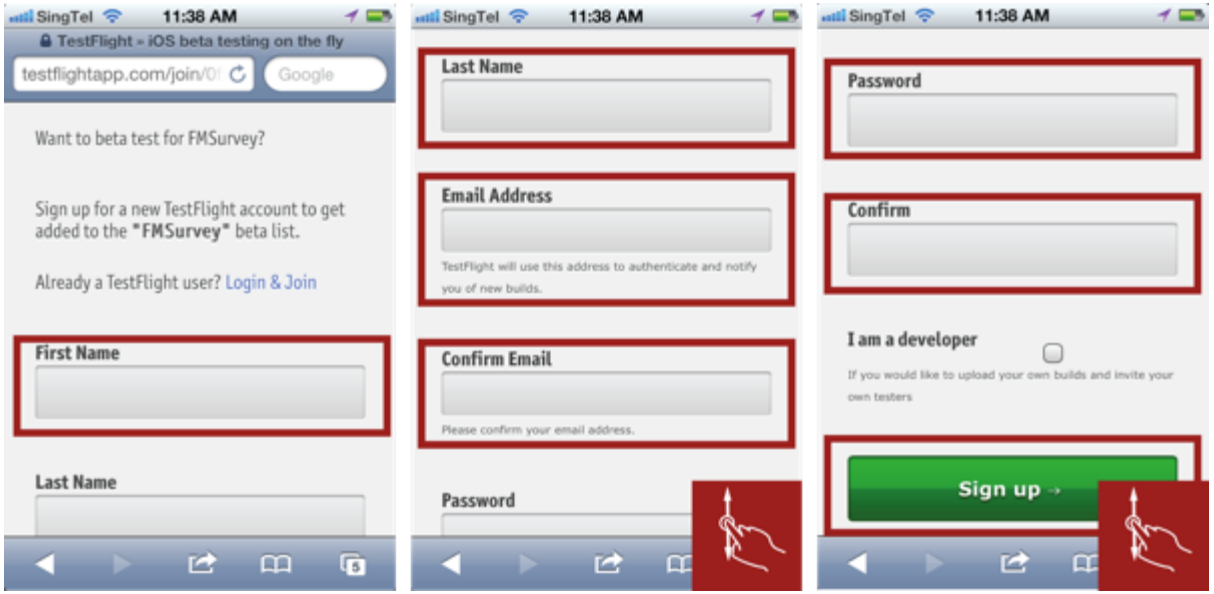
Welcome to the Future Mobility Survey!
This brief user guide will provide you with information about the iphone application installation.
Thank you for taking part!

Install the app in your phone

iPHONE INSTALLATION PLAN
Testflight is an iOS application used for testing applications
before going through the process of applying to the App Store.

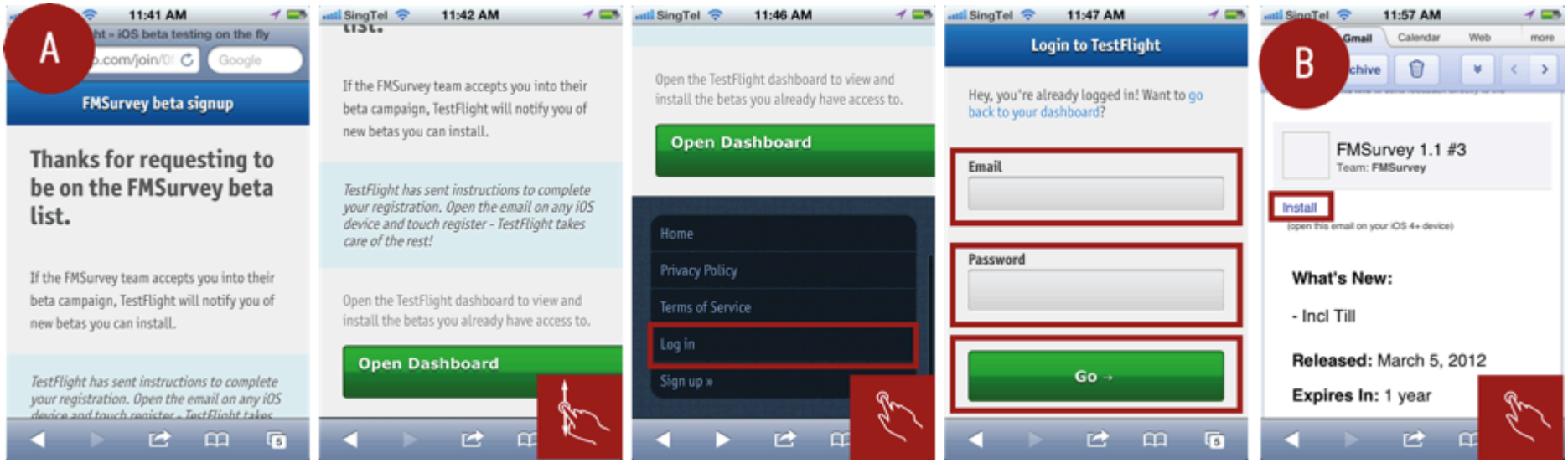
Step 1: Acess to the Testflight
Open the following link on your iPhone browser: http://bit.ly/wFrUWo

Step 2: Registration
Register as a Testflight beta tester by filling out the form on your iPhone.
Please insert your first name, last name, e-mail and password and press
"Sign in".



Step 3: Login

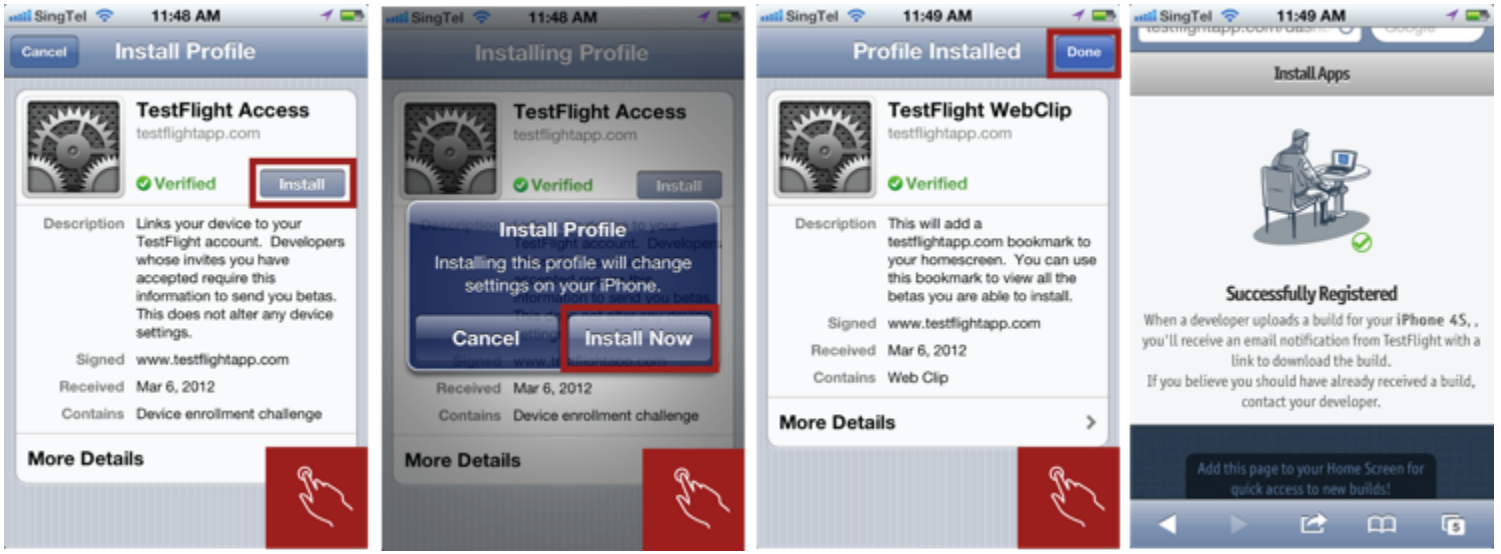
After registering, login via your iPhone from the current screen (A) or via the e-mail that you will receive from Testflight (B).



Step 4: Device registration

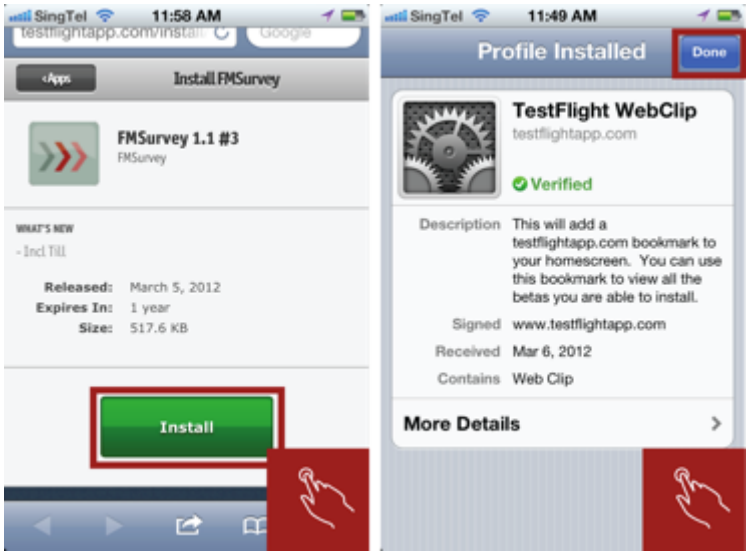
After you login successfully you need to register your device in order to have access to the application to be tested.
You will be asked for authorization → Click “Install” and then “Install now”. (This can take a while…).

When “Profile Installed” comes up, click “Done”.
This click brings you to a screen that says successfully registered.



Step 5: Confirmation message

Once our developer has added you, you will receive an email letting you know that you're successfully enrolled in the system and asking you to open the "install" URL on your iPhone. Open the URL, press install and then install again.



Step 6: Enjoy it!

Congratulations! Now you're set to help us test and improve the application.

iPHONE APPLICATION

The Future Mobility survey is a non-intrusive application that is used to record your **location data**.
You will have access to some of the information collected, for example, the amount of data collected and the total time the app and GPS have been running. In addition, you have some options regarding battery and memory preferences.

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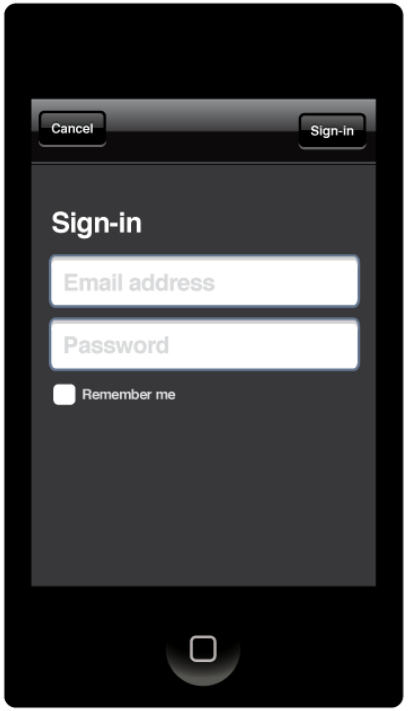

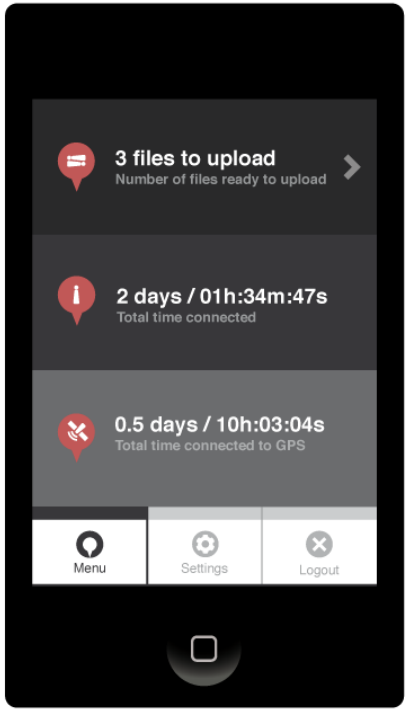

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WI-FI / A mechanism for wirelessly connecting electronic devices. A device enabled with Wi-Fi, such as a personal computer, video game console, smartphone, or digital audio player, can connect to the Internet via a wireless network access point.

ANEXO F — Manual de utilização aplicação web

FUTURE MOBILITY SURVEY

Survey User Manual
Last review: May 2012

Welcome!

Welcome to the Future Mobility Survey!
This brief user guide will provide you with information about each step of the survey.
Thank you for taking part!

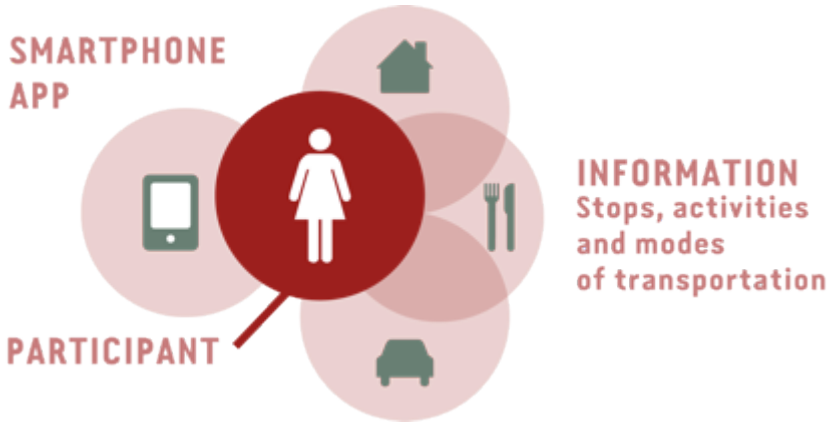
Introduction

WHAT IS IT ALL ABOUT?

The Future Urban Mobility Group at the Singapore-MIT Alliance for Research and Technology (SMART-FM) is soliciting volunteers to participate in a pilot test of a research study about travel and activity patterns.

THE MAIN GOAL

The objective is to better understand people's travel patterns in Singapore in order to improve the provision of transportation services in the future and increase environmental sustainability.



WHO CAN PARTICIPATE?

Anyone can participate!

We're particularly interested in groups and families that live in the same house/apartment; however, any size household may participate - from one to one hundred! A Household Responsible (HHR) and any remaining household members constitute a group. The HHR is responsible for registering the group, answering the Pre-survey and setting up the activity diaries of household members who are under 18 (and are not allowed by the HHR) or are otherwise unable to input their information. We're asking all household members over the age of 12 to take part; however, it's fine if only one or some members wish to participate.

The big picture

INFORMATION NEEDED

The planning and implementation of transport improvements require many inputs, including:

Where people are going,
How they got there,
When they got there, and
With whom they travelled.

DATA REGISTRATION

In the Future Mobility Survey, we use smartphone sensors and your input to gather this data to support activities that will help Singapore better prepare for future transport needs, including roadway and transit improvements.

WHAT DO WE NEED FROM YOUR PARTICIPATION?

What we need from you to make this a reality is your participation in the Future Mobility Survey. We will ask you, first, to register yourself and other members of your household. Next, you will be asked to download and install the smartphone mobile application, which will log your daily travels and activity stops and upload them to our secure server. You can then log onto the website and validate your traces and activities.

PRIVACY STATEMENT

We respect your privacy, and will only use your data for planning and research purposes.

Register your self

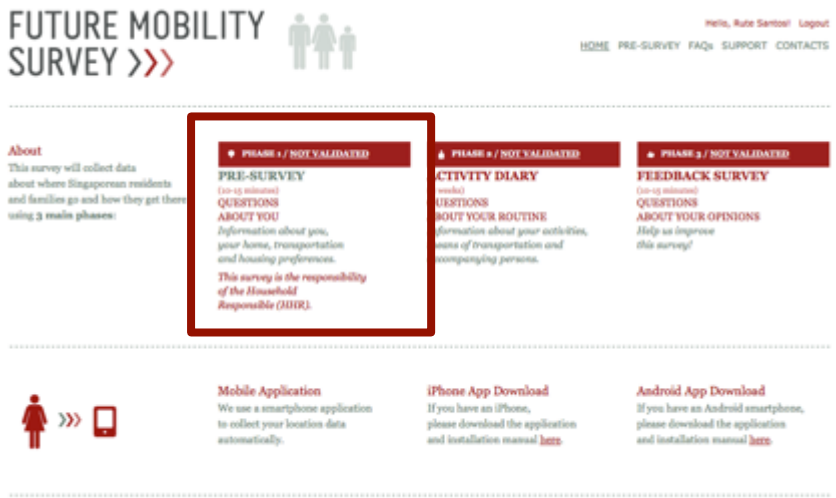
REGISTRATION PHASE (15 minutes)
The first step towards participation in the FMSurvey is for the head of your household (or the HHR) to register at [http://mobile.isc.ntu.edu.sg/].

Once this step has been completed, all registered members (including the HHR) will receive a confirmation e-mail with the smartphone application and user guide.

Fill out the Pre-Survey

PRE-SURVEY (10-15 minutes)
After you have received and validated your registration via e-mail, you can login at **http://mobile.isc.ntu.edu.sg/**.

If your credentials are correct you will be re-directed to the survey welcome page.



If you are a HHR, your menu will include the Pre-survey option;
otherwise you will be given the Activity-Diary option.
HHRs will have information about all household members on the top menu.

The Pre-survey is the **responsibility of the HHR** and aims to collect information about you, your home and transportation and housing preferences. It consists of 4 main groups of questions.

Install the app in your phone

Do you have an **iPhone**?
Go to section **10**.

Do you have an **Android**?
Go to section **15**.

iPHONE INSTALLATION PLAN

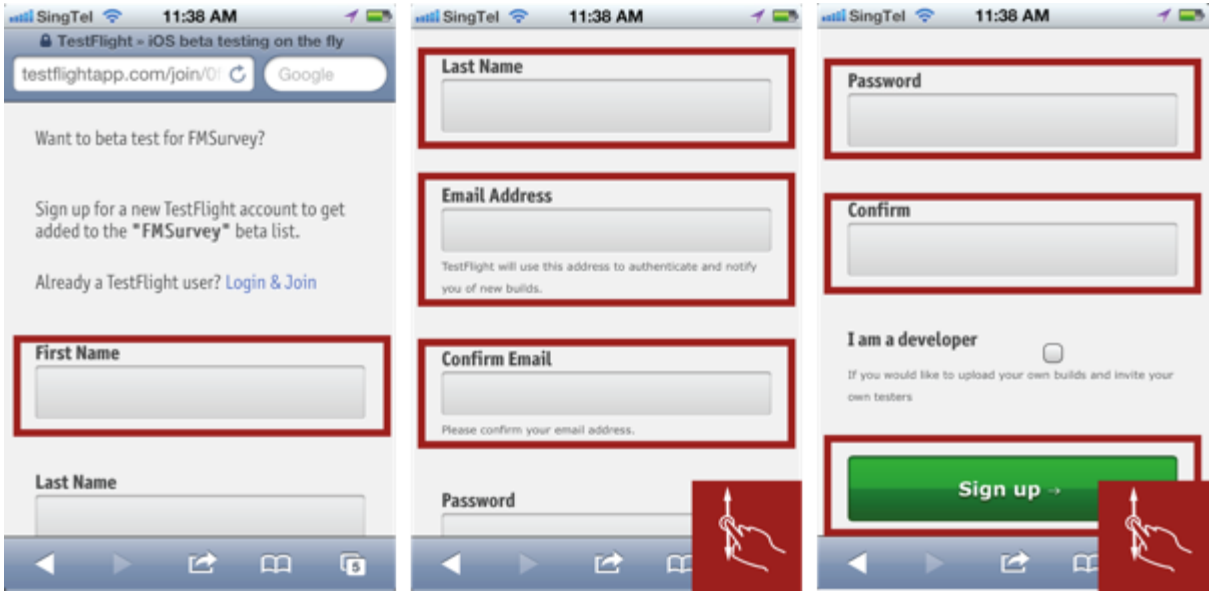
Testflight is an iOS application used for testing applications before going through the process of applying to the App Store.

Step 1: Acess to the Testflight

Open the following link on your iPhone browser: http://bit.ly/wFrUWo

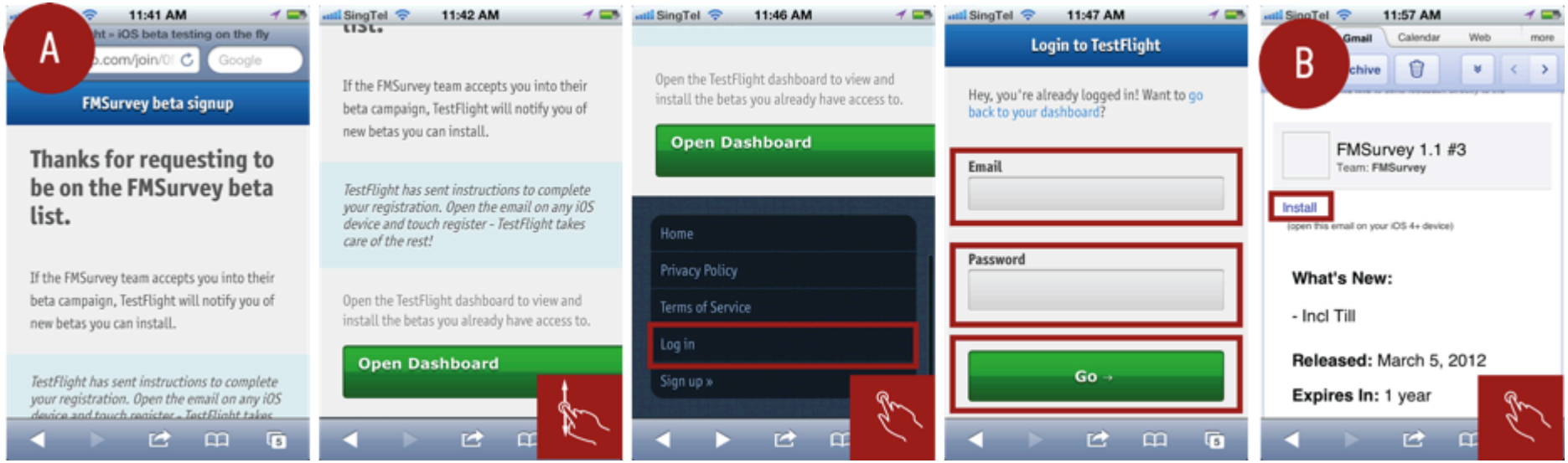
Step 2: Registration

Register as a Testflight beta tester by filling out the form on your iPhone. Please insert your first name, last name, e-mail and password and press "Sign in".



Step 3: Login

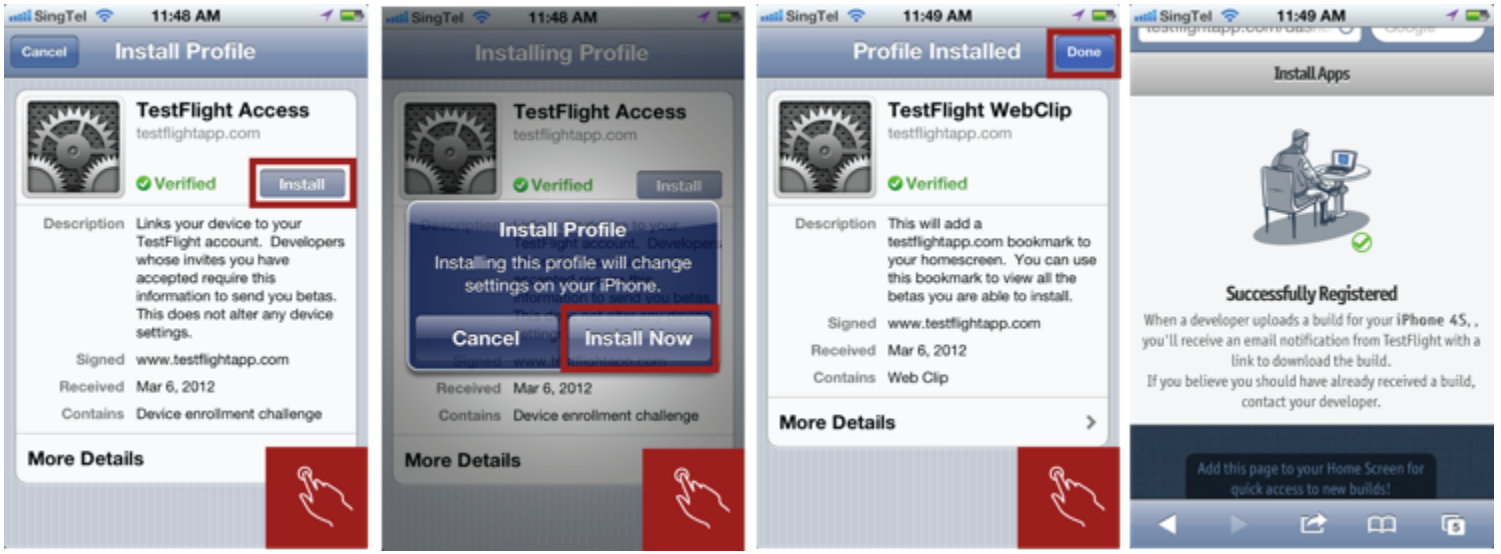
After registering, login via your iPhone from the current screen (A) or via the e-mail that you will receive from Testflight (B).



Step 4: Device registration

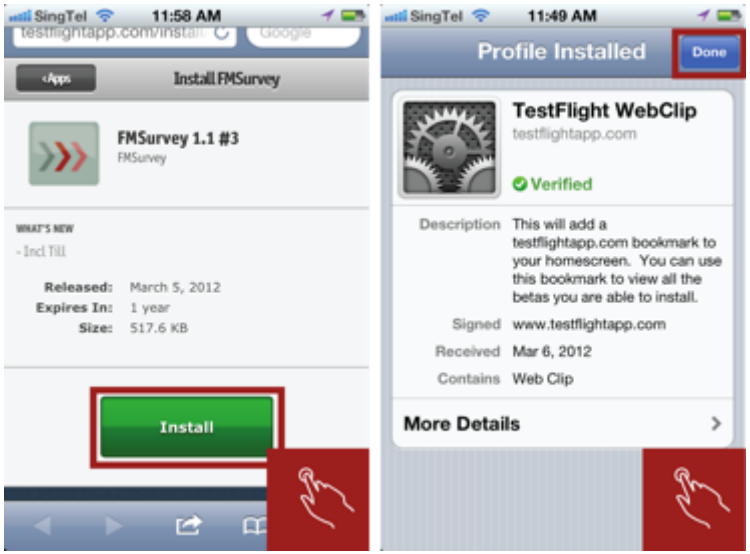
After you login successfully you need to register your device in order to have access to the application to be tested.
You will be asked for authorization → Click “Install” and then “Install now”. (This can take a while…).

When “Profile Installed” comes up, click “Done”.
This click brings you to a screen that says successfully registered.



Step 5: Confirmation message

Once our developer has added you, you will receive an email letting you know that you're successfully enrolled in the system and asking you to open the "install" URL on your iPhone. Open the URL, press install and then install again.



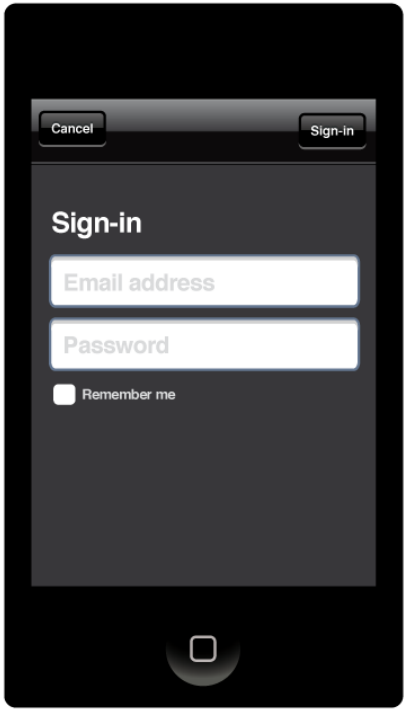
Step 6: Enjoy it!

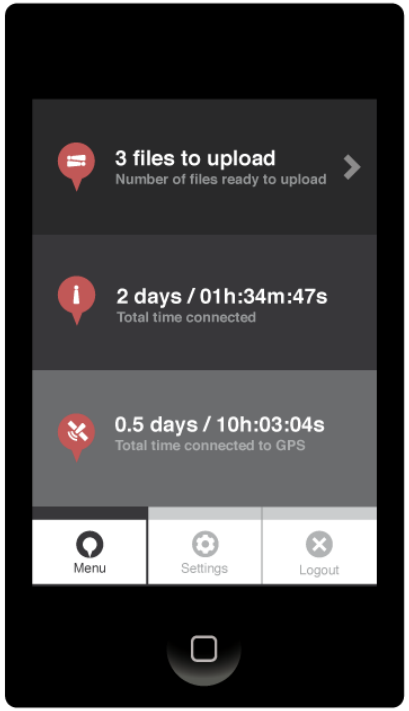
Congratulations! Now you're set to help us test and improve the application.

iPHONE APPLICATION

The Future Mobility survey is a non-intrusive application that is used to record your **location data**.
You will have access to some of the information collected, for example, the amount of data collected and the total time the app and GPS have been running. In addition, you have some options regarding battery and memory preferences.

You may receive a **notification** from the app **if internet connection** is lost and/or the **GPS is turned off**. We need both of these technologies to gather accurate information about your location.





ANDROID INSTALLATION PLAN

Installing apps on Android is relatively straightforward with the Android Market. You search for an app, select it and click install. However, there are often times when you may want to install a newly released app or an app that is not available in the Android Market. In these cases you will usually have to manually download and install an .apk file. An .apk file behaves in a similar manner to an ".exe" file on Windows- you need to copy it to your device and run it.

Option 1: Installing Android App via link

Step 1: Access the link to the app

You can access the app via e-mail.
Please make a request to caitlin@smart.mit.edu or smrbox25@nus.edu.sg.

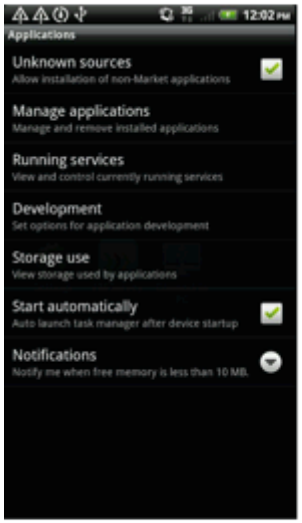
Step 2: Install it.

Step 3: Enjoy it!

Option 2: Installing Android App via File Manager

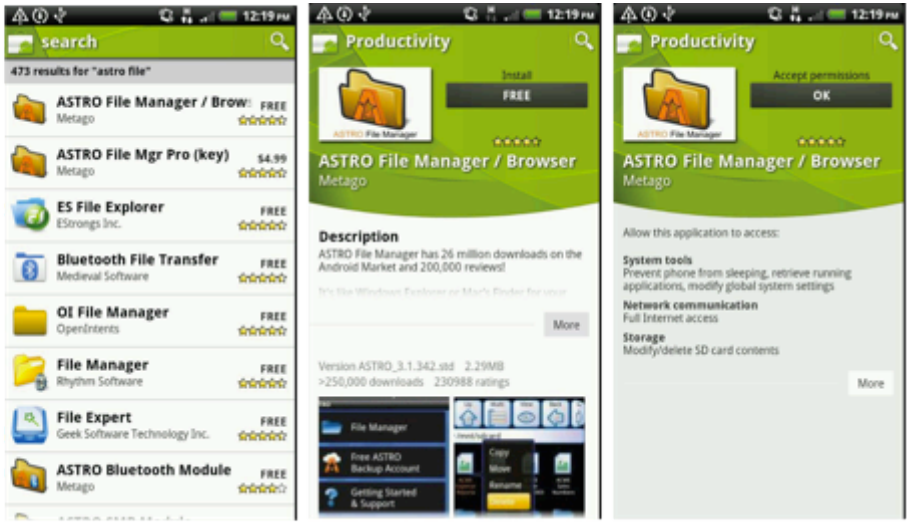
Step 1: Enable unknown sources

Before attempting a manual installation of apps using the .apk files, you must first allow your phone to install from “Unknown Sources” (i.e. non-Market apps). To do this, navigate to Menu > Settings > Applications and check the box marked “Unknown Sources“.



Step 2: Install file manager

Android does not come pre-installed with any method of browsing data on an SD card, so you will need to install a file manager from a market. There are a large variety of file managers available on Android, for example ASTRO File Manager.



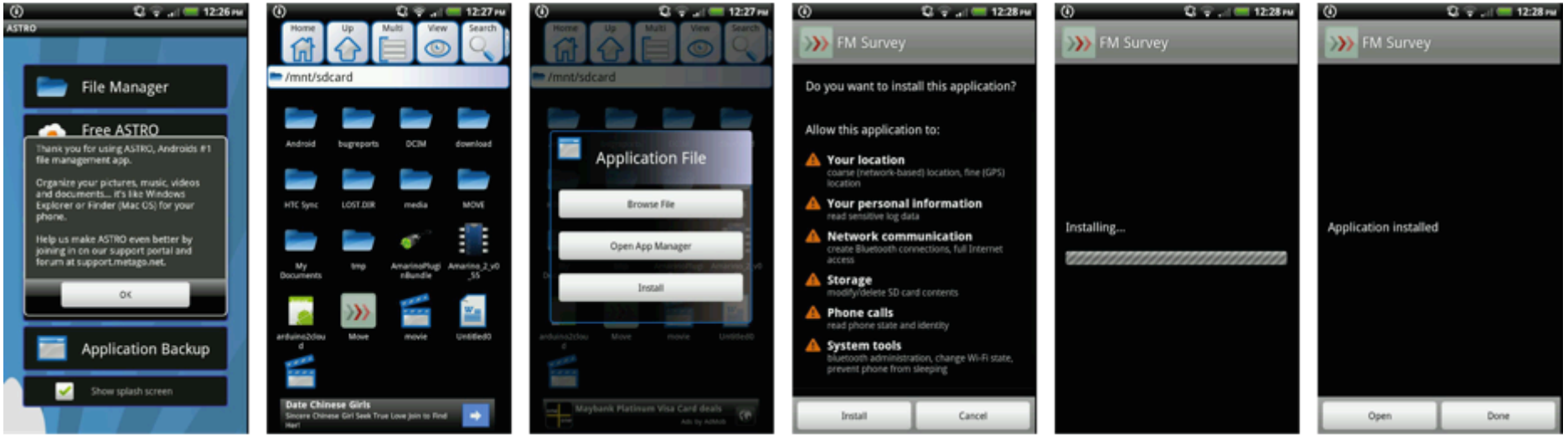
Step 3: Copy .apk file to SD card

Once you have ASTRO File Manager installed, connect your Android device to your computer using your USB cable. Mount the SD card and copy over the .apk file you would like to install (If you have downloaded the .apk already please skip this step).

Step 4: Install the .apk file

On your Android device, navigate to the .apk file using ASTRO File Manager and select it. This will open a dialog box allowing you to install the app. Select “Open App Manager“. On the next two pages, select “Install” and “Install” again to install the .apk. Your new app is now installed!

Step 5: Enjoy it!



ANDROID APPLICATION

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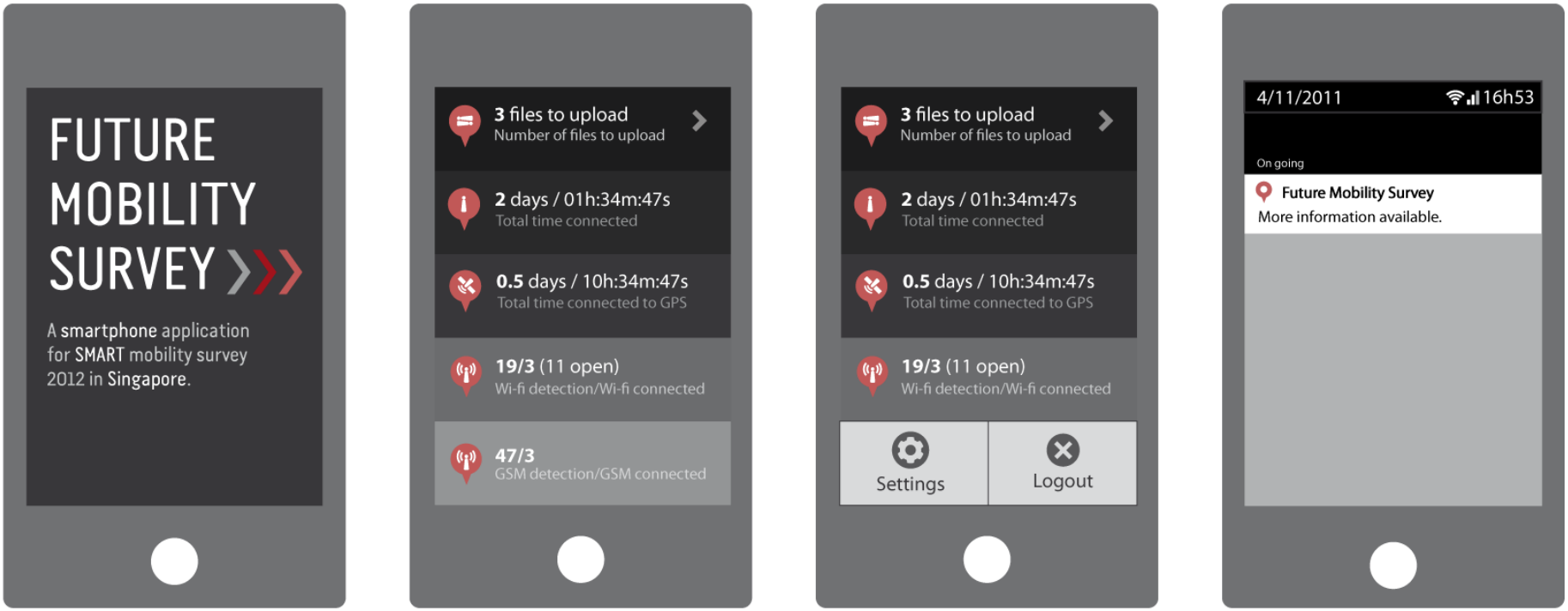
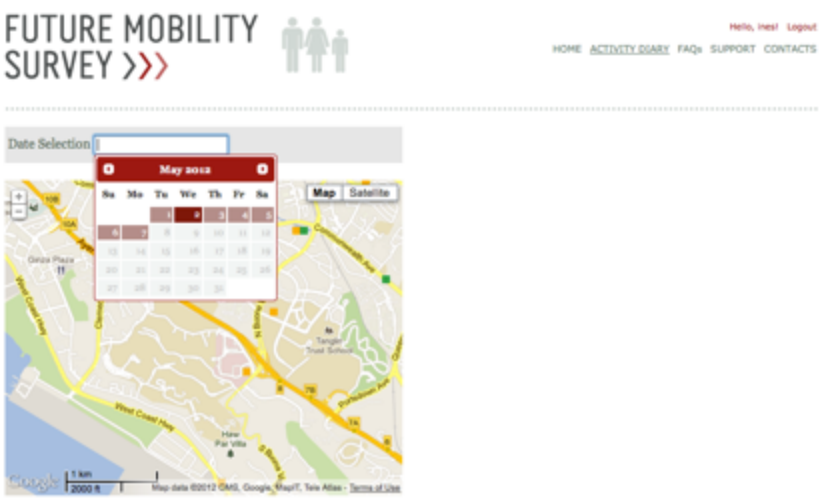


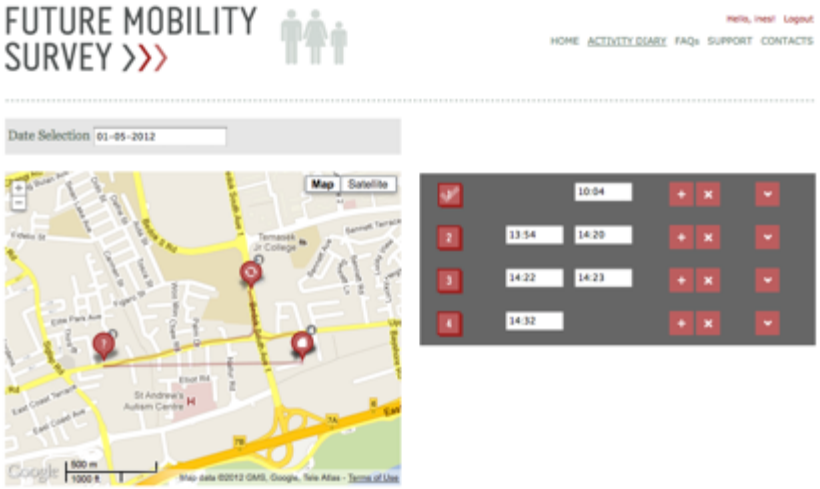
Validate your data in the Activity Diary

VALIDATION PHASE (15 DAYS)

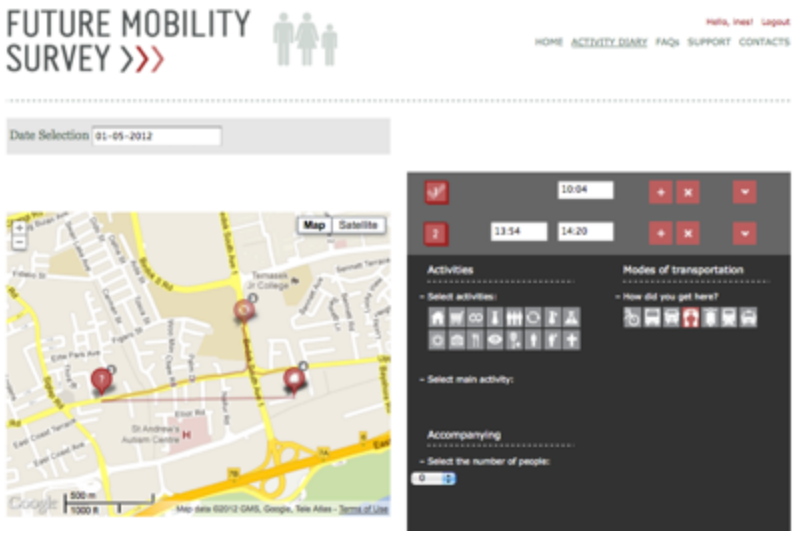
Here, you will first be prompted to select the date of travel for the trip you are validating.



Once a valid travel date has been selected, you will be presented with a map showing activity locations and travel paths based on data collected from your mobile application.



For each activity, you will be asked to provide data related to the activity to which you travelled (work, school, shopping, home, etc.), your method of travel (bus, MRT, private car, taxi, etc.), and who travelled with you.
We will ask you to repeat this process for all activities for the day of travel being validated.



Should the map show stops that are incorrect, or indicate the wrong location, you may delete or correct the incorrect stops.
Should an activity in which you have participated not be recorded on the phone, you may enter the details to the best of your ability. Should you prefer that an activity remain private, you may switch off the application or delete the stop. It is our goal to ensure that the application is as unobtrusive and easy-to-use as possible.

Give us some Feedback!

FEEDBACK PHASE (15 minutes)
The final step of the process is the feedback survey, where we will ask you and your household members to let us know your opinions about this survey.

Although your participation is formally over, your account will continue to be available for you to validate information about your trips in the activity diary.

Support and Contacts

SUPPORT

If you have any issues regarding the web or mobile application please contact us from the support menu.

CONTACTS

For other issues, you may contact us via the "Contacts" menu. We want to hear from you!

Please contact the Principal Investigator, Professor Moshe Ben-Akiva or Attn: Caitlin Cottrill at (+65) 6601-1634 or caitlin@smart.mit.edu for all research-related matters.

For an independent opinion regarding the research and the rights of research participants, you may contact a staff member of the relevant Institutional Review Board (IRB) as follows:

— If you are a student, faculty or staff member of the National University of Singapore (NUS), please contact Mr. Chan Tuck Wai, at telephone (+65) 6516-1234 or email at irb@nus.edu.sg

— If you are are a student, faculty or staff member of the Nanyang Technological University (NTU), please contact Ms. Germaine Foo, at telephone (+65) 6592-2495 or email at irb@ntu.edu.sg

— If you are affiliated with neither NUS or NTU, please contact Massachusetts Institute of Technology's (MITs) Committee on the Use of Humans as Experimental Subjects (COUHES) at Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone +1-617-253 6787.

Privacy Policy

The Smartphone Travel Survey team respects your privacy and promises to protect it. The information your household provides will be kept strictly confidential.

Your name and personal information will be separated from your question responses for analysis, and your individual travel data will not be shared with anyone outside of the project team unless they have agreed to abide by our privacy policies. Only aggregated data will be shown for presentation purposes or in research documents.

ANEXO G — Plano de testes

Part 1: Welcome and Purpose

Thank you for agreeing to participate in this website evaluation. Today we are asking you to serve as an evaluator of this website and to complete a set of tasks. Our goal is to see how easy or difficult you find the website to use. We will record your reactions and opinions; so, we may ask you to clarify statements that you make from time to time.

— Things to Keep in Mind

Here are some things that you should know about your participation:
We are not testing you; you're testing the website. So don't worry about making mistakes. There is no right or wrong answer. We really just want to know if we designed the website well for you. If you ever feel that you are lost or cannot complete a scenario with the information that you have been given, please let us know.

— Methodology: Think-Aloud Protocol

In a think-aloud protocol, study subjects are asked to narrate their experiences and thought processes while they execute a given task. Researchers will record this narration, noting in particular their "interaction path" with the application and website, their specific questions, and any confusion or surprise that is expressed. In addition, researchers will make note of body language, and how it corresponds with the subject's verbalized experience.
The test facilitator(s) will have a set of instructions that will be used to guide him or her through the process of interviewing the subject. Questions included in this protocol will be open-ended and non-leading questions in order to encourage the participant to share openly his or her experiences in interacting with the application. The facilitator(s) will also be responsible for taking notes on the subject's interaction.

— Test plan

The next page will present a series of tasks with the objective of website evaluation. After task completion, you will be presented with a questionnaire regarding the tasks.
Do you have any questions before we begin?

Part 2: Tasks and questionnaires

Preparation
Please access to your preferred browser and go to the website http://mobile.isc.ntu.edu.sg/.

— Task 1: Look&Feel
Validation goal
To validate if the contents showned are clear and the user understand the main goal of this survey.

Task description
Please freely explore the website, by accessing all the available options. Please don´t forget to express your opinion, difficulties, positive and negative feedback. Don´t take up more than 5 minutes of your time. Were you able to know what was this all about?

Questionnaire 1

1. The organization of information presented was clear.
2. Understanding the menu structure was difficult.
3. The website had an actual look&feel.
4. Website navigation was pleasant.
5. I perfectly understood the purpose of the website.

—Task 2: Login + Pre-survey
Validation goal
To validate if the contents of the questions are clear and if the user is able to aswers them in a efficient manner.

Task description
As a volunteer you are suppose to register your self and your group for the survey.

Questionnaire 2

1. It was easy to find the option to register my household.
2. I was not made clearly aware when I had completed this portion of the survey.
3. Overall, the questions presented were clear.
4. Overall, there were not sufficient answer options available for all questions.
5. Overall, the questions presented were relevant.
6. Overall, the questions presented were not too intrusive.
7. The next phase of the survey was not clear to me.
8. The questionnaire is too long.
9. The system provides error messages that clearly indicate how to fix problems.

— Task 3: Activity-diary

Validation goal

To validate if the user is able to add/delete stops, to identify the activities, accompanyning and modes of transportation in an efficient way.

Task description 3.1

Imagine that you have the smartphone application installed on your Smarphone and that has registered your location for the last few days. We now ask you to validate the data. Please assign/validate at least five different activities.

Task description 3.2

Once you have completed the previous task, please validate one of the days available in the calendar. Feel free to associate any stop points, activities, accompanying and modes of transportation. Please, let us know when you started the task and when you have finished it.

Questionnaire 3

1. It was difficult to understand how to begin the validation process.
2. It was easy to choose a calendar date.
3. It was difficult to differentiate the status of different dates on the calendar.
4. The list of activities match the information present on the map.
5. The options/question items were well organized and functions (such as add/delete stop) were easy to find.
6. It was difficult to add new activities to the activity diary.
7. The map complements the information.
8. The activity distinction was not clear to in the map.
9. It was easy to add/change modes of transportation that had been assigned to my activities.
10. I felt that I would need more time to learn how to use the system in an efficient manner.
11. I immediately understood the function of each option.
12. The presented information was not very effective in helping me complete the tasks.
13. Whenever I made a mistake using the system, I was able to recover easily and quickly.
14. The buttons were not well organized or easy to find.
15. I felt that I could effectively complete my tasks using this system.
16. The system provides error messages that clearly indicate how to fix problems.
17. I was clearly informed when I had finished the process of validating my activities for a day.
18. I feel comfortable using this system.
19. The feedback messages were clear.

— Task 4: Support

Validation goal

Use the Support option.

Task description

Imagine that while you were validating your daily activities or using the application on the Smarphone, some problem occurred. Please, report to the projet team what was wrong.

Questionnaire 4

1. The organization of information on the system screens was clear.
2. Understanding the menu structure was difficult.
3. The website has a look and feel that emphasizes the credibility of the project.
4. Website navigation was pleasant.
5. I perfectly understood the purpose of the website.
6. The website looks credible.

— Task 5: Final questions

Questionnaire 5 – Final questions about the website

1. This website seems reliable.
2. This website is visually appealing.
3. Overall, I am satisfied with this system.
4. What did you like the most about the website? (open question)
5. What did you like the least about the website? (open question)
6. Do you have any other final comments or questions? (open question)

— Task 6: Final questions

Questionnaire 6 – SUS

1. I think that I would like to use this website frequently.
2. I found the website unnecessarily complex.
3. I thought the website was easy to use.
4. I think that I would need the support of a technical person to be able to use this website.
5. I found the various functions in this website were well integrated.
6. I thought there was too much inconsistency in this website.
7. I would imagine that most people would learn to use this website very quickly.
8. I found the website very cumbersome to use.
9. I felt very confident using the website.
10. I needed to learn a lot of things before I could get going with this website.

Questionnaire 8 — Questions about the user

Gender:

[ ] Female] Male

For classification purposes, which age category do you fall into?

[ ] <18 [ ] 18-30 [ ] 31-40 [ ] 41-59 [ ] 60-74 [ ] >75

What´s you nationality?

_____

Are you an English native speaker? [ ] Yes [ ] No

If you answered No, please identify your level of English: [ ] Elementary [ ] Lower Intermediate [ ] Upper Intermediate [ ] Lower Advanced [ ] Upper Advanced

What is the highest level of education that you have completed?

[ ] High school or less [ ] College [ ] Bachelor's degree [ ] Graduate degree

In a week, how much time do you spend using a computer?

[ ] Less than 1 hour a week [ ] 1-3 hours a week [ ] 4-15 hours a week [ ] More than 15 hours a week

In a week, how many times do you conduct searches using the web?

[ ] Less than once a week [ ] 2-9 times a week [ ] 10-20 times a week [ ] More than 20 times a week

What computer platform do you usually use?

[ ] Mac [ ] Windows [ ] Linux

What Internet browser(s) do you usually use?

[ ] Internet Explorer [ ] Firefox [ ] Safari [ ]Other. Which one?_____

What is your educational area?

_____

Your feedback will be used to improve our website, to collect better data about mobility. Thank you for your participation!