Global Future Cities Programme

Iskandar Malaysia & Melaka

Capacity Building Workshop – ArcGIS Knowledge Sharing

3 March 2021

Workshop Objectives

An introduction to data sharing to enable evidence based urban and transport planning.

1. Review the data we presently use
2. Examine the challenges of using these data to achieve this objective
3. Look at data collection to improve and enhance data sets
4. Consider collaborative approaches to data sharing and use

Agenda

1. Introduction
2. Existing Data available in IM and Melaka Database
3. Basic urban planning data
4. Basic transport planning data
5. Cross function analyses
6. Data Collaboration
7. Data Visualization & Analysis Platform
8. Discussion and Q&A

Introduction

Introduction

- Introduction to the available data available in IM and Melaka in the form of GIS
- Methods and platforms for data collection used
- Initiatives in the data collaboration platform between Mott MacDonald, IRDA, and Local Authority
- Standard used & Dataset Library
- Data Visualization & Analysis Platform used

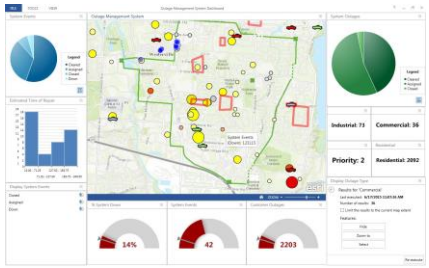
Identify

Collect

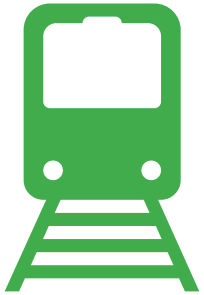
Format

Conversion

Visualization



Data Requirements for Planning

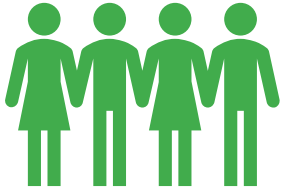


Data requirements of transport planning

O&D surveys based on cells

Traffic flows

Junction turning movements



Data requirements of urban planning : By Planning Block

Population densities

Housing types and densities

Employment locations and densities

Income

Environment

Existing Data Sets

Existing Data Available

Iskandar

Urban Planning

Plan Malaysia	Landuse- Type of housing, Institutional, Recreational complex
DOSM	• Census -Population based on Age, Race, Ethnicity, Gender • State level - Religion, Marital, Residency status • District - Employement
JPN Johor	Location, Number of student and teacher based on Age, Ethnicity, Gender
Environment	• Air pollution Index • Weather Forecast

Transport Planning

Open Streetmap	Road Layout
Local Authority	Location of ITS Infra
MOW	Historical traffic count data in study area

Others

Built Environment
Demarcation
Utility

Melaka

Urban Planning

DOSM	• Census -Population based on Age, Race, Ethnicity, Gender
Local Authority	• Landuse- Type of housing, Institutional, Recreational complex, • ITS Infra
UPEN	Tourism demand data – number of visitors per day for each site.
Tourism	PMSB – HOHO Bus and stop
APAD	CBIP (Bus Infrastructure Plan) report for Alor Gajah, Jasin, and Melaka Tengah.

Transport Planning

Open Streetmap	Road Layout
Local Authority	Location of ITS Infra
MOW	Historical traffic count data in study area

Others

Built Environment
Demarcation
Utility

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Basic Urban Planning Data

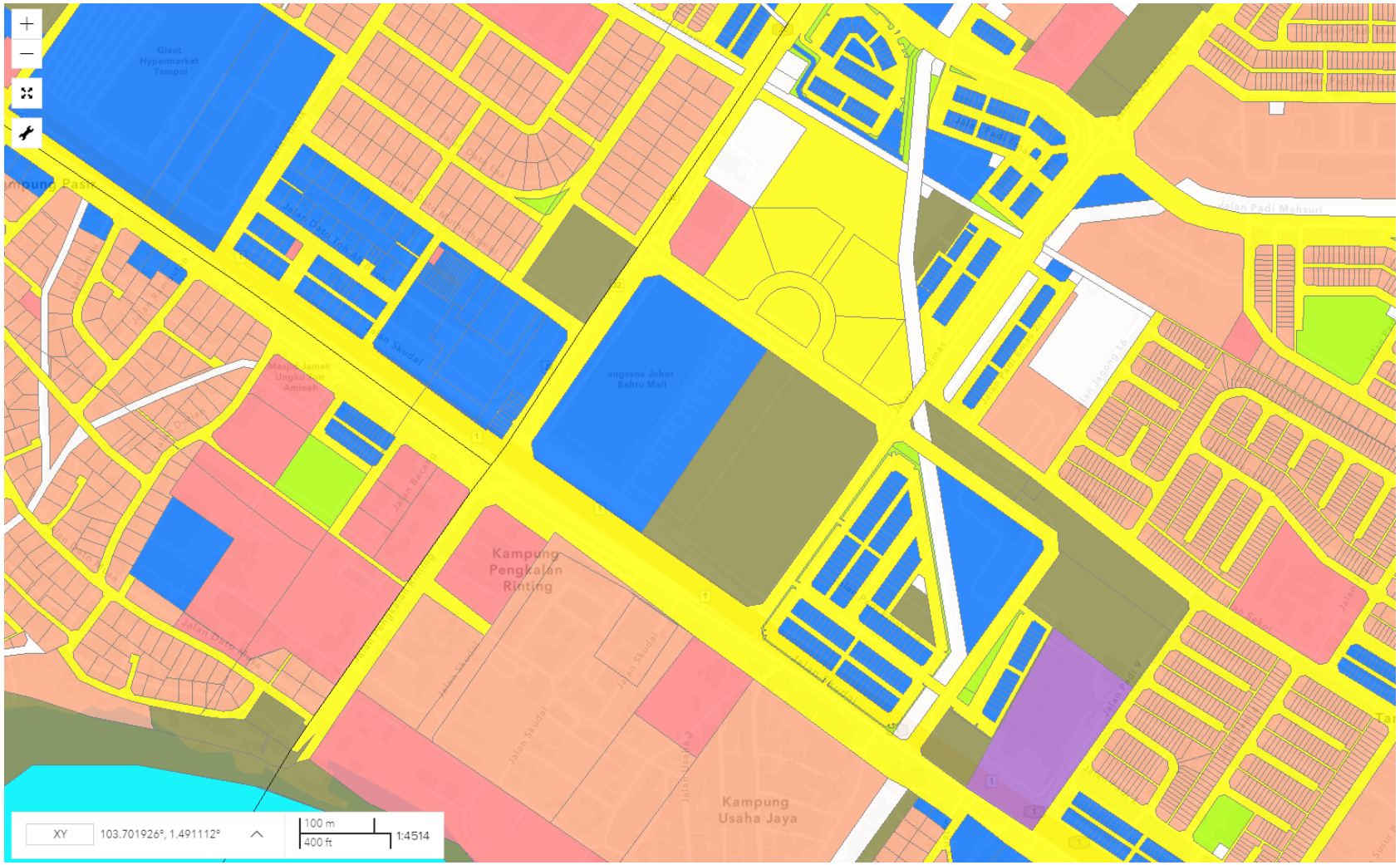
Urban Planning Information – Census

Examples of census information from DoSM

- Population densities
- Demographics
- Economic activity
- Social inclusion
- Migrant workers

Land Use - PlanMalaysia

- Using PlanMalaysia layers
- Housing
  - Density and height
  - Impact of high rise



Basic Transport Planning Data

Transport planning model

Creating a network

The model framework is built on:

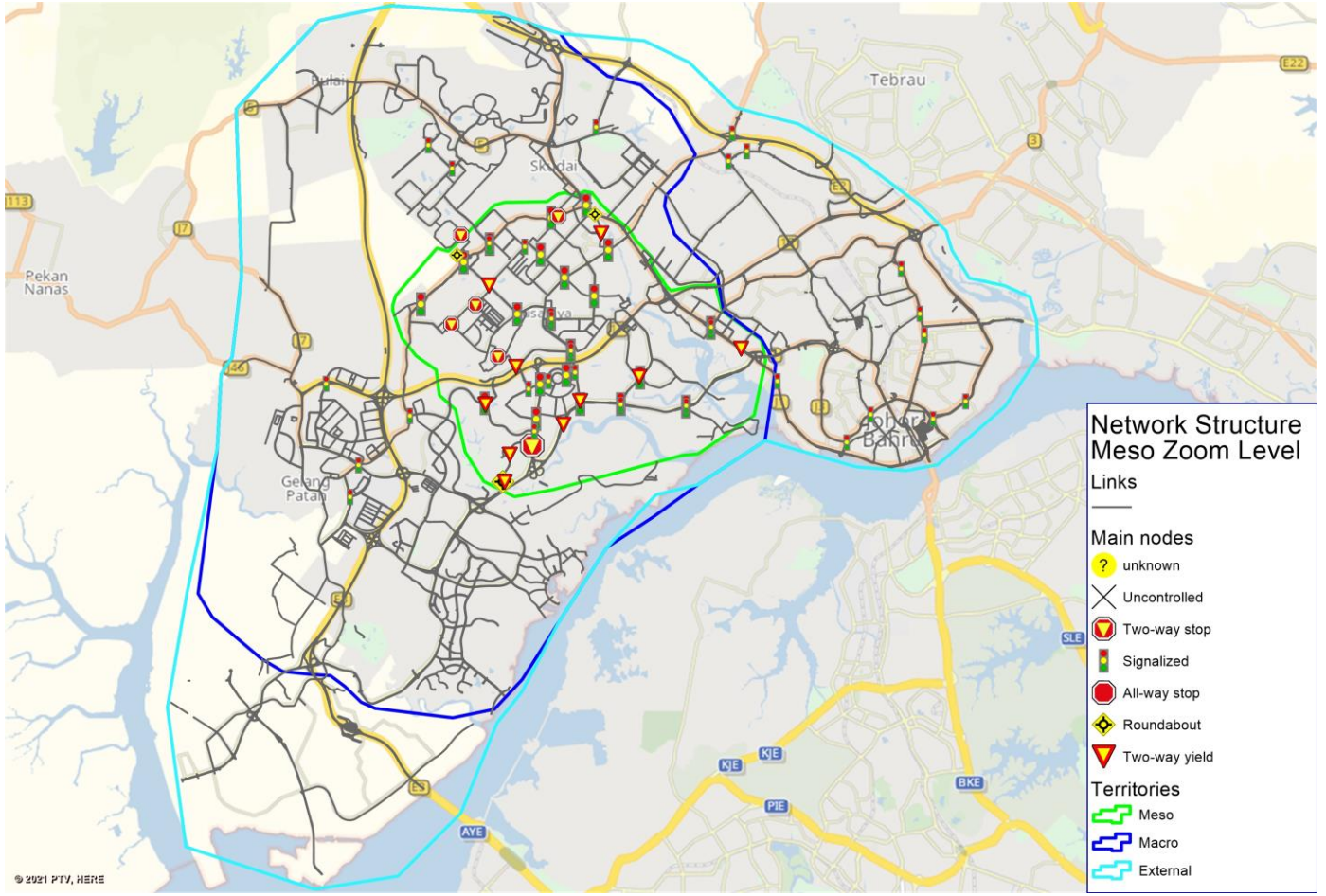
- Road network
- Public transport network

These networks come from :

- OpenStreetMap
- National mapping
- GPS traces

This will enable the building of a transport planning model which will include:

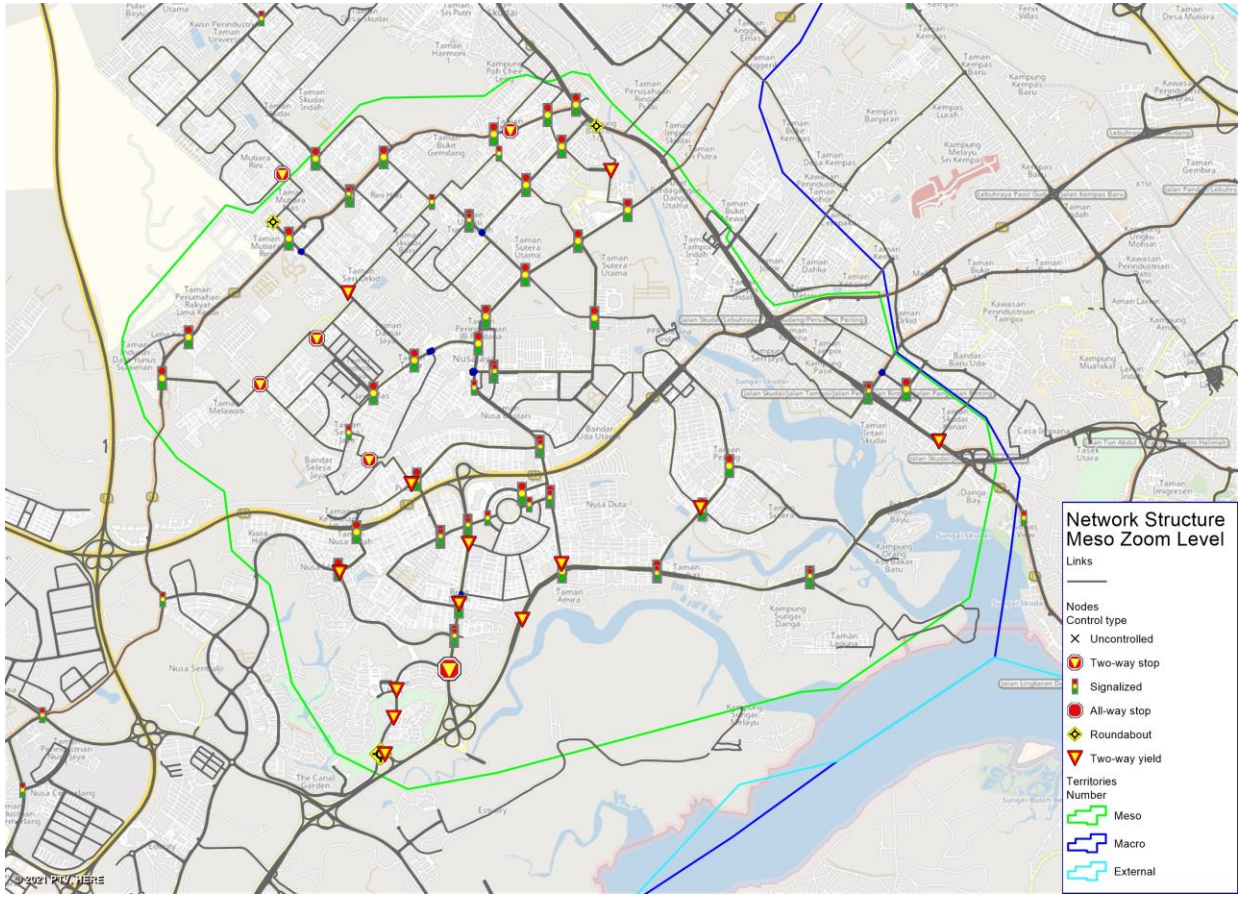
- A public transport model
- A highway model
- A gravity/demand model
- AM and PM peak periods
- Mix of cars, motorbikes, trucks and buses



Transport Network = the supply

Highway network is built on:

- links based on road hierarchy (e.g. speed, number of lanes)
- junctions based on type, road geometry, layout (and signal timings)
- public transport network
- Matrices for highway and public transport trips.



Supporting transport planning data

Typical traffic data

Data to be included from the transport modelling

- Journey times
  - Time spent on each link
- Traffic counts
  - Flows on each link
- Turning movements at junctions
- Traffic Events
- Car Park Occupancy
- Additional data
  - Emissions from vehicle types

Public transport routes

Transport planning = the demand

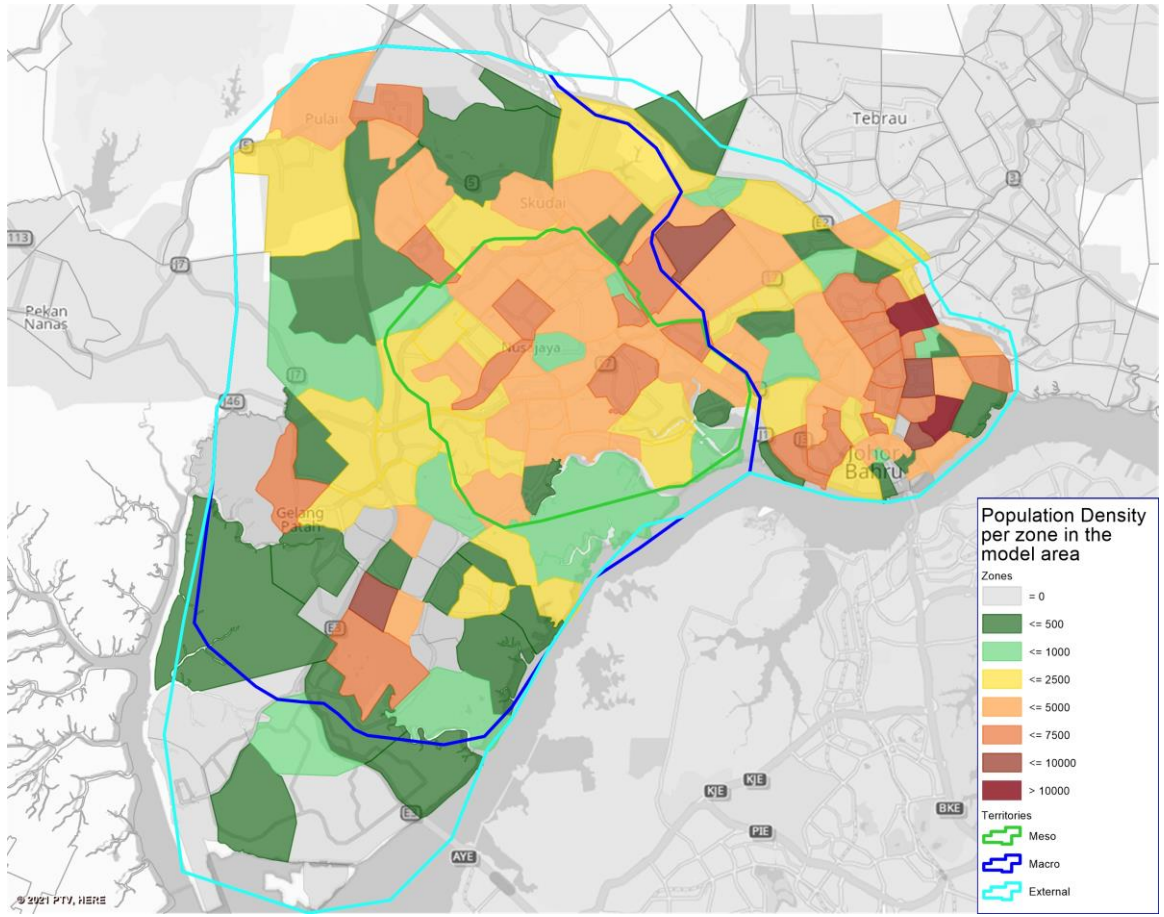
Creating a demand model

To understand where people live

- Create zone or cell boundaries
- Require attributes for these zones
- Population density
- Car/motorbike ownership

Assess granularity of these zones

- Are they suitable for planning?
- Too big and they do not help planning
- Too diverse and they create confusion



Cross Function Analyses

Cross function analysis

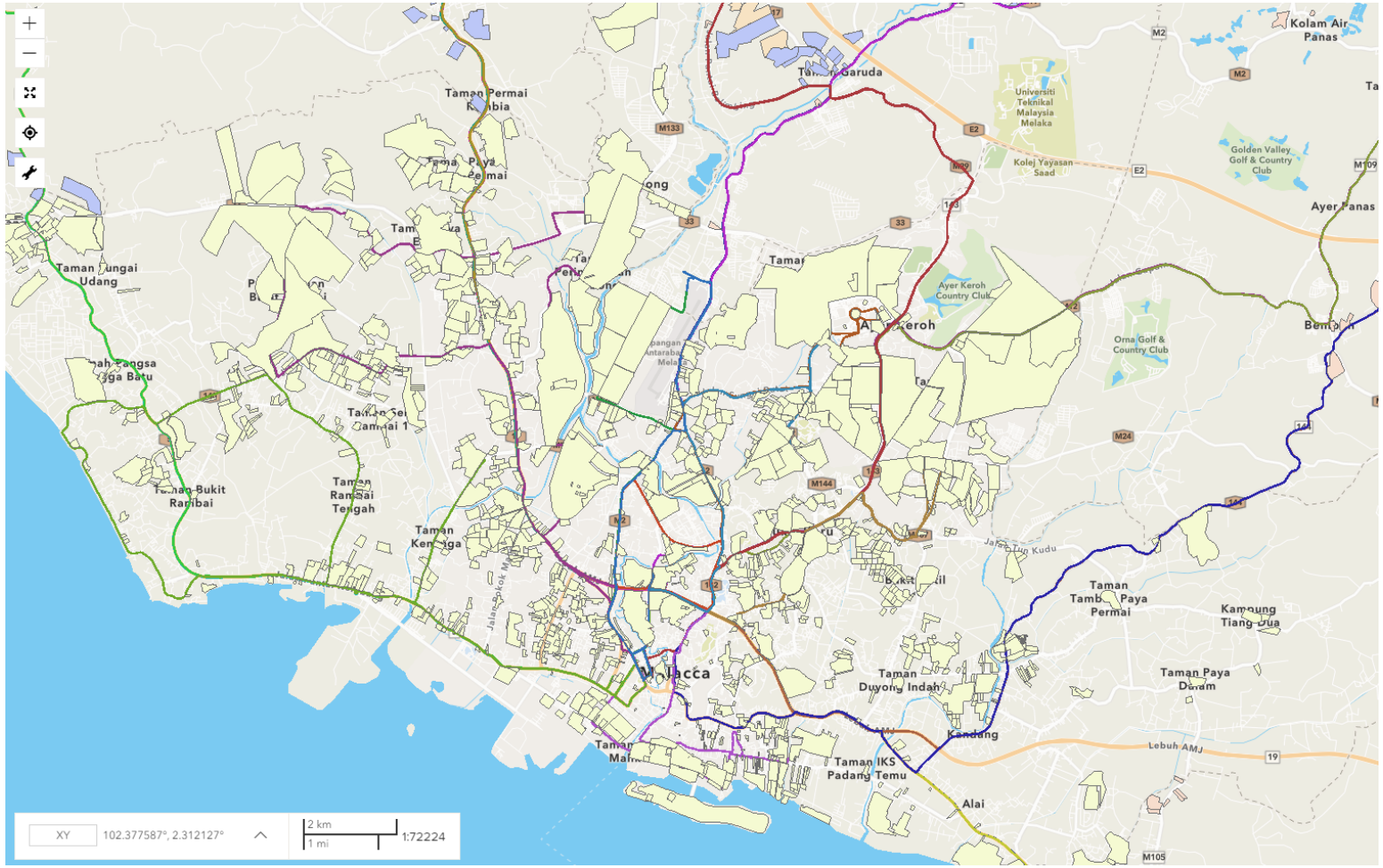
Examples of cross function analytics

Sample of analytics that could be included based on log-frame SDG work, depending on data availability, to help urban and transport planning

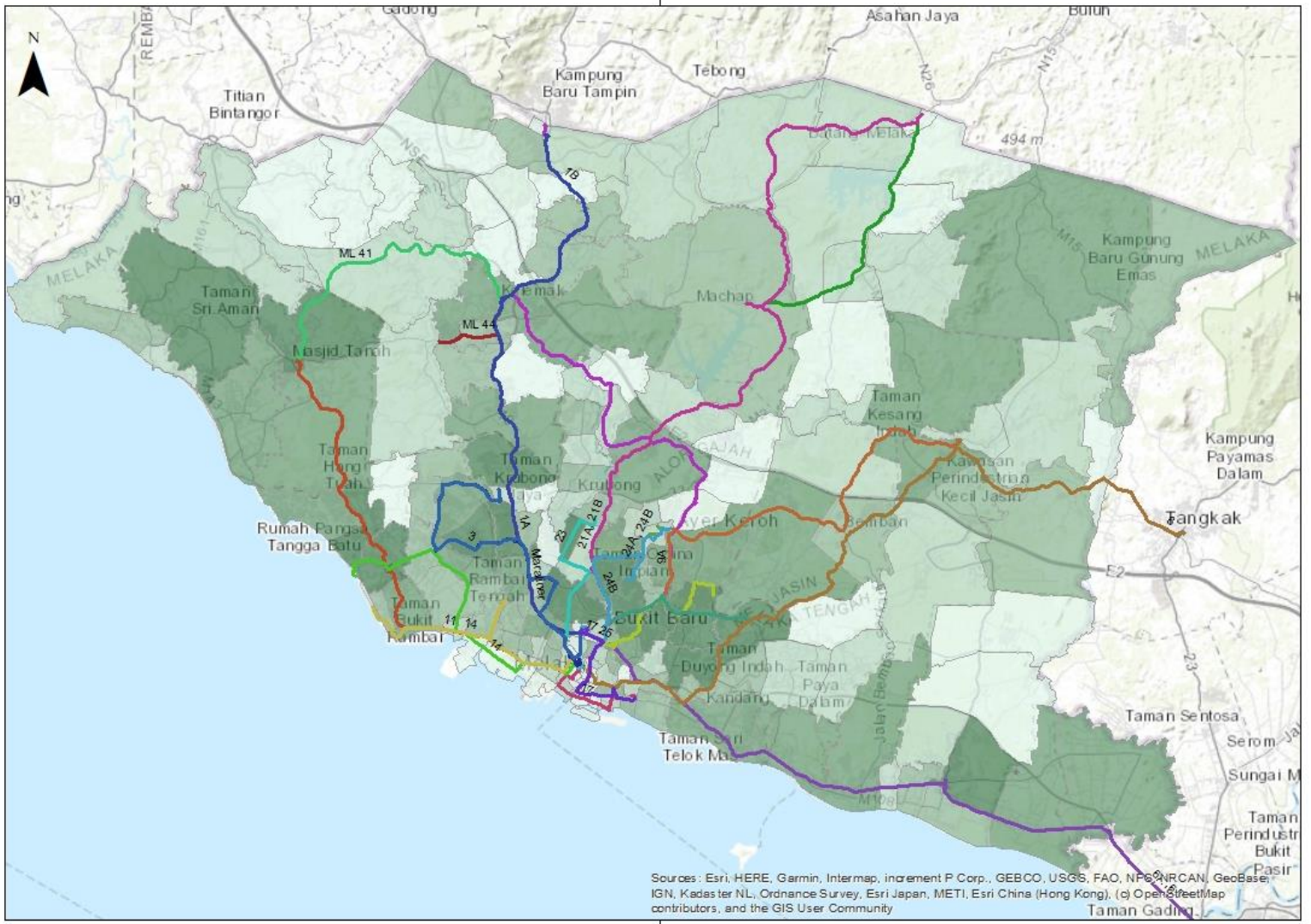
- % of dwelling units within 400m of bus services (or other public transport facilities)
  - For a selected bus route (from MMS or other sources), apply a spatial query with a 400m buffer to find land use (from IMUO data)
- Population demographics within 400m of bus services
  - For a selected bus route (from MMS or other sources), apply a spatial query with a 400m buffer to find the population demographics (from IMUO data) for potential users
- GHG emissions correlated to traffic volumes
  - For a selected area extract the traffic volumes (from ITS or transport model), apply a spatial query to find the GHG emission (from IMUO data) to find correlations

Bus routes and residential areas

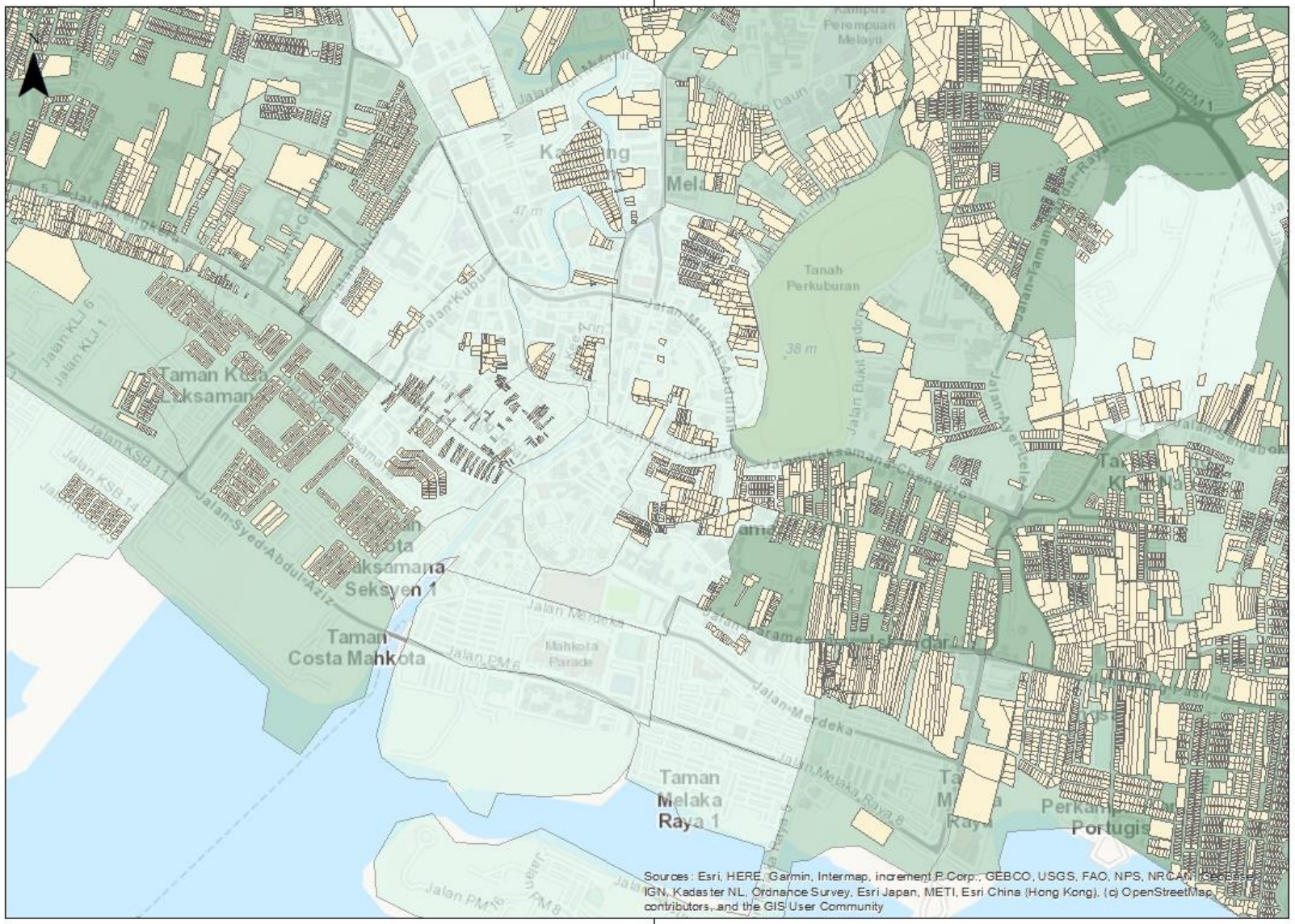
Examples of cross function analytics 1



Bus routes and population density



Residential areas and population density



Cross function analysis

Add future metrics when data are available

- Bus punctuality scores crossed with traffic patterns
  - To decide if more buses are needed at particular times
- Levels of service across network
  - To decide if alternative bus routes during peak times should be activated
- Bus activity patterns (volume) over time
  - Could be cross with weather data to look for correlations
  - Could be crossed with social economic (income etc) data to look for patterns
- Taxis activity patterns (volume) over time
  - Could be cross with weather data to look for correlations
- Origin-destination data
  - Crossed with traffic volumes and level of service on roads between OD centres

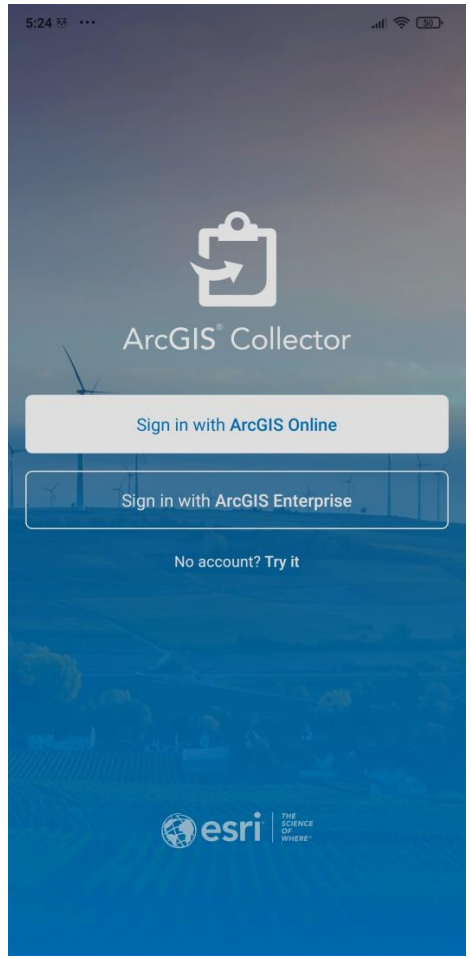
What cross function analyses would you like to see?

1. % of dwelling units within 500m of scheduled public transport service
2. % monthly earnings spent on public transport
3. % of respondents indicating that they believe public transport to be "safe"
4. Number of traffic jams and time taken to clear
5. Number of women and men with improved access to affordable transport
6. Reduction in private vehicles

Data Collection Methods

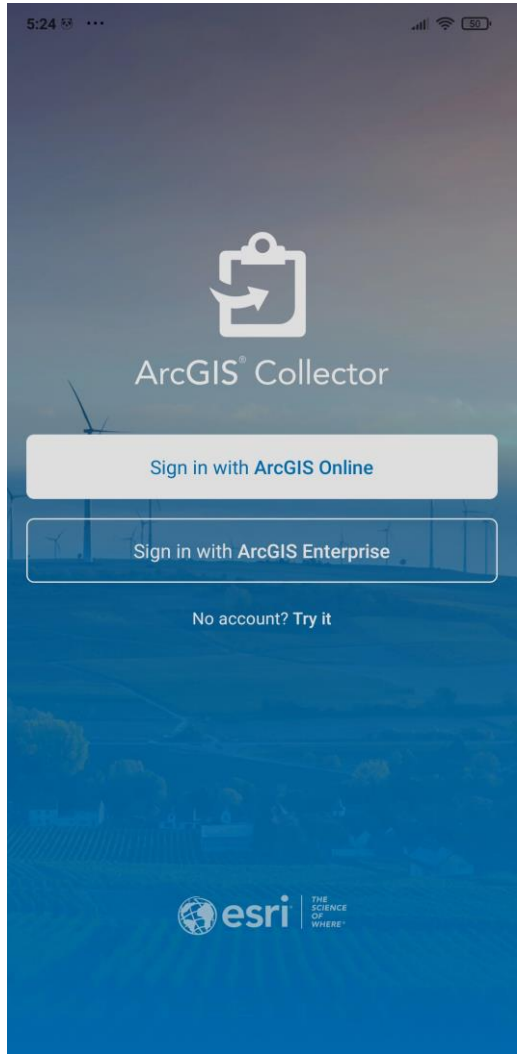
Data Collection Method

- The method of data collection is important on implementing which app to be utilized for data collection.
- The common apps for data collection in ArcGIS Online are ArcGIS Collector and ArcGIS Survey123.
- Both applications are available in App Store and Google Play.



ArcGIS Collector

- ArcGIS Collector is used to collect the data on field site or study area site.
- The app allows the user to collect all geometry types feature based on the features that available in Collector map.
- The user need to create a data template (geometry types and attribute table fields) for the data collection.
- Data template can be prepared in Desktop (ArcMap or ArcGIS Pro) or directly from ArcGIS Online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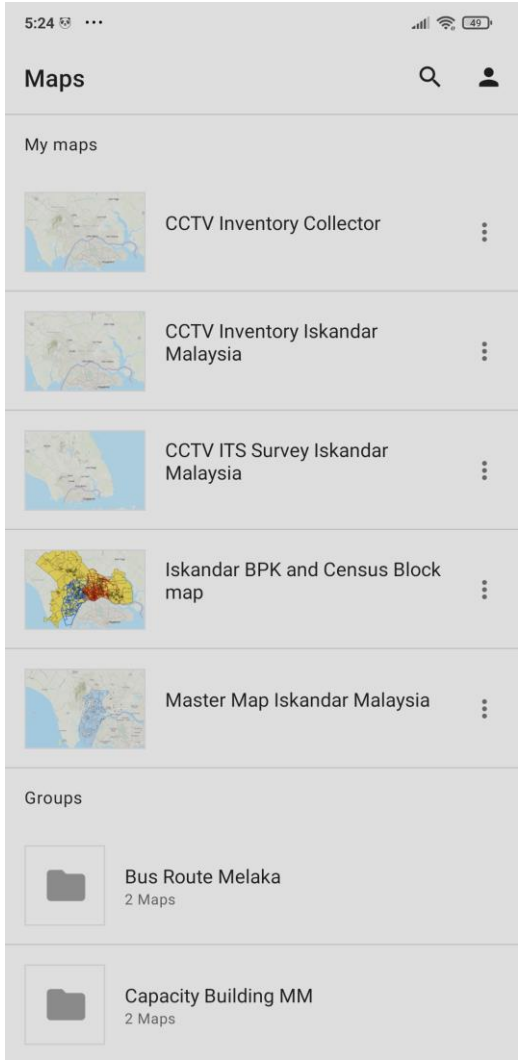
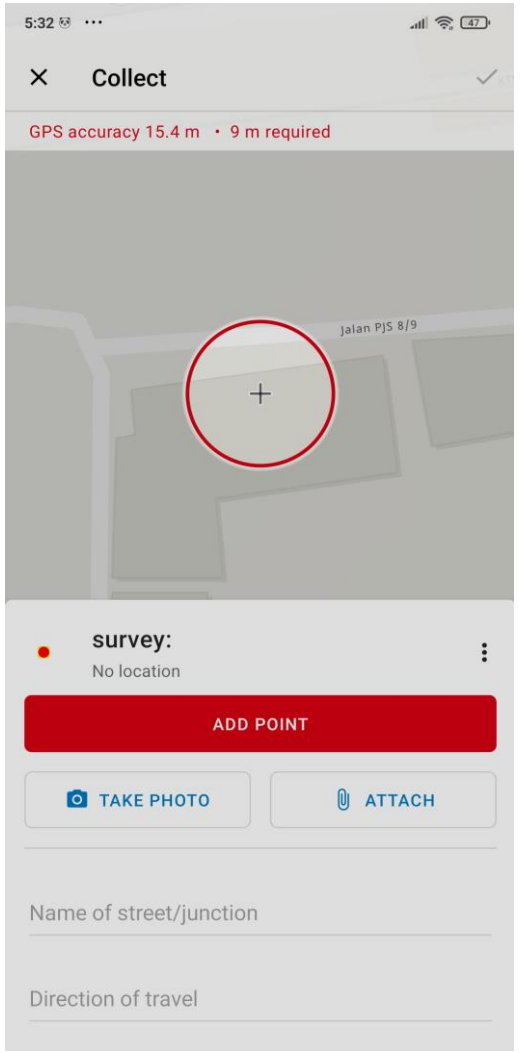
ArcGIS® Collector
Sign in with ArcGIS Online
Sign in with ArcGIS Enterprise
No account? Try it
esri


5:24
Maps
My maps
CCTV Inventory Collector
CCTV Inventory Iskandar Malaysia
CCTV ITS Survey Iskandar Malaysia
Iskandar BPK and Census Block map
Master Map Iskandar Malaysia
Groups
Bus Route Melaka
2 Maps
Capacity Building MM
2 Maps


5:32
Collect
GPS accuracy 15.4 m • 9 m required
Jalan PJS 8/9
survey:
No location
ADD POINT
TAKE PHOTO
ATTACH
Name of street/junction
Direction of travel

ArcGIS Survey123

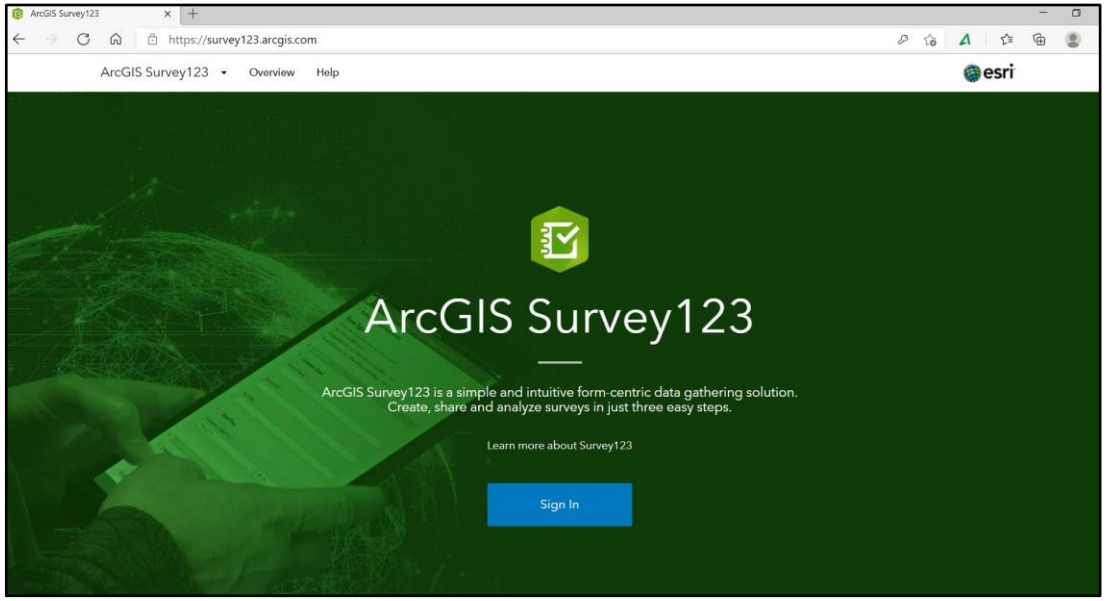
- ArcGIS Survey123 allow the user to create a survey form and share the survey to specific or public audience to collect the data.
- ArcGIS Survey123 can be used to collect GIS data (polygon, line and point) from geolocation question.
- The survey can be submitted through ArcGIS Survey123 or web browser by sharing the survey link.
- Useful for data collection through crowdsourcing as it can be shared to large audience through the survey link.

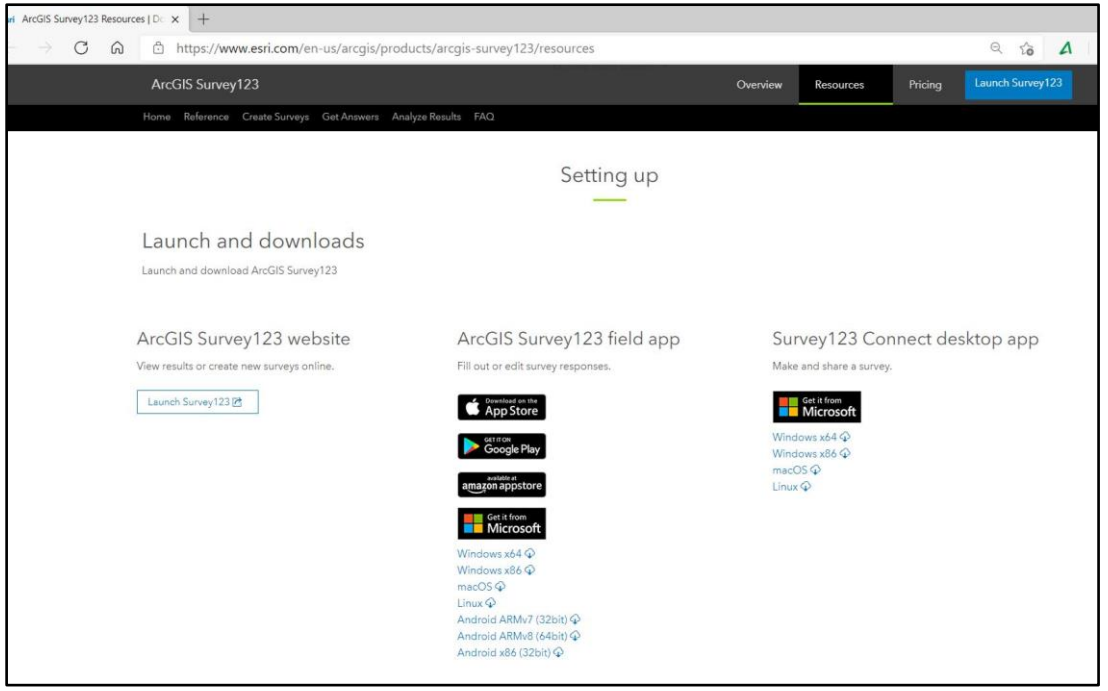
ArcGIS Survey123

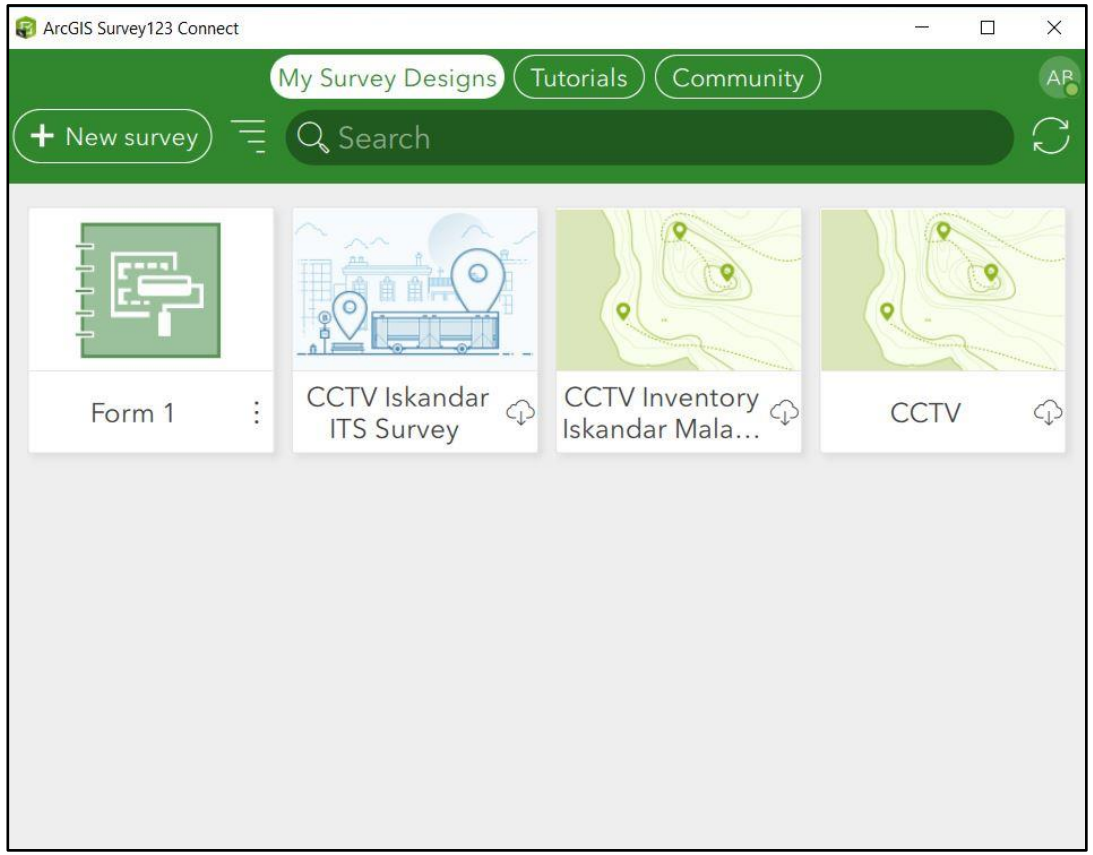
- The survey form can be created using Survey123 web designer and Survey123 Connect.

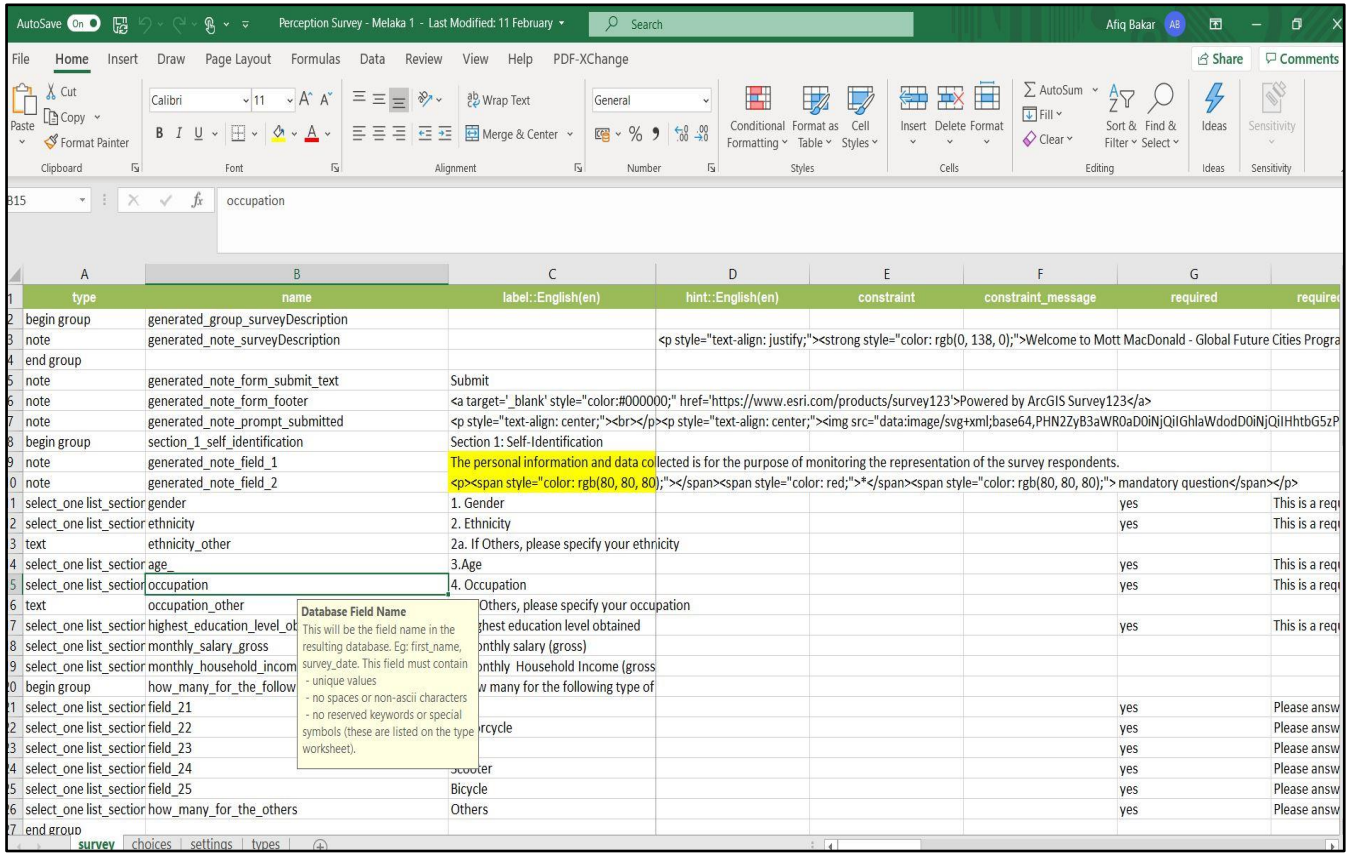
- Survey123 web designer can be accessed from Survey123 webpage (ArcGIS Survey123).

- Survey123 Connect can be downloaded from ArcGIS Survey123 Resources | Downloads, Training, Videos & Documentation (esri.com)






ArcGIS Survey123 Connect
My Survey Designs
Tutorials
Community
AR
New survey
Search
Form 1
CCTV Iskandar ITS Survey
CCTV Inventory Iskandar Mala...
CCTV


Perception Survey - Melaka 1 - Last Modified: 11 February
Afiq Bakar
File Home Insert Draw Page Layout Formulas Data Review View Help PDF-XChange
Share Comments
occupation
type | name | label::English(en) | hint::English(en) | constraint | constraint_message | required
begin group | generated_group_surveyDescription
note | generated_note_surveyDescription | Welcome to Mott MacDonald - Global Future Cities Progra
end group
note | generated_note_form_submit_text | Submit
note | generated_note_form_footer | Powered by ArcGIS Survey123
note | generated_note_prompt_submitted |
 <img src="
begin group | section_1_self_identification | Section 1: Self-Identification
note | generated_note_field_1 | The personal information and data collected is for the purpose of monitoring the representation of the survey respondents.
note | generated_note_field_2 | * mandatory question
select_one list_sectior | gender | 1. Gender | yes
select_one list_sectior | ethnicity | 2. Ethnicity | yes
text | ethnicity_other | 2a. If Others, please specify your ethnicity
select_one list_sectior | age_ | 3.Age | yes
select_one list_sectior | occupation | 4. Occupation | yes
text | occupation_other | Others, please specify your occupation
select_one list_sectior | highest_education_level_ob | ghest education level obtained | yes
select_one list_sectior | monthly_salary_gross | onthly salary (gross)
select_one list_sectior | monthly_household_incom | onthly Household Income (gross
begin group | how_many_for_the_follow | w many for the following type of
select_one list_sectior | field_21 | yes
select_one list_sectior | field_22 | rcycle | yes
select_one list_sectior | field_23 | yes
select_one list_sectior | field_24 | cooter | yes
select_one list_sectior | field_25 | Bicycle | yes
select_one list_sectior | how_many_for_the_others | Others | yes
end group
Database Field Name
This will be the field name in the resulting database. Eg: first_name, survey_date. This field must contain
- unique values
- no spaces or non-ascii characters
- no reserved keywords or special symbols (these are listed on the type worksheet).
survey choices settings types

Comparison between ArcGIS Collector and ArcGIS Survey123

ArcGIS Collector	ArcGIS Survey123
• Can be used to collect the data on field site	• Can be used for data crowdsourcing by sharing the survey link to the target audiences.
• Required the user to have ArcGIS Collector access to perform data collection	• Required the user to have ArcGIS Survey123 access to perform data collection through app
• The user can create an offline map to collect data in suburban or rural area	• Survey can be submitted through web browser by sharing the survey link and useful to collect the data from public audiences.

Data Collaboration Methods

Why we need collaborative working

What creates the barriers

Silo Working

- Working in my own area without reference to the rest of the team, district, state and country

Fear of Conflict

- If I share then someone will criticise me

Complacency

- Doing what we always do is good enough

Misaligned Incentives

- Rewarding behaviours that conflict with a common goal

Principles of collaboration

Standards and data structure driven

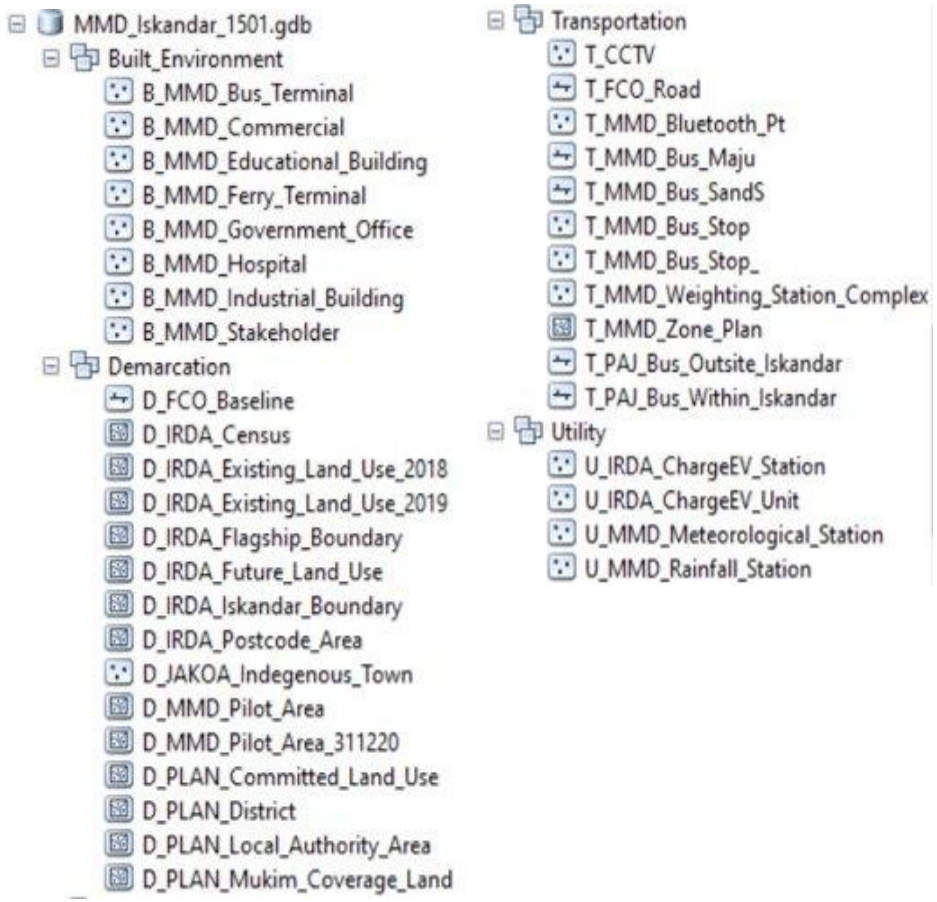
Based on API type connections

- Principle of sharing data and not copying it
- Open Government Data (MAMPU)

Standard & Data Library

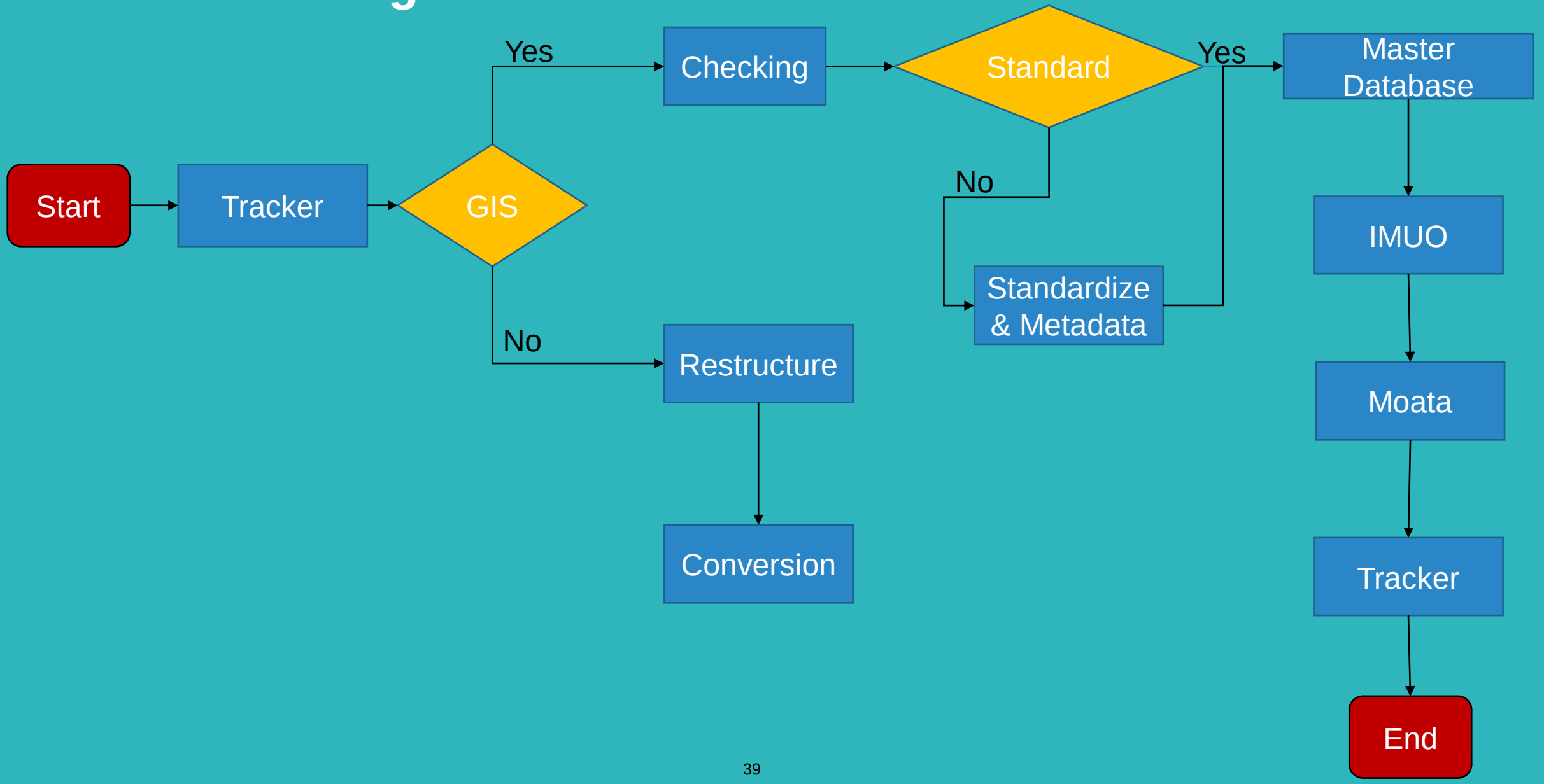
Standard ID	Name	Description
MS 1759:2015	Malaysian Standard Geographic Information/ Geomatics Feature and Attribute Codes	Describes the encoding of the world in terms of features and attributes. Features are real world objects while attributes are properties or characteristics associated with the objects.
MS ISO 19115:2003	Geographic Information - Metadata	Defines the schema required for describing geographic information and services. Provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital data.
MS ISO 19115-2:2011	Geographic Information – Metadata Extensions for Imagery and Gridded Data	Extends the existing geographic metadata standard by defining the schema required for describing imagery and gridded data. Provides information about the properties of the measuring equipment used to acquire the data, the geometry of the measuring process employed by the equipment, and the production process used to digitize the raw data.

GIS Online Platform



GIS File Geodatabase

Data Processing Flow



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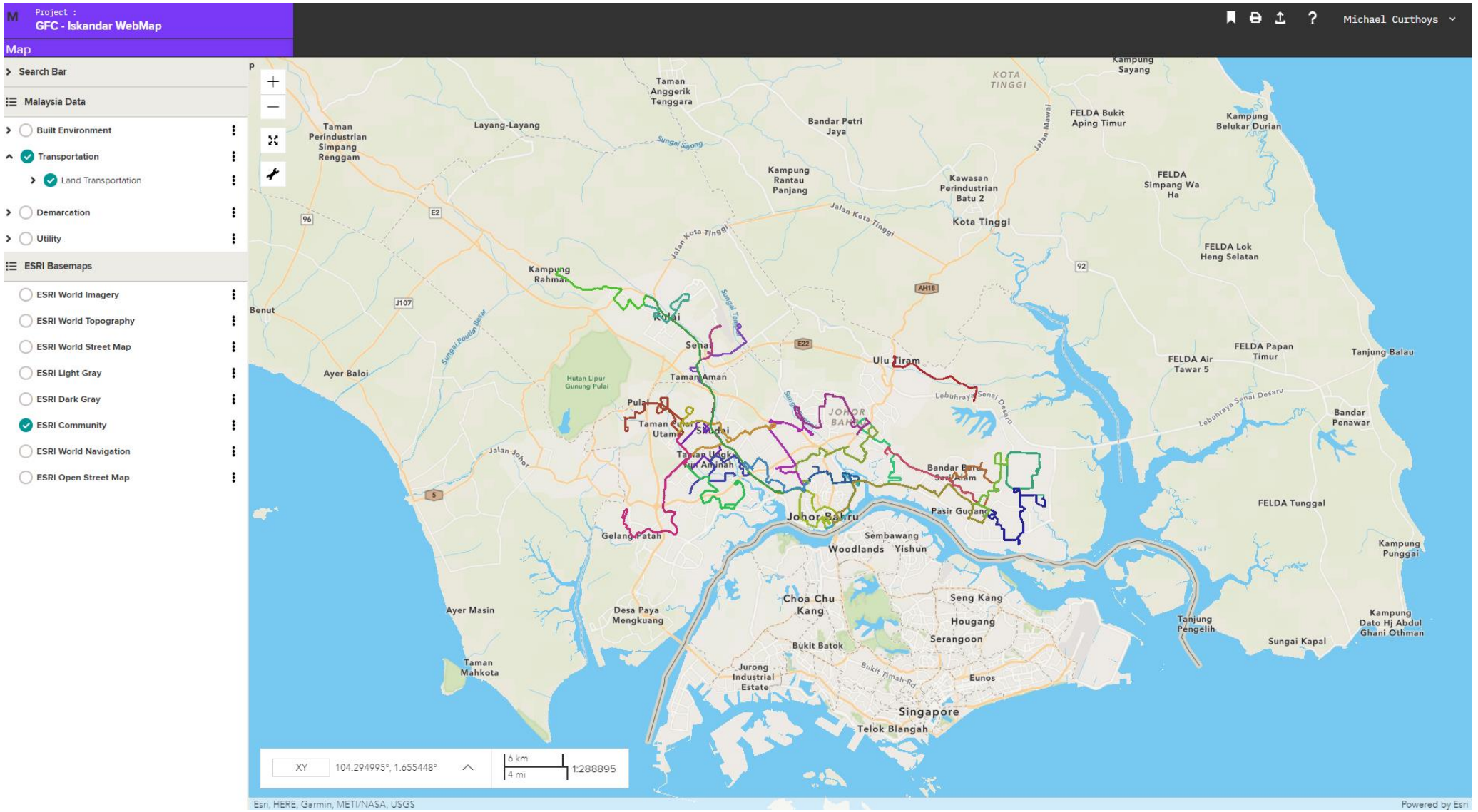
Data Visualization & Analysis Platform

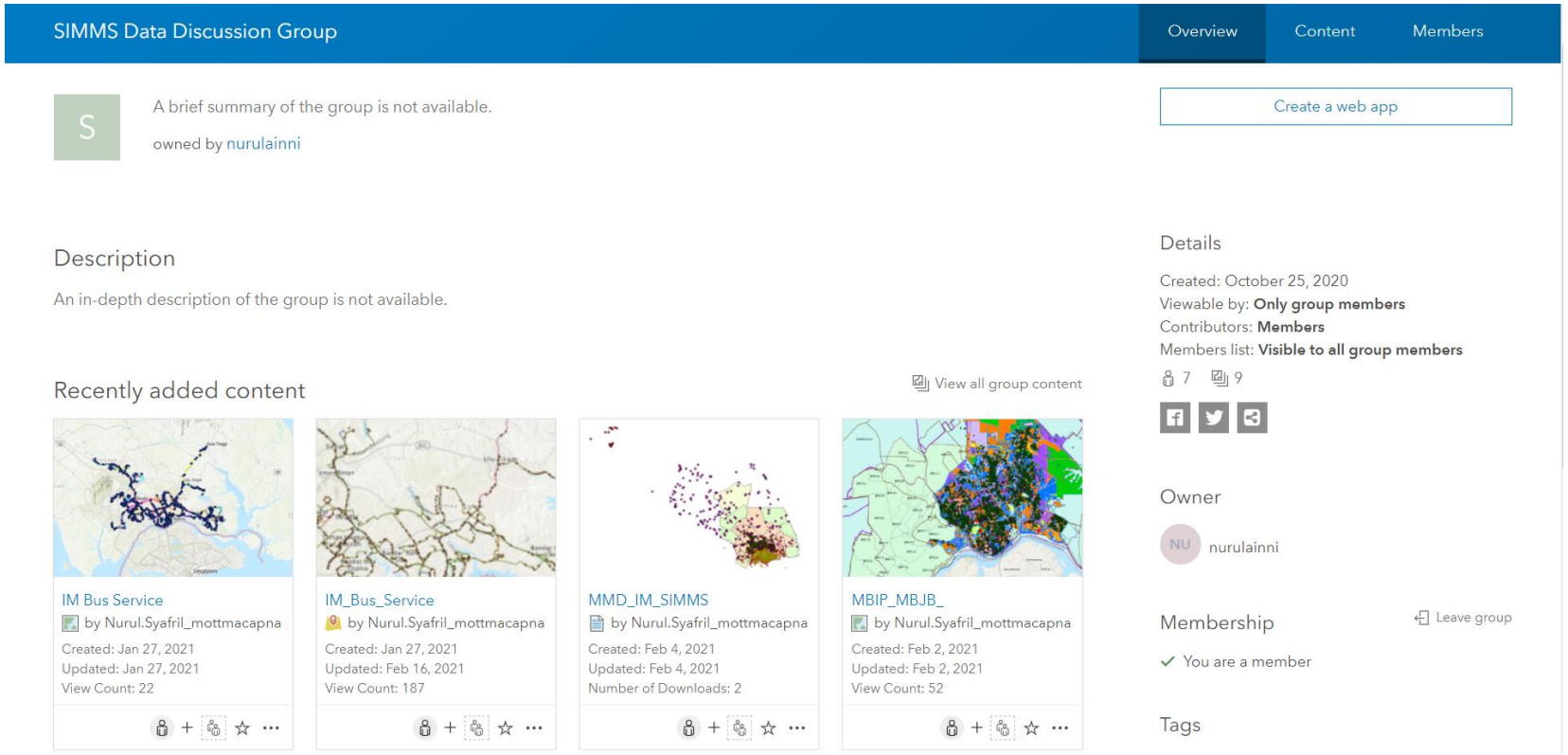
Our SmartGIS



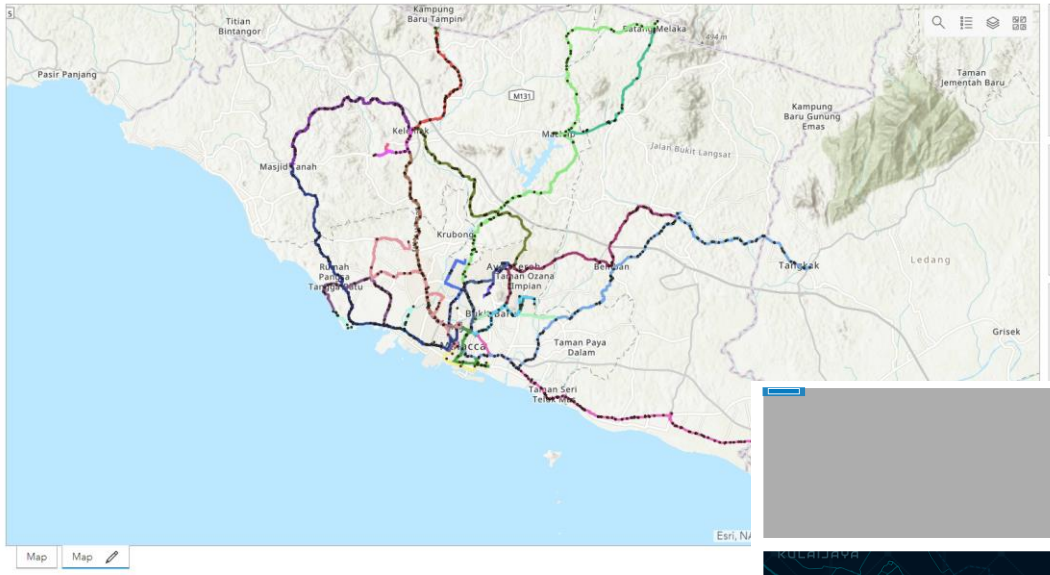
Data Collaboration

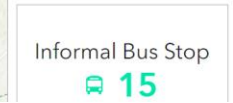
Online Smart GIS Group

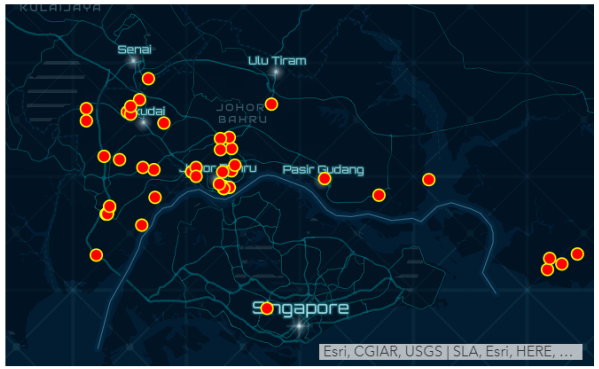
- Data links already created
  - IMUO
  - MBJB
  - MBIP
  - Air quality
- Embedded Public Feature Service
- Visualization & Analysis
  - Dashboard
  - Web Application
  - Web Map

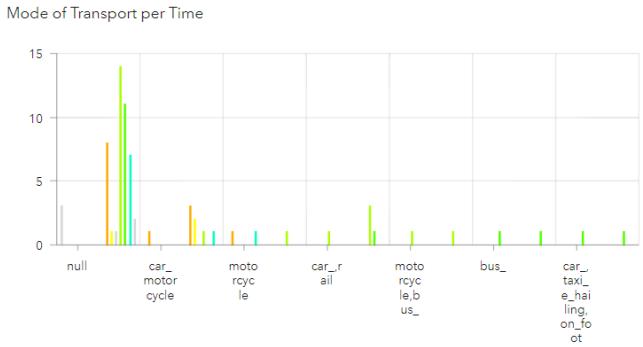


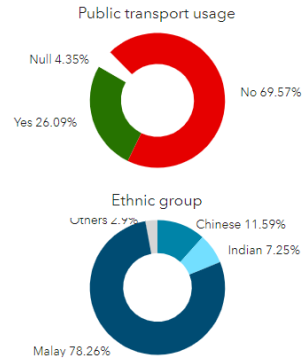
Data Visualization & Analysis Platform

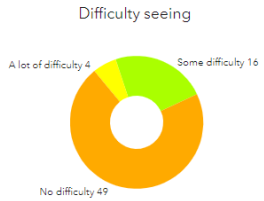


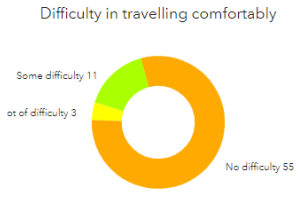


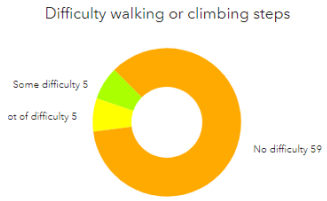


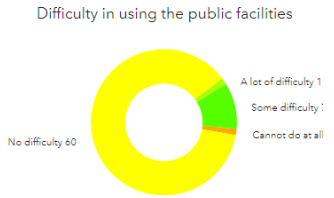


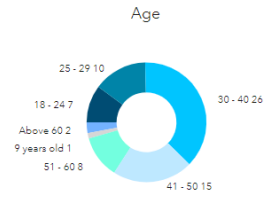












Existing & Required Data available - IM

Existing

Urban Planning

Plan Malaysia	Landuse- Type of housing, instutional, Recreational complex,
DOSM	• Census -Population based on Age, Race, Ethnicity, Gender • State level -
JPN Johor	Location, Number of student and teacher based on Age, Ethnicity, Gender
Environment	• Air pollution Index • Weather Forecast

Transport Planning

Open Streetmap	Road Layout
Local Authority	Location of ITS Infra
MOW	Historical traffic count data in study area

Others

Built Environment
Demarcation
Utility

Required

Urban Planning

Plan Malaysia	Multi Storey housing type : specify number of unit
DOSM	Census Block by Marital status Residency status Employed Unemployed Self-employed Type of occupation Sector Income level Education level Disability or infirmity

Transport Planning

Port	
JKR	• No of lanes, Lane width, Lists of vehicle types permitted/mandated/excluded, Speed limit, Height/Weight restrictions, Toll information • Signal positions , Lane markings , Turn restrictions
Local Authority	Signal timing information , Method of control, Signal specification - stages, phases, phase delay, special conditioning (e.g. queue detectors on approach), Time periods, Signal staging diagram 2. Log of data - to analyse average green times, with time periods
Waze	Journey time data (link-based – as disaggregate as possible) Journey-time data. Where possible, mapping of count data links to network links.
DOSM	License holding statistics, Vehicle registration, Vehicle ownership

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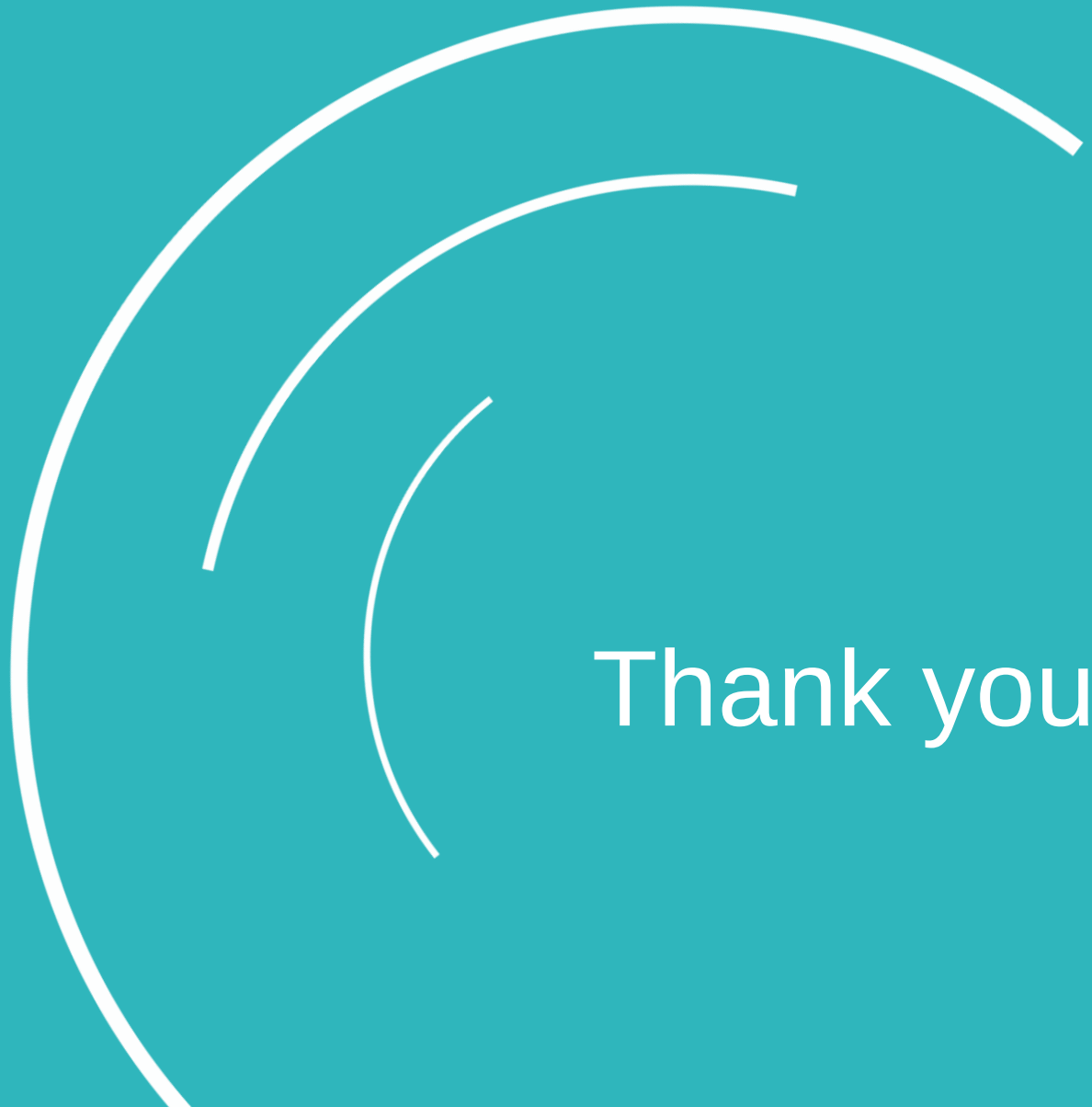

Thank you