

ICTs and LOW-CARBON CITIZENS



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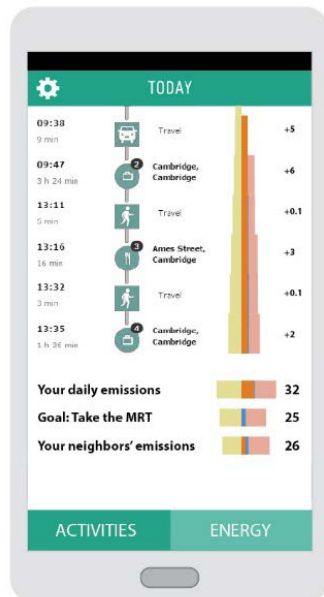
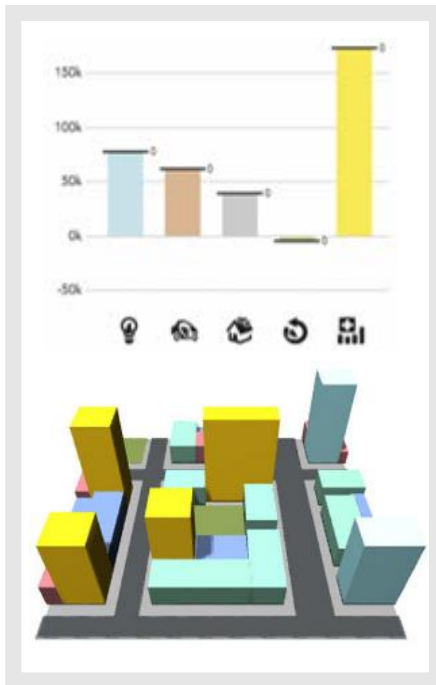
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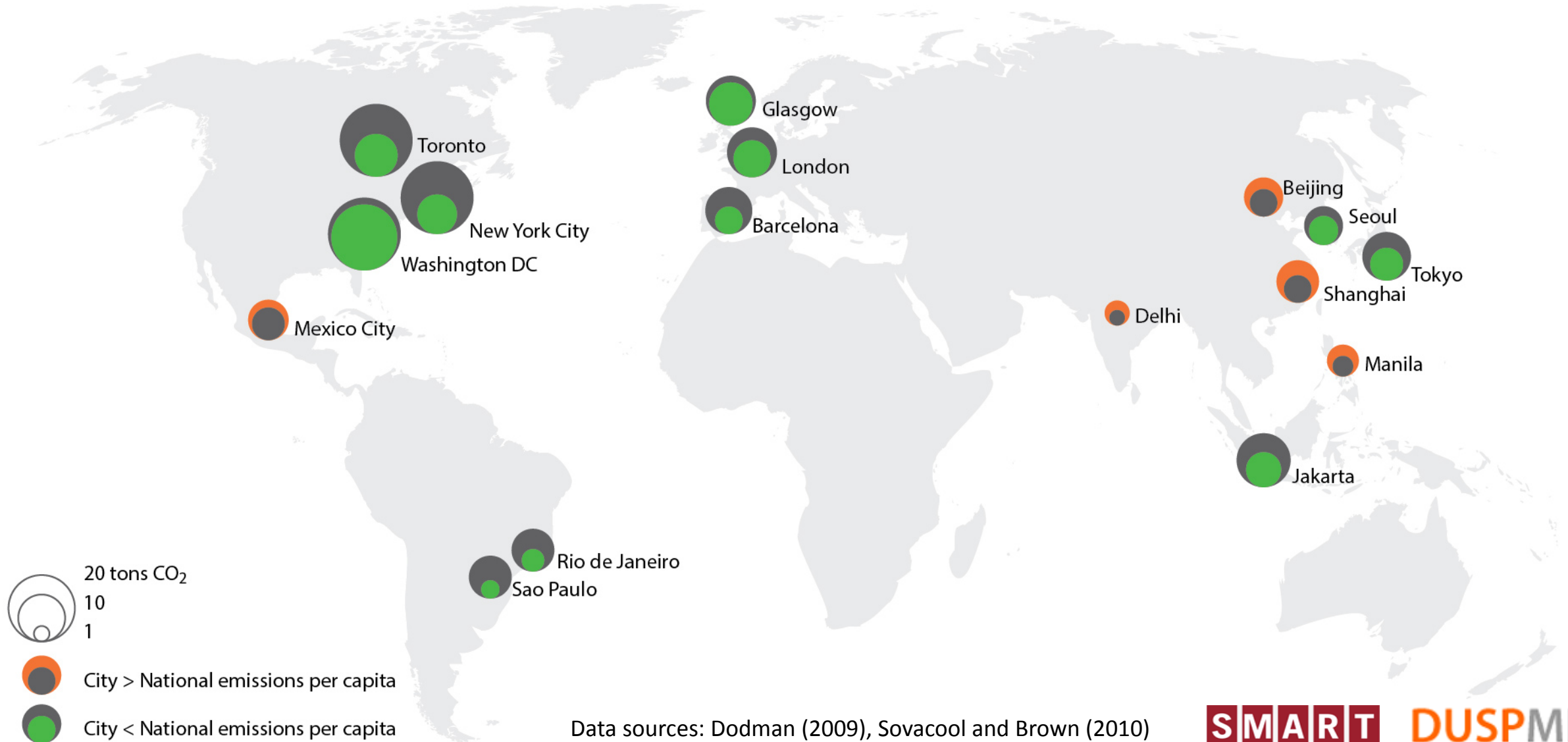
ICTs and LOW-CARBON CITIZENS



- › **Human behavior and lifestyles:** key component of urban energy use
- › **Information and communication technologies (ICTs):** emerging tools for understanding and modifying behavior
- › **Energy Proforma:** neighborhood energy assessment tool
- › **Future Mobility Sensing (FMS):** energy assessment and behavioral feedback tool
- › **Moving forward**

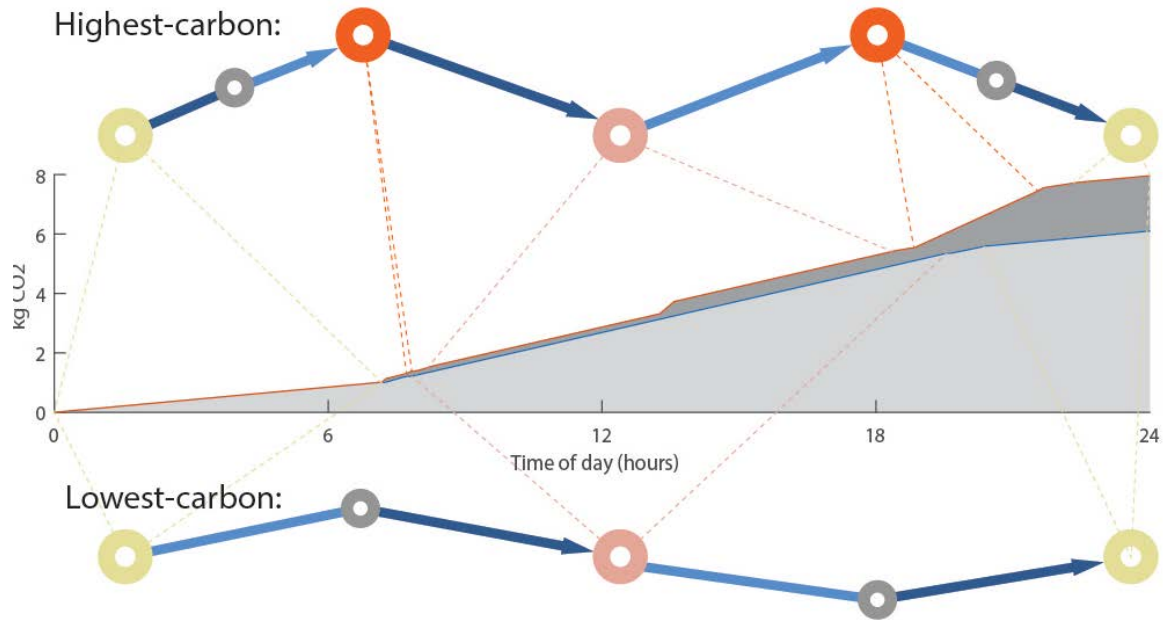
CARBON-INTENSIVE CITIES...OR *LIFESTYLES*?

Per capita emissions of cities vs. nations

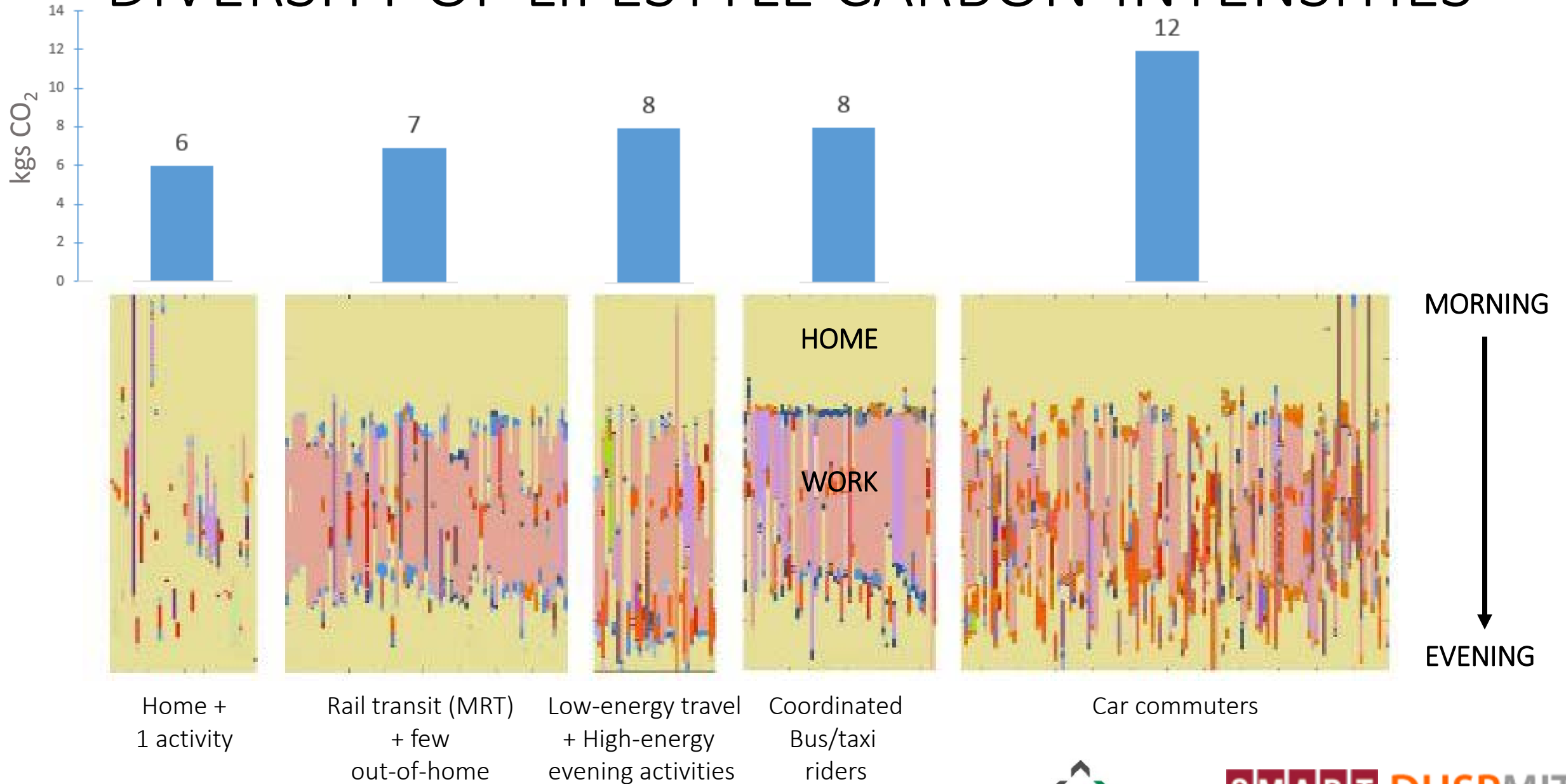


HIGH-CARBON CITIES...OR *LIFESTYLES*?

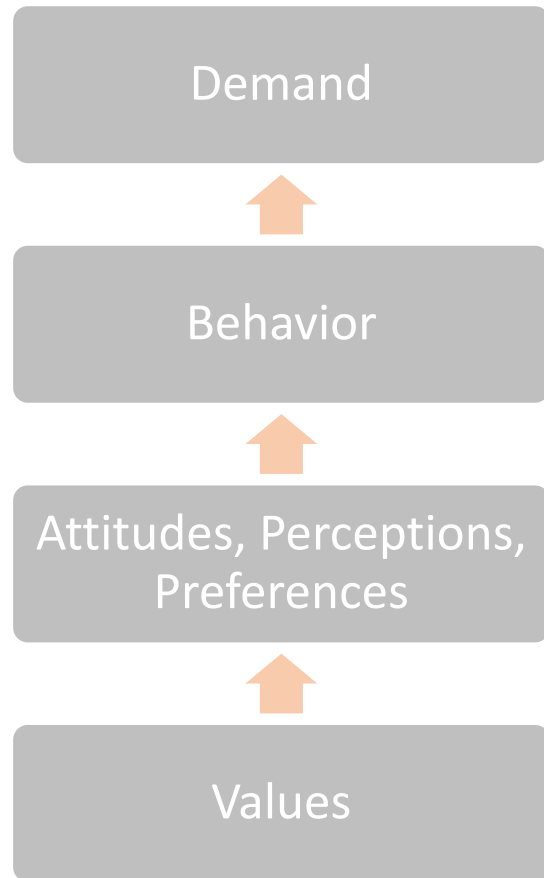
Example: Daily emissions of one person vary from 6 – 8 kgCO₂



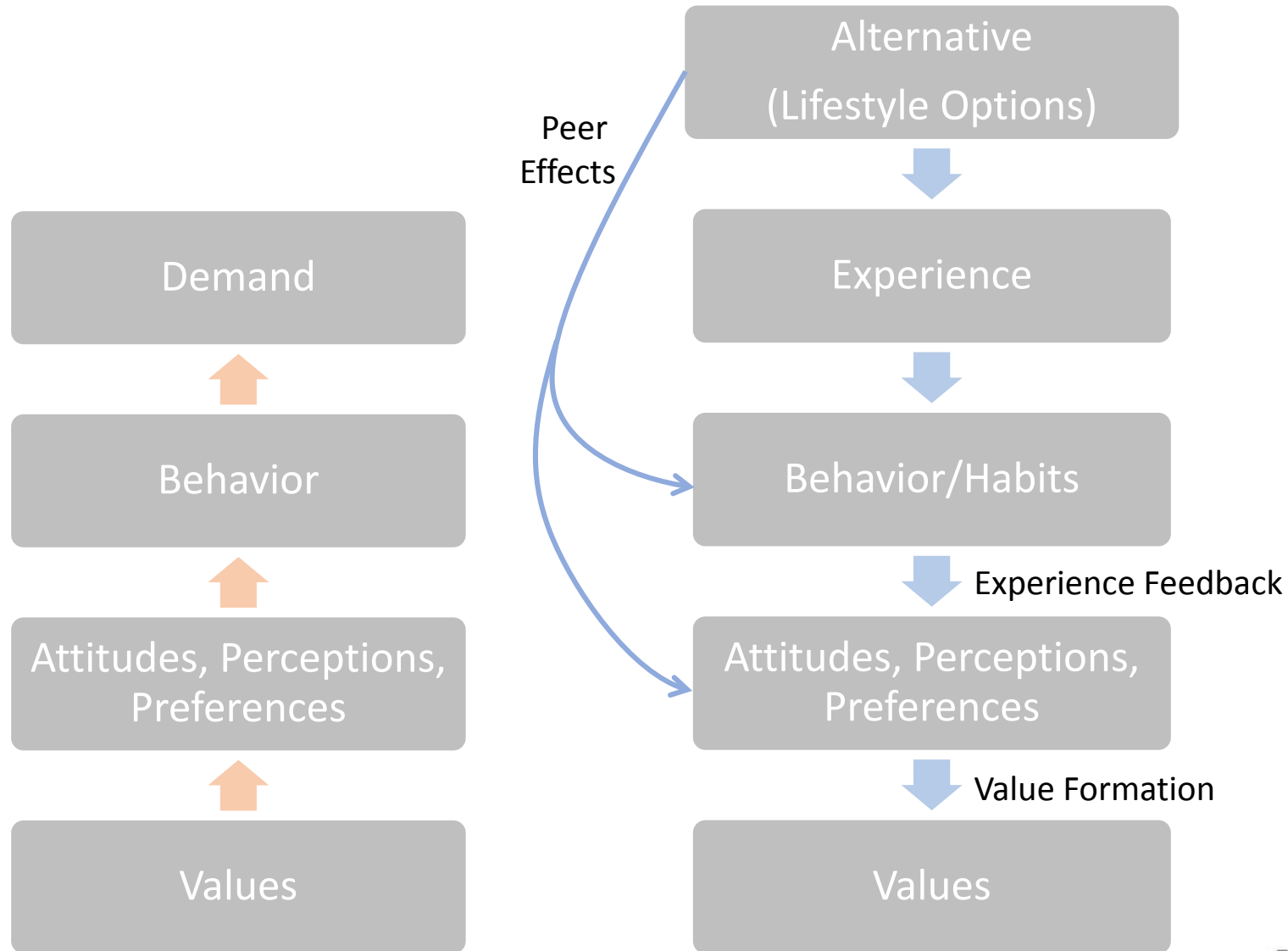
DIVERSITY OF LIFESTYLE CARBON-INTENSITIES



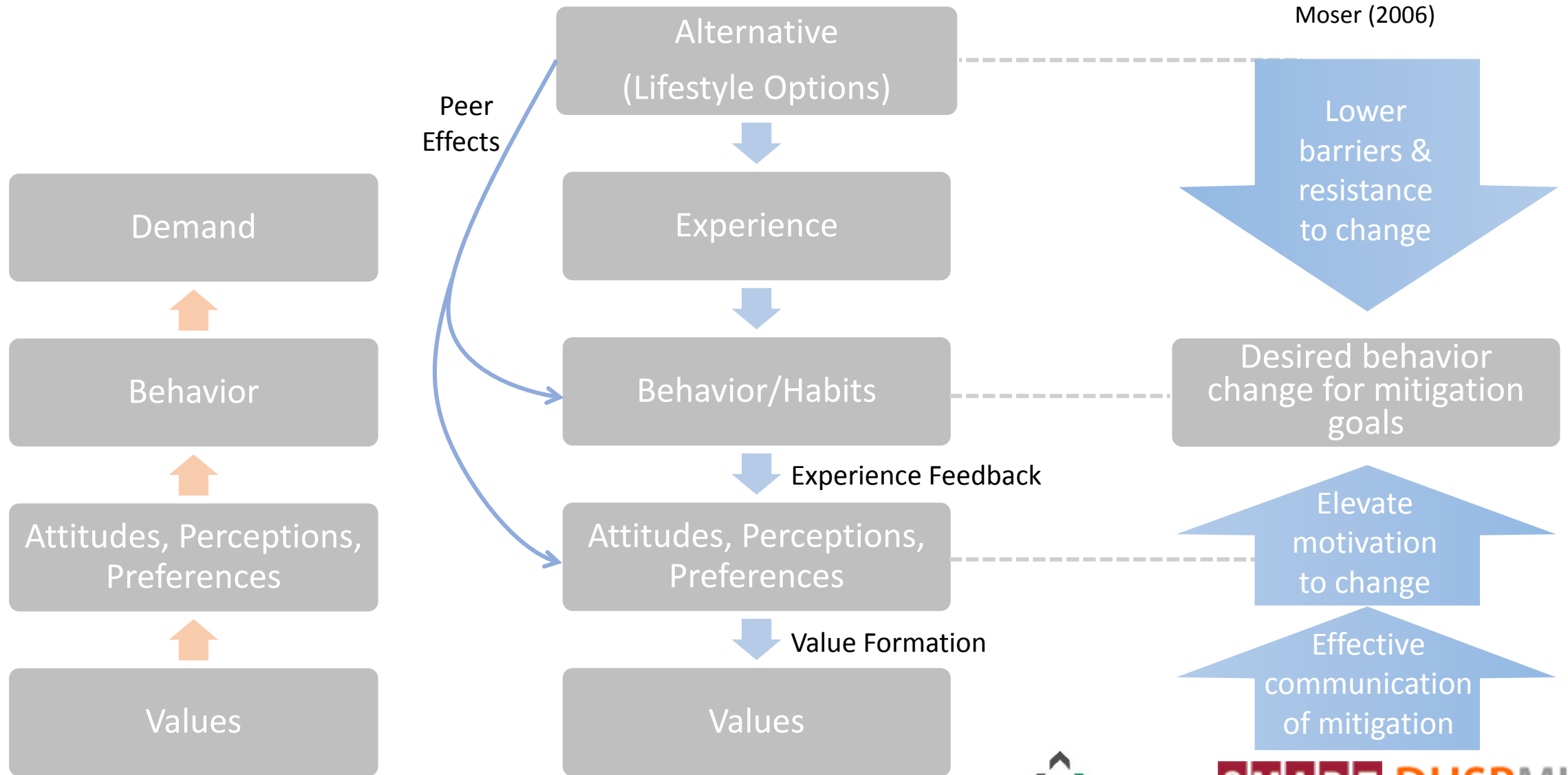
UNDERSTANDING LIFESTYLE



UNDERSTANDING LIFESTYLE *CHANGE*



UNDERSTANDING LIFESTYLE *CHANGE & INFLUENCE*



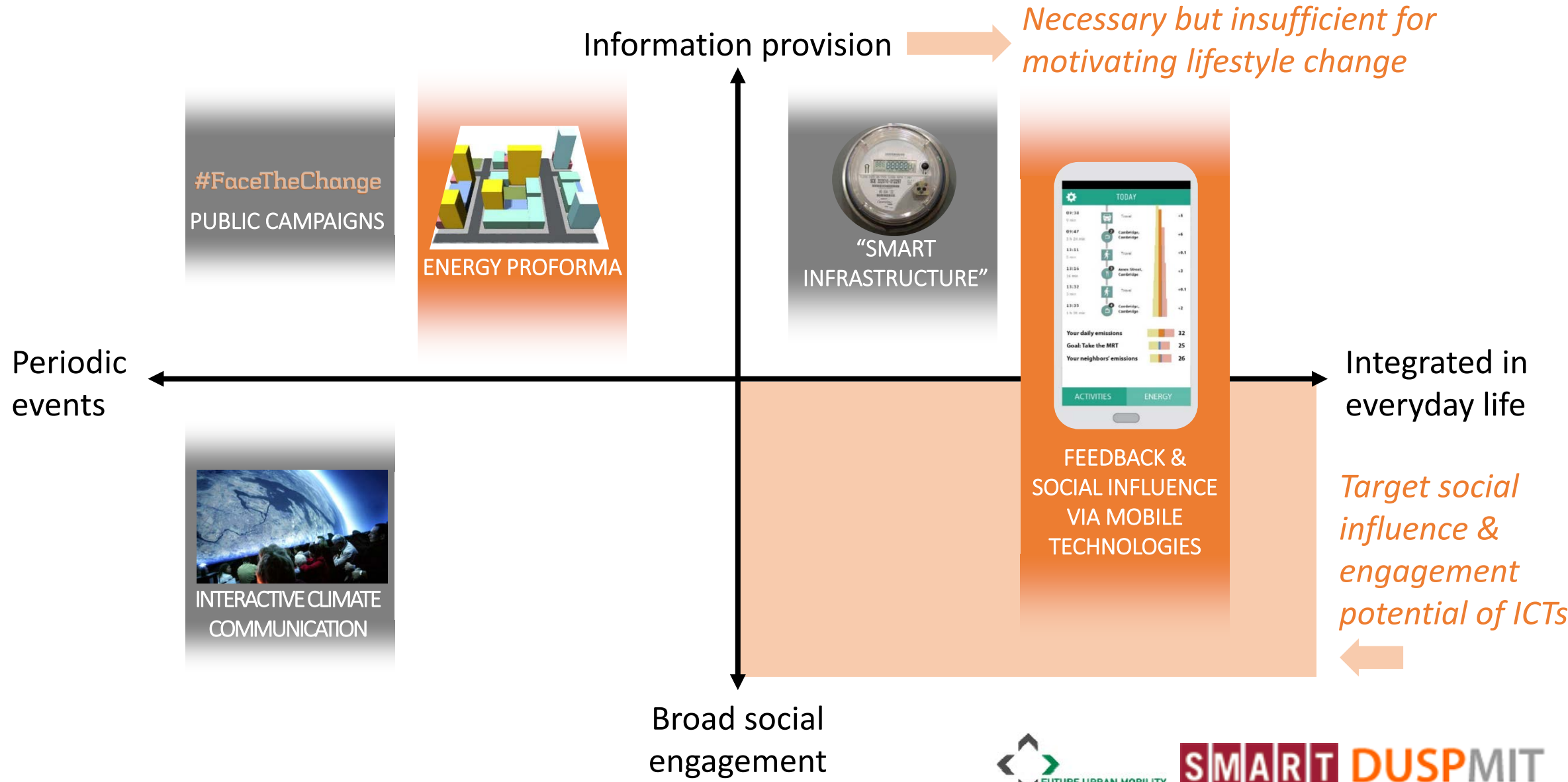


Peshkova/Shutterstock.com



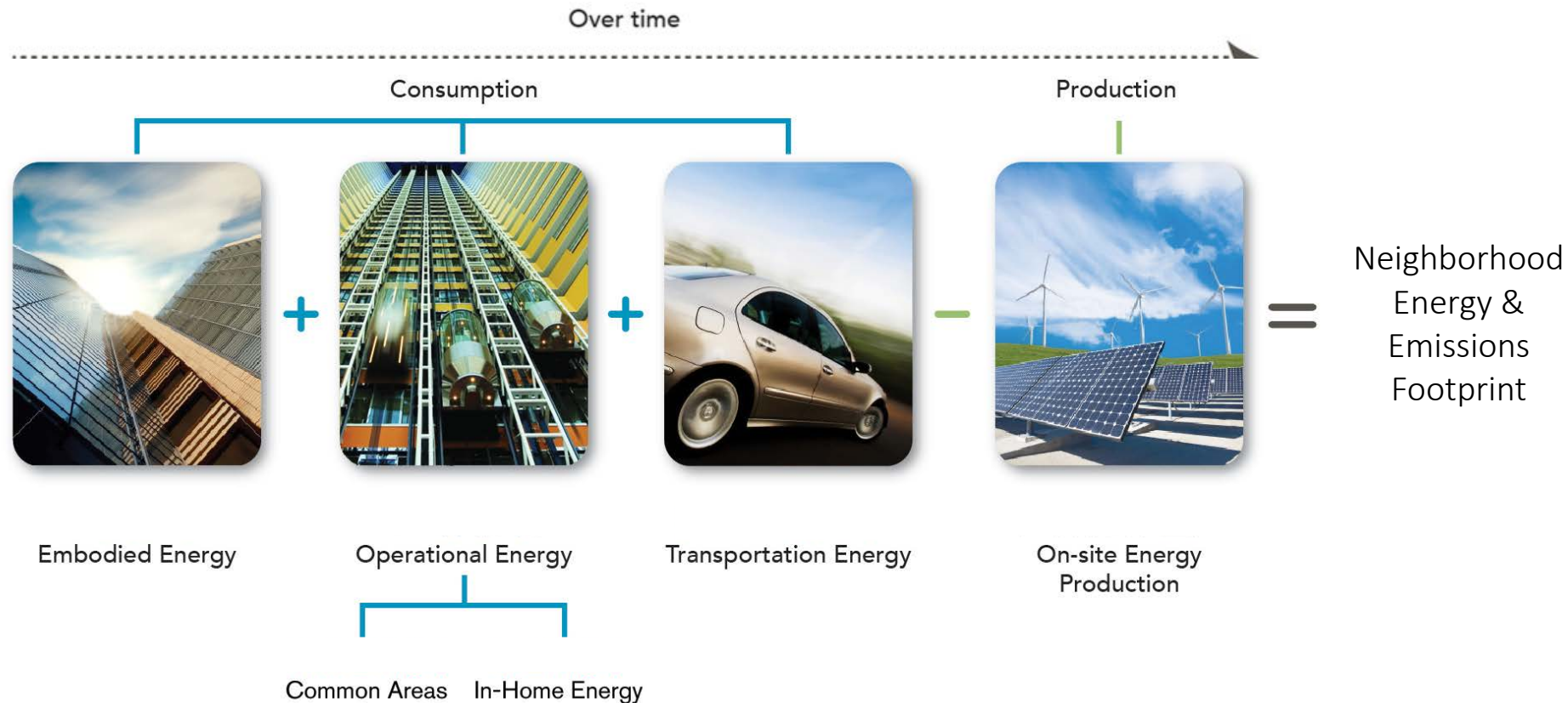
SMART DUSPMIT

All ICT use is not created equal...



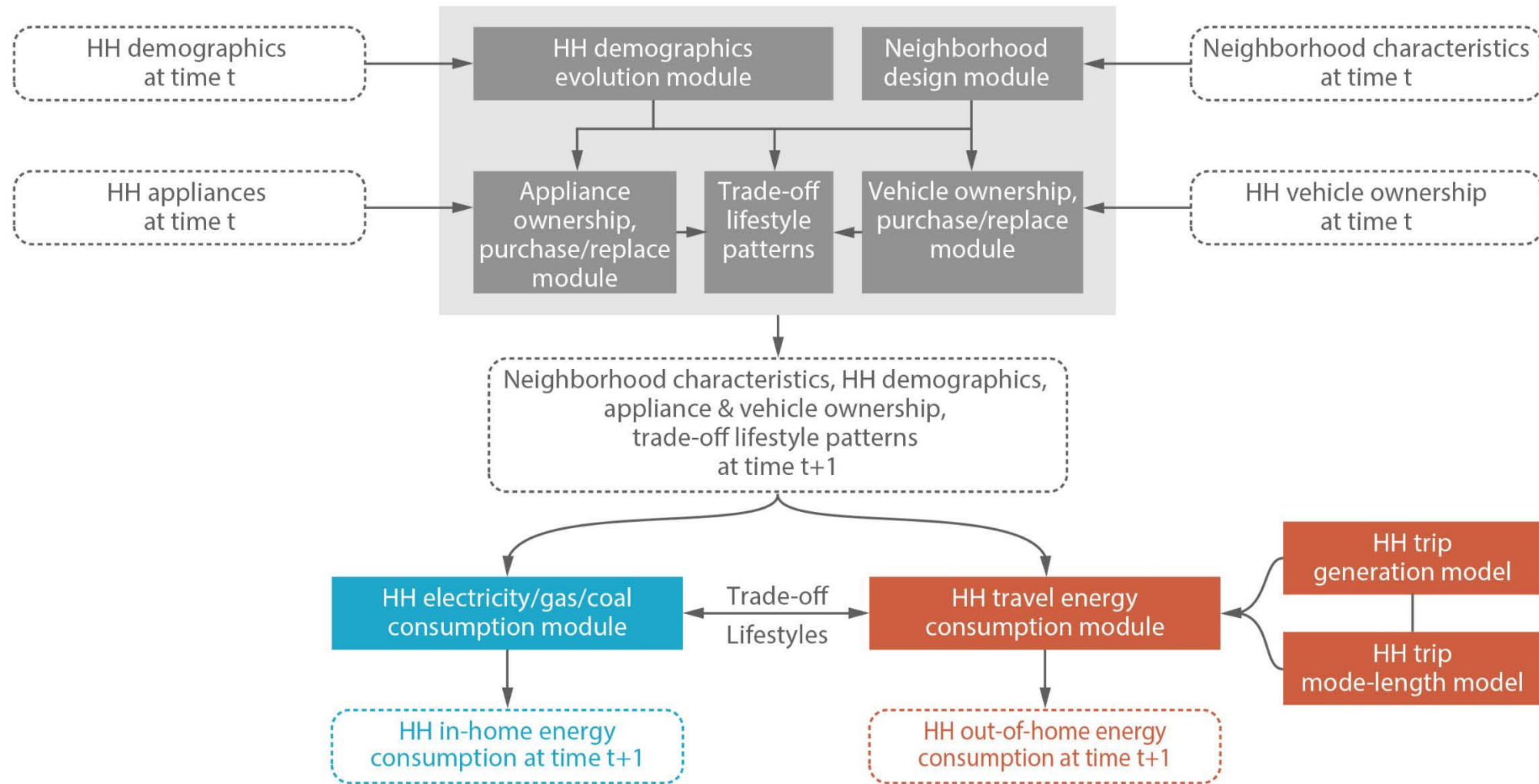
ENERGY PROFORMA[©]

- › Empirically-based simulation of in-home and transportation energy use at neighborhood level
- › Openly available, web-based tool
- › Goal of engaging stakeholders: Planners, developers, policy makers



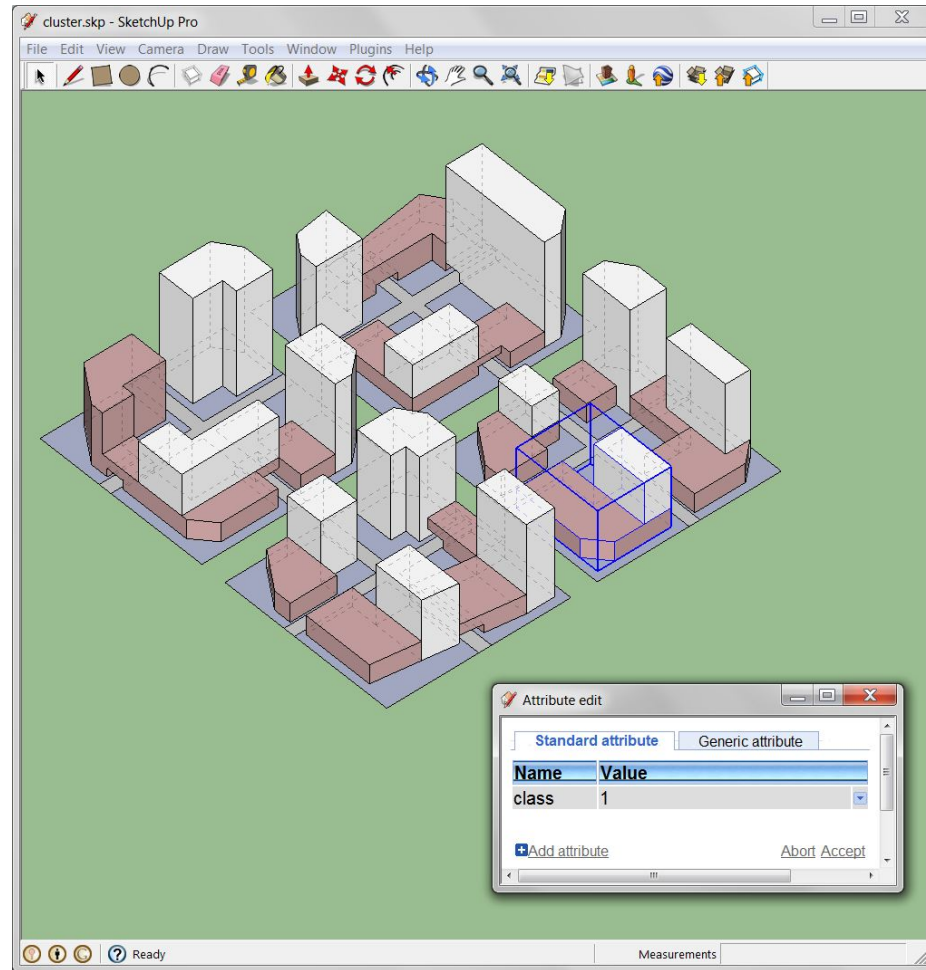
ENERGY PROFORMA

INTEGRATED RESIDENTIAL AND TRANSPORT BEHAVIORAL MODEL



ENERGYPROFORMA.mit.edu

ONLINE RAPID ENERGY ASSESSMENT TOOL



ATTRIBUTES

Indicators Extras Details

Avg Building Height: 31 m

Building Coverage %: 40 %

South-Facing Wall %: 21 %

Building Function Mix: 0 %

Avg Building Footprint: 1500 sqm

% GF Commercial Area: 50 %

Apt Avg Unit Size: 150 sqm

Roof PV Coverage: 50 %

Save Reset

ENERGY AND CARBON ESTIMATE

Energy Consumption Carbon Emissions

kwh/year Output Type

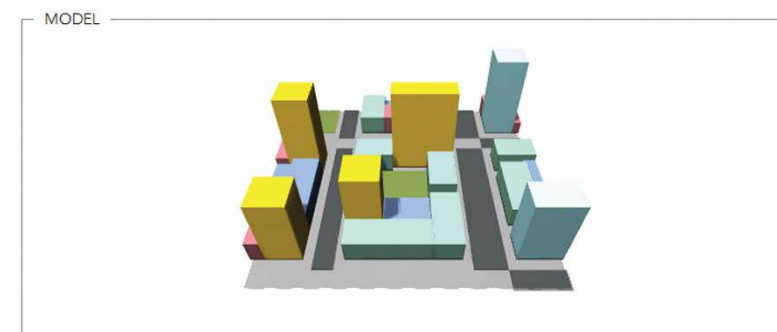
	OP	TR	EM	RE	Total
Original	77.2	61	38.6	-4.5	172.3
Current	77.2	61	38.6	-4.5	172.3
Difference	0	0	0	0	0

ENERGY ANALYSIS

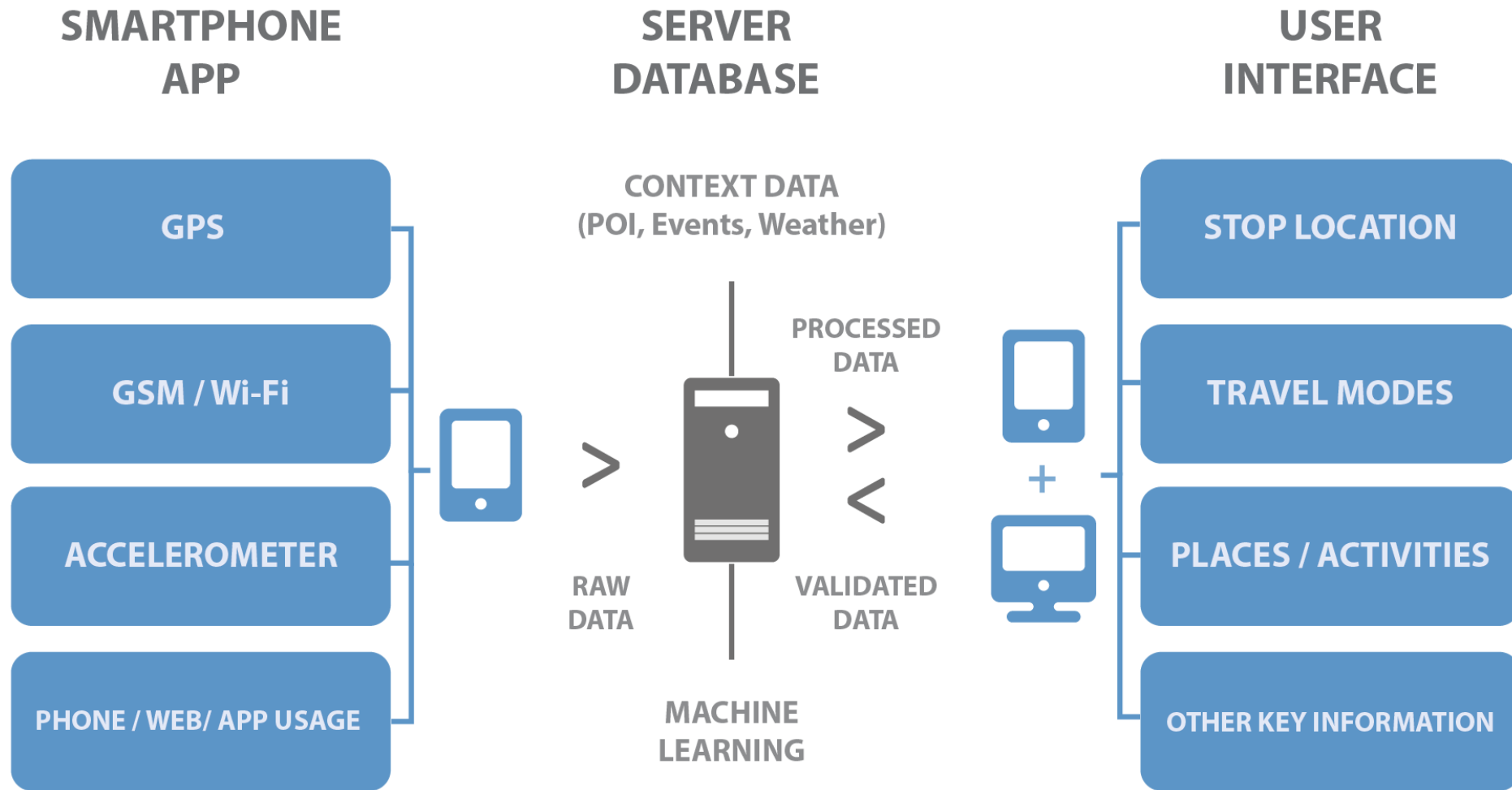
OP TR EM RE

Information

- Centralized Heating
- Gas
- Porosity
- Building function mix
- Air conditioners
- Apartment unit area
- Renter
- One or more child
- Three or more adults in III
- Two adults in III
- Intercept

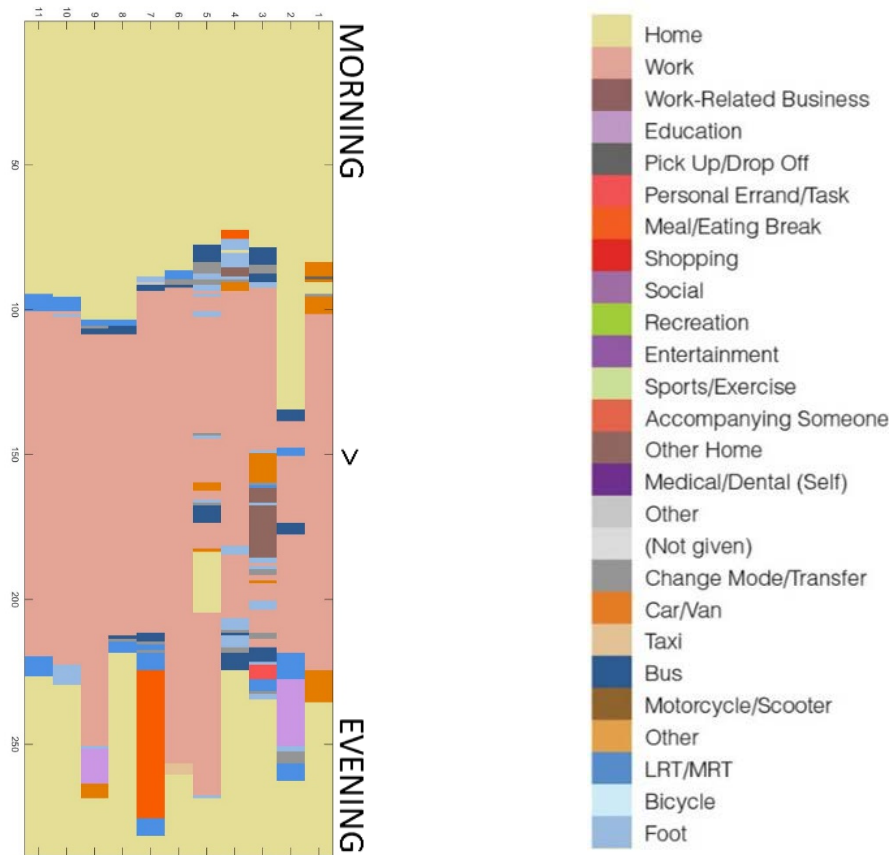


FUTURE MOBILITY SENSING (FMS)



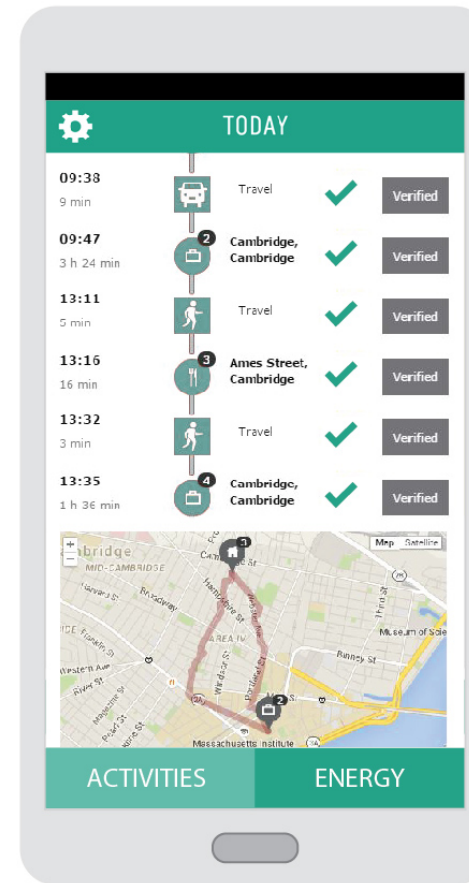
FUTURE MOBILITY SENSING (FMS)

Next-generation activity-travel survey tool, using smartphone logging capabilities



ACTIVITY LOGGING

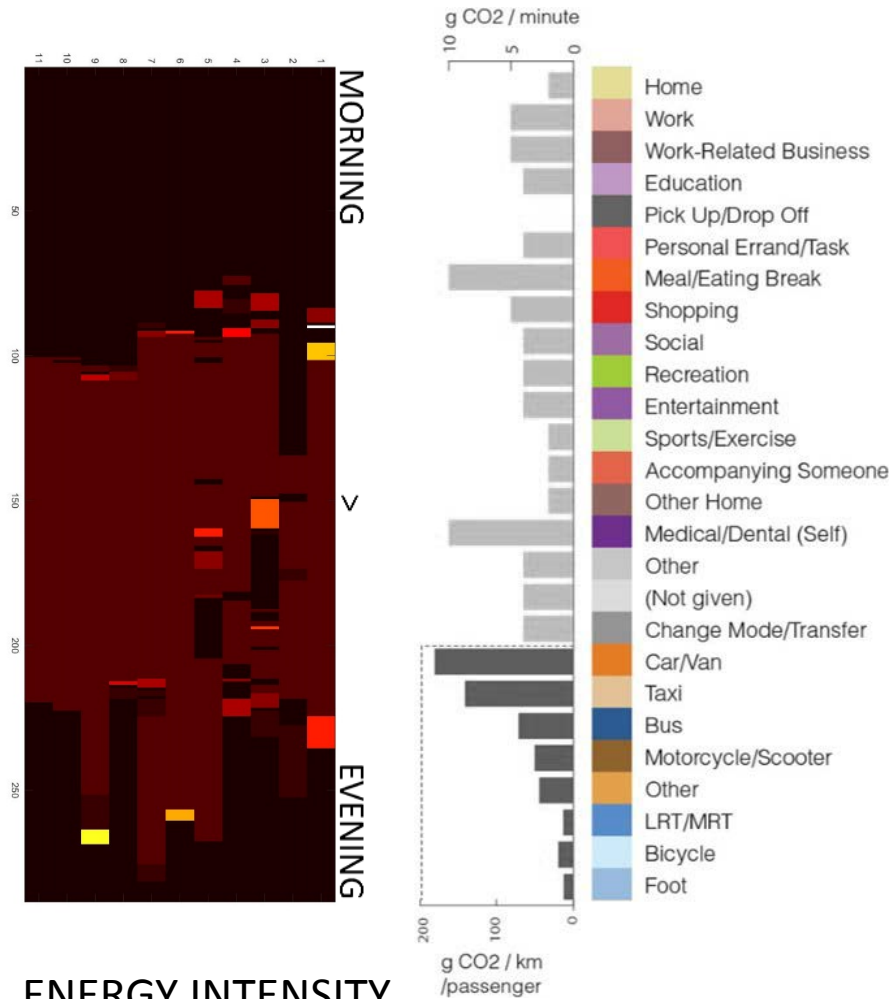
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ACTIVITY VALIDATION

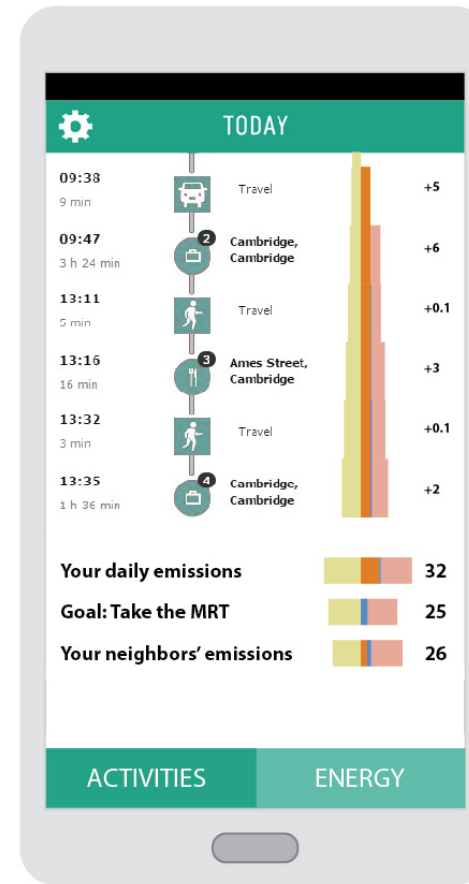
FMS + ENERGY AND EMISSIONS ASSESSMENT

Creating a high-resolution, bottom-up “activity-based carbon footprinting,” analysis, and feedback tool



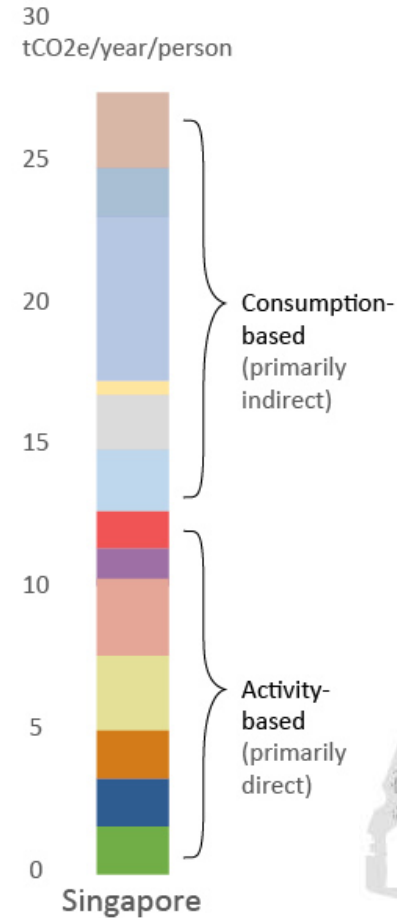
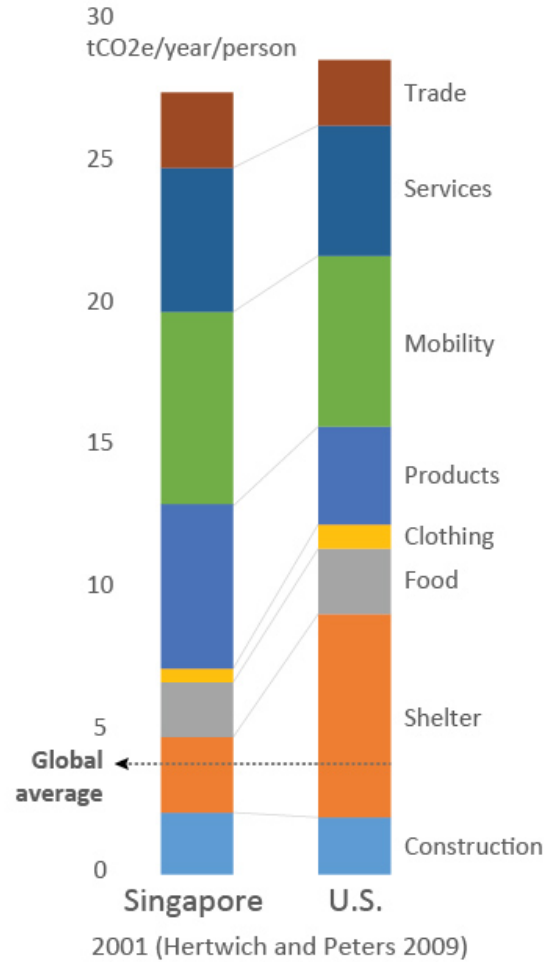
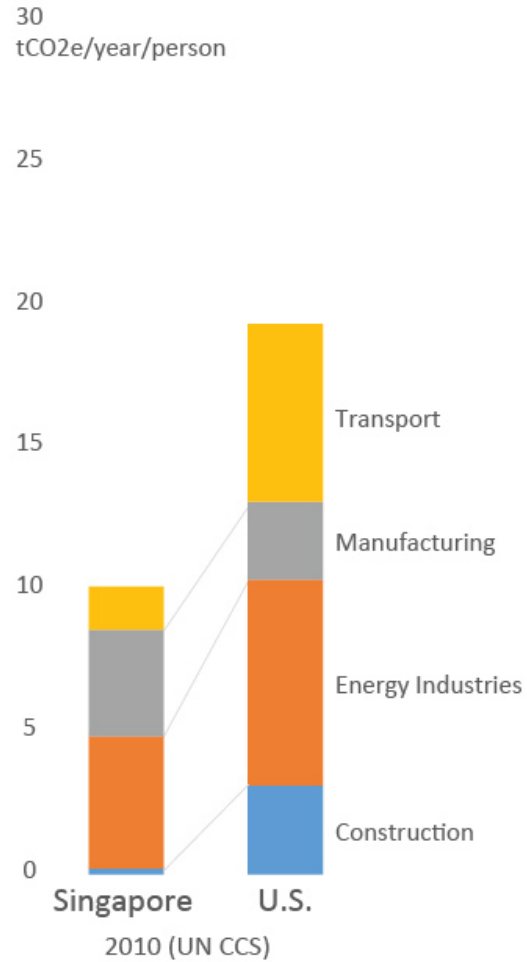
ENERGY INTENSITY

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ENERGY FEEDBACK

(HUMAN) ACTIVITY-BASED CARBON FOOTPRINT



SECTOR-BASED

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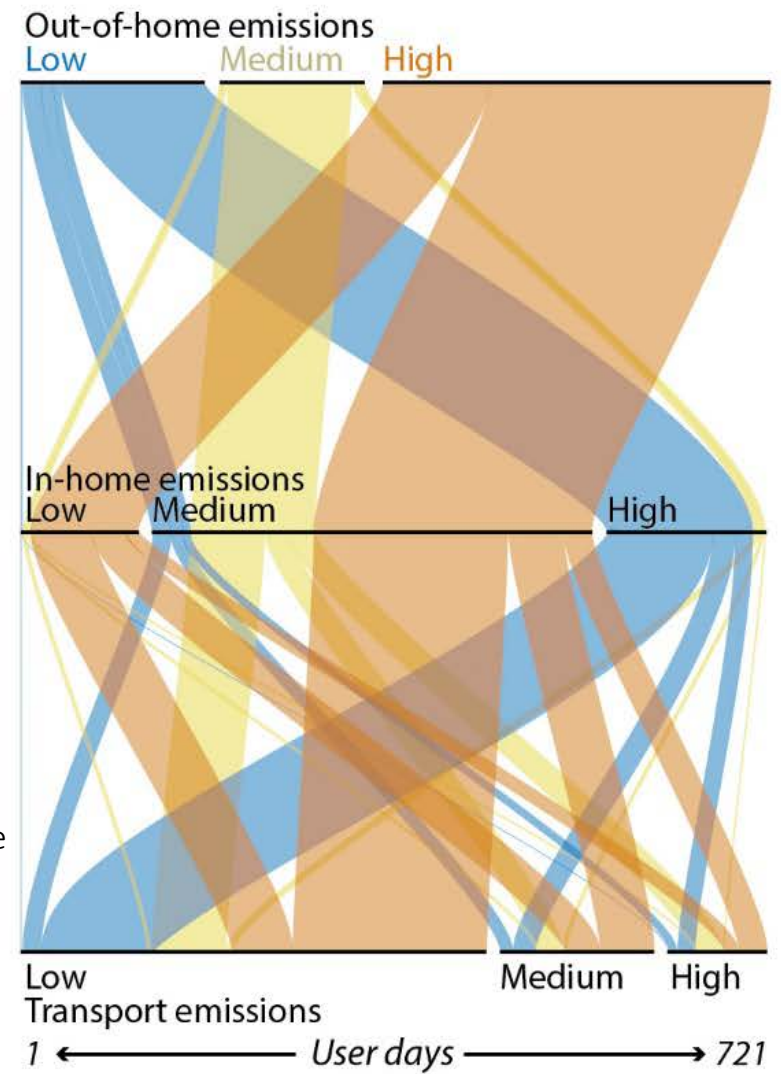
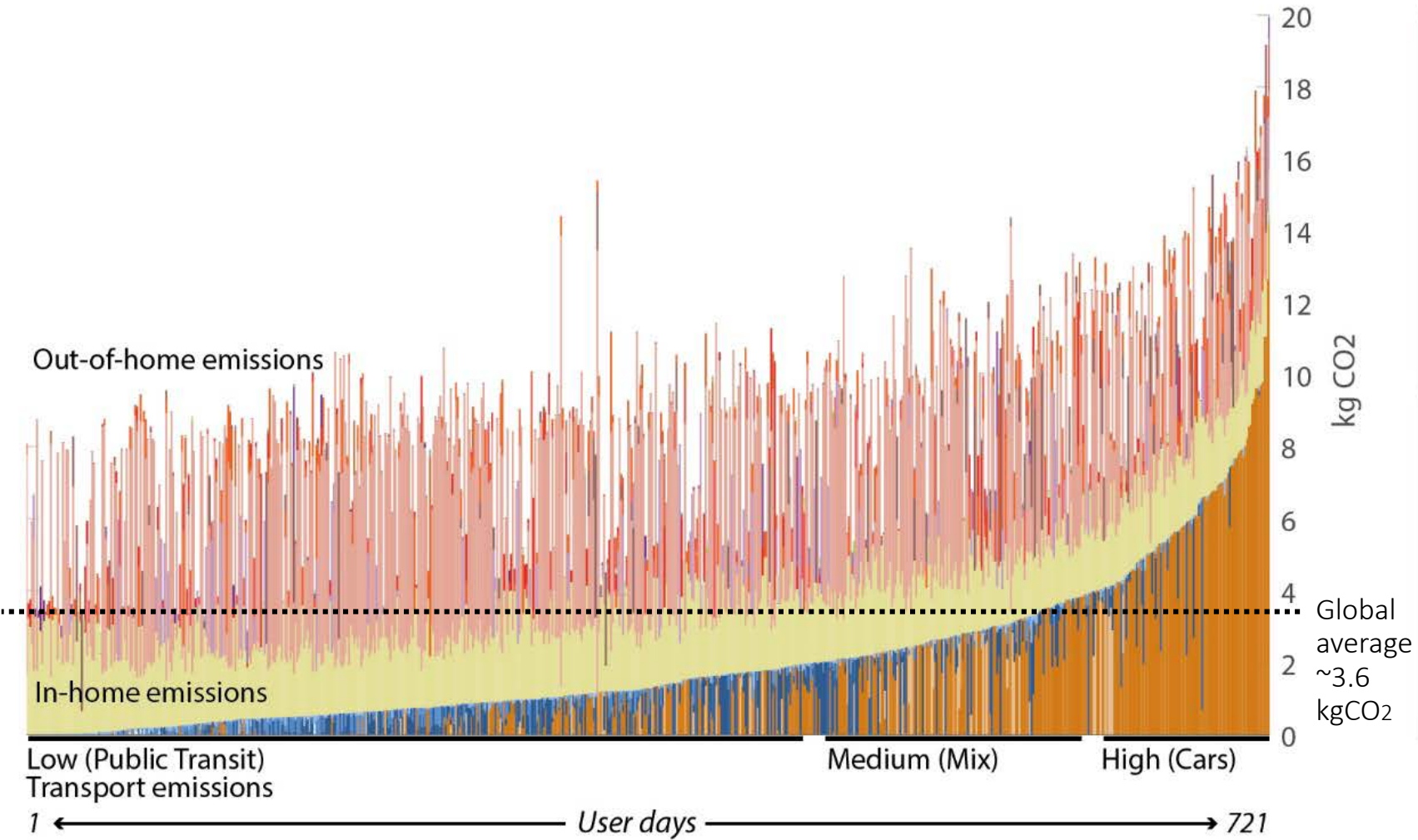
CONSUMPTION-BASED

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ACTIVITY + CONSUMPTION

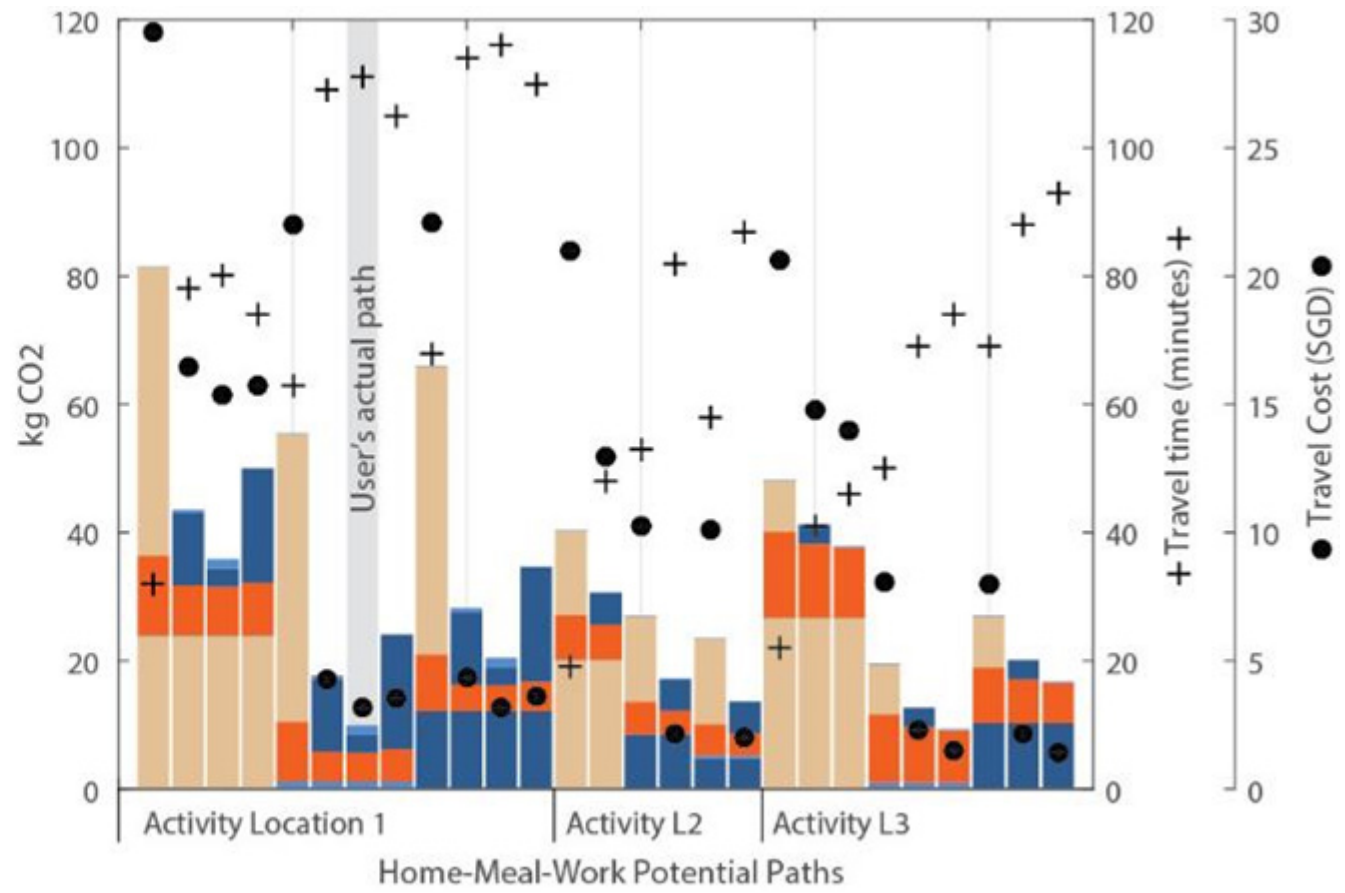
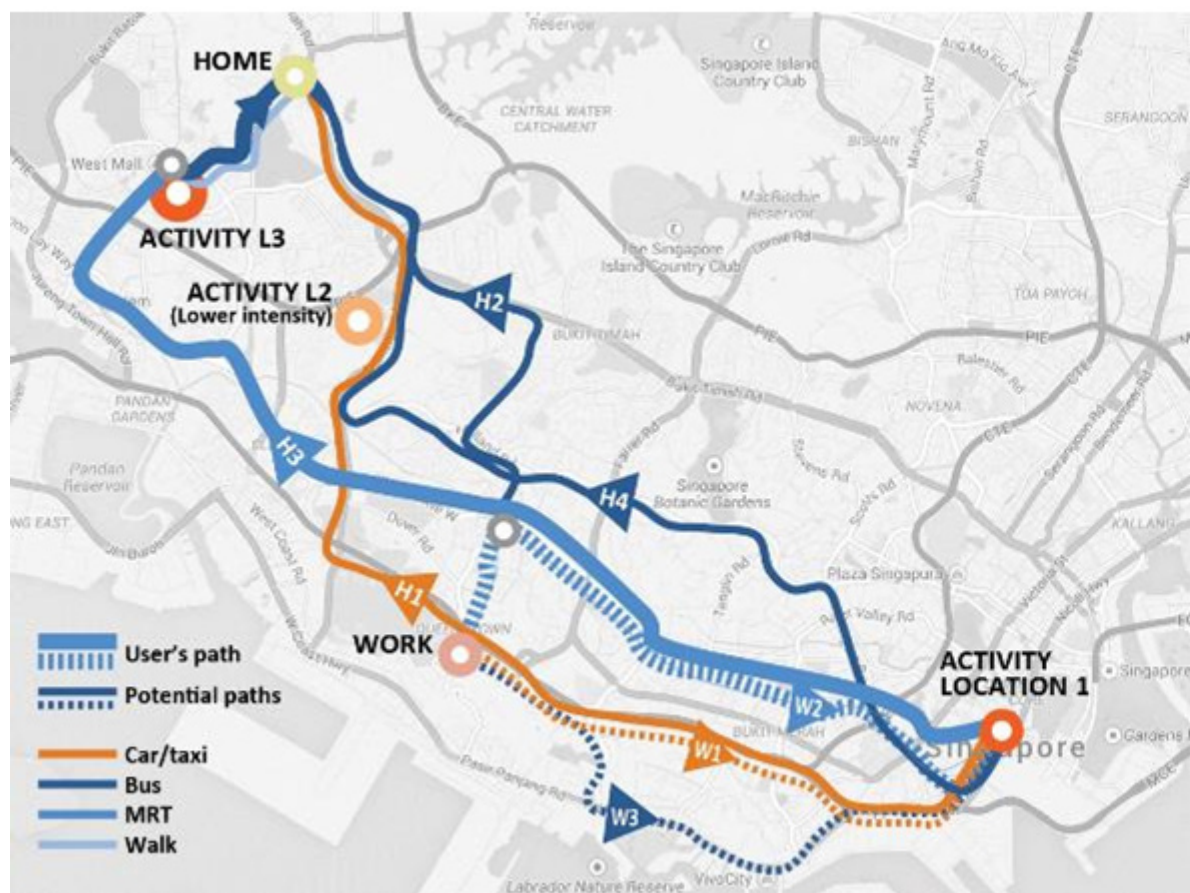
FMS + ENERGY AND EMISSIONS ASSESSMENT

Users' daily emissions across in-home, out-of-home, and transport

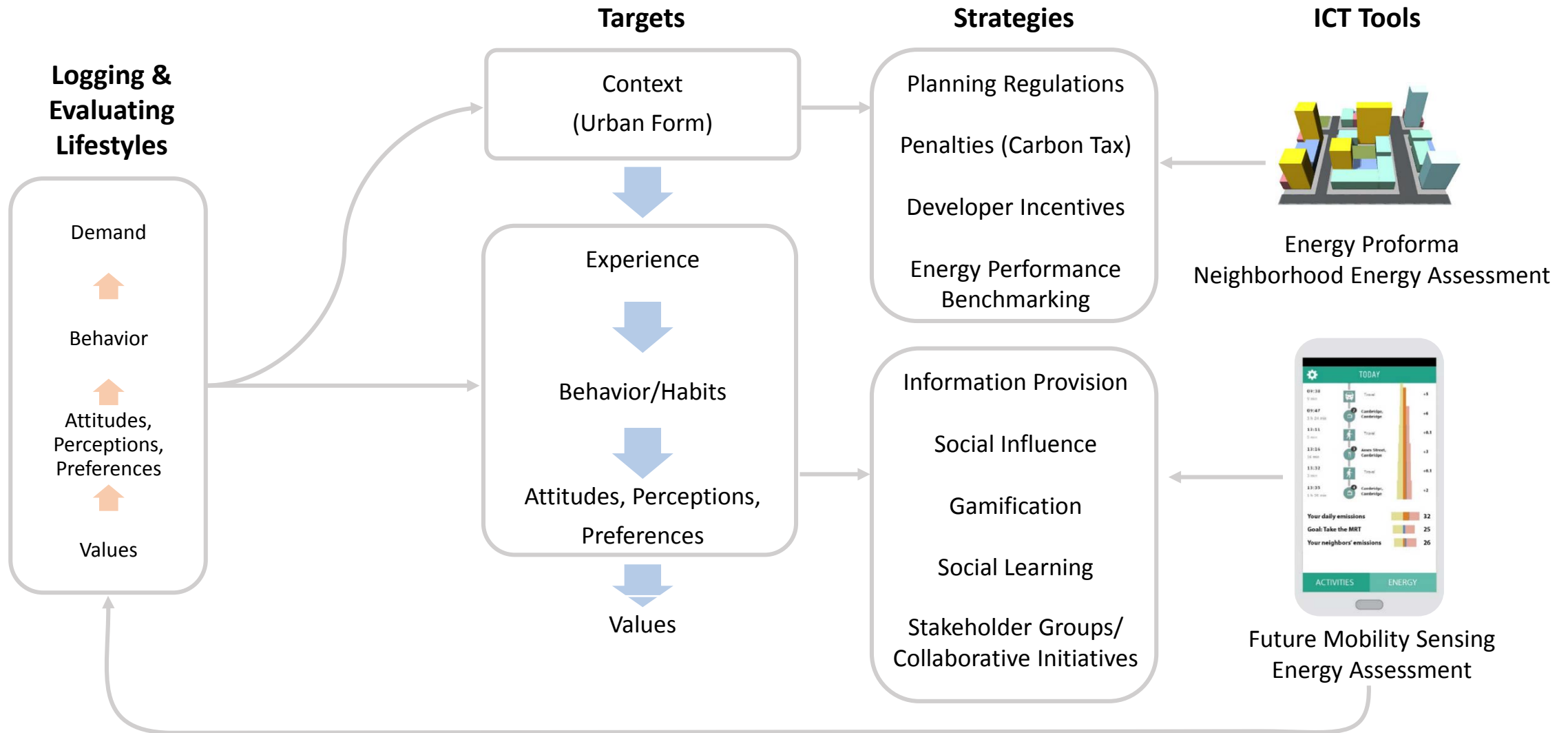


LOW-CARBON ACTIVITY SPACE (ACCESSIBILITY)

Assess relative access to low-carbon services and efficiency of users' activity + paths, w.r.t. energy/emissions costs, temporal constraints, and financial costs



ICTs FOR UNDERSTANDING & MODIFYING HUMAN BEHAVIOR



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