Centre for **Water** **Technology** and **Policy**

The University of Hong Kong

Smart Water Auditing Project

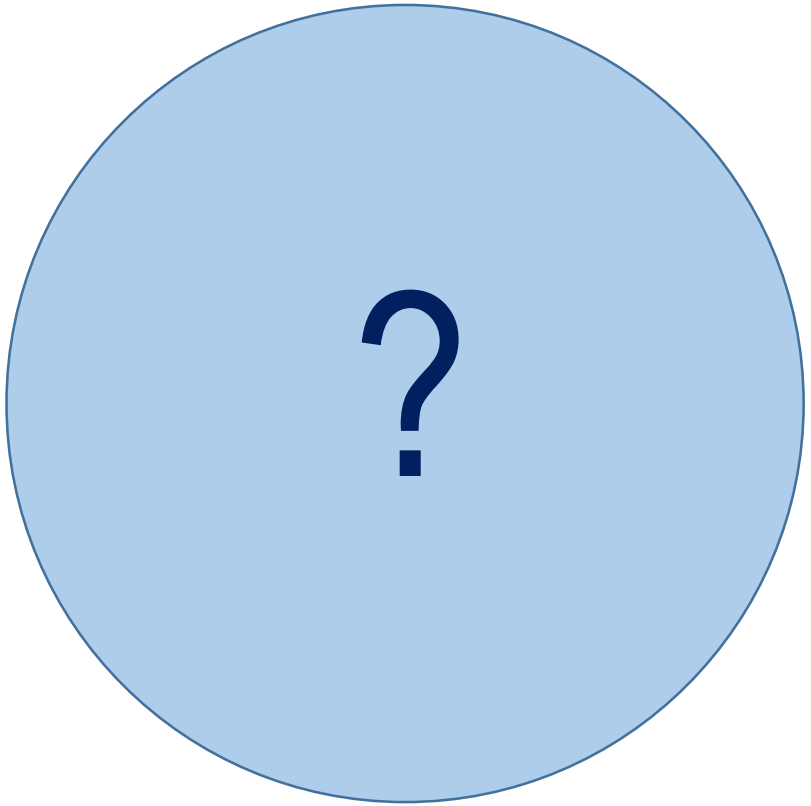
IWRA Smart Water Management webinar

25 September 2019

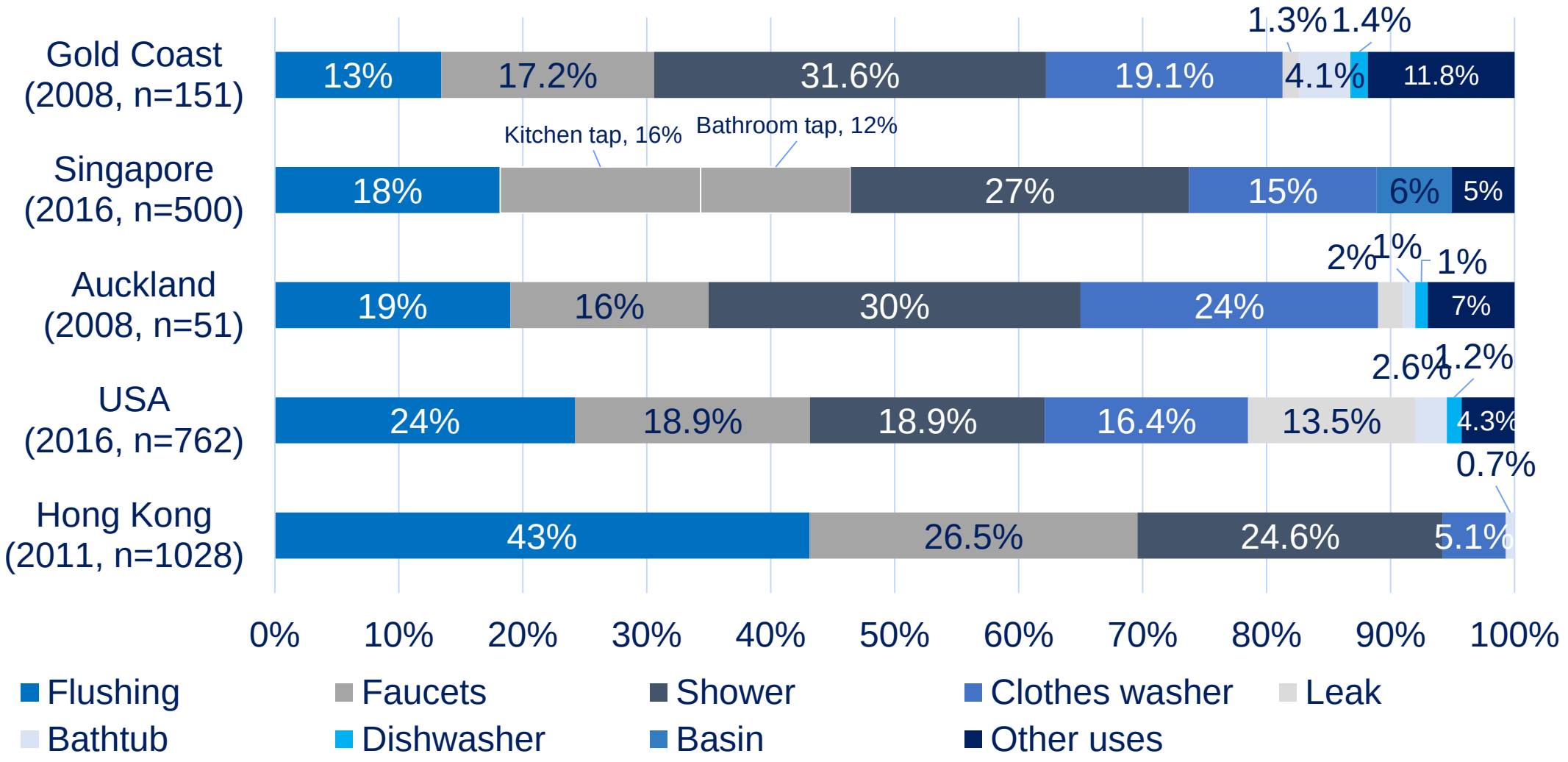
Focus: Domestic water-use composition

Singapore (2016/2017)

Hong Kong



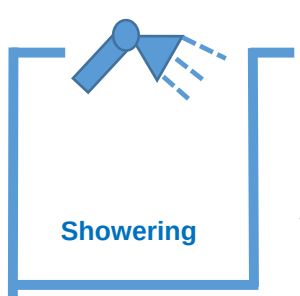
Research gap: Lack of valid domestic water-use data



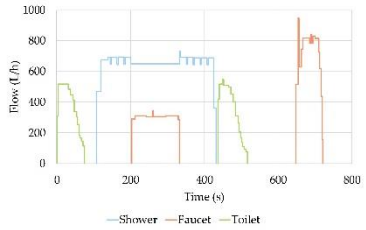
***Project objectives*:**

1. To collect data on domestic water use pattern in Hong Kong
2. To test feedback mechanism on water consumption patterns to empower water users to experiment with and embrace habit-changing water conservation practices
3. To facilitate the formulation of well-targeted water conservation measures and to evaluate the efficacy of such measures
4. To optimize public infrastructure investment in Hong Kong's water supply system

Smart Water Auditing System: A schematic illustration



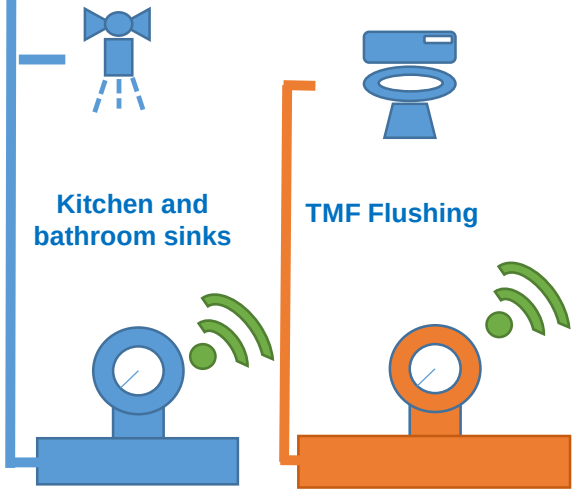
Data transmitted to a cloud system through a wireless network



Data are stored and analyzed in a cloud system

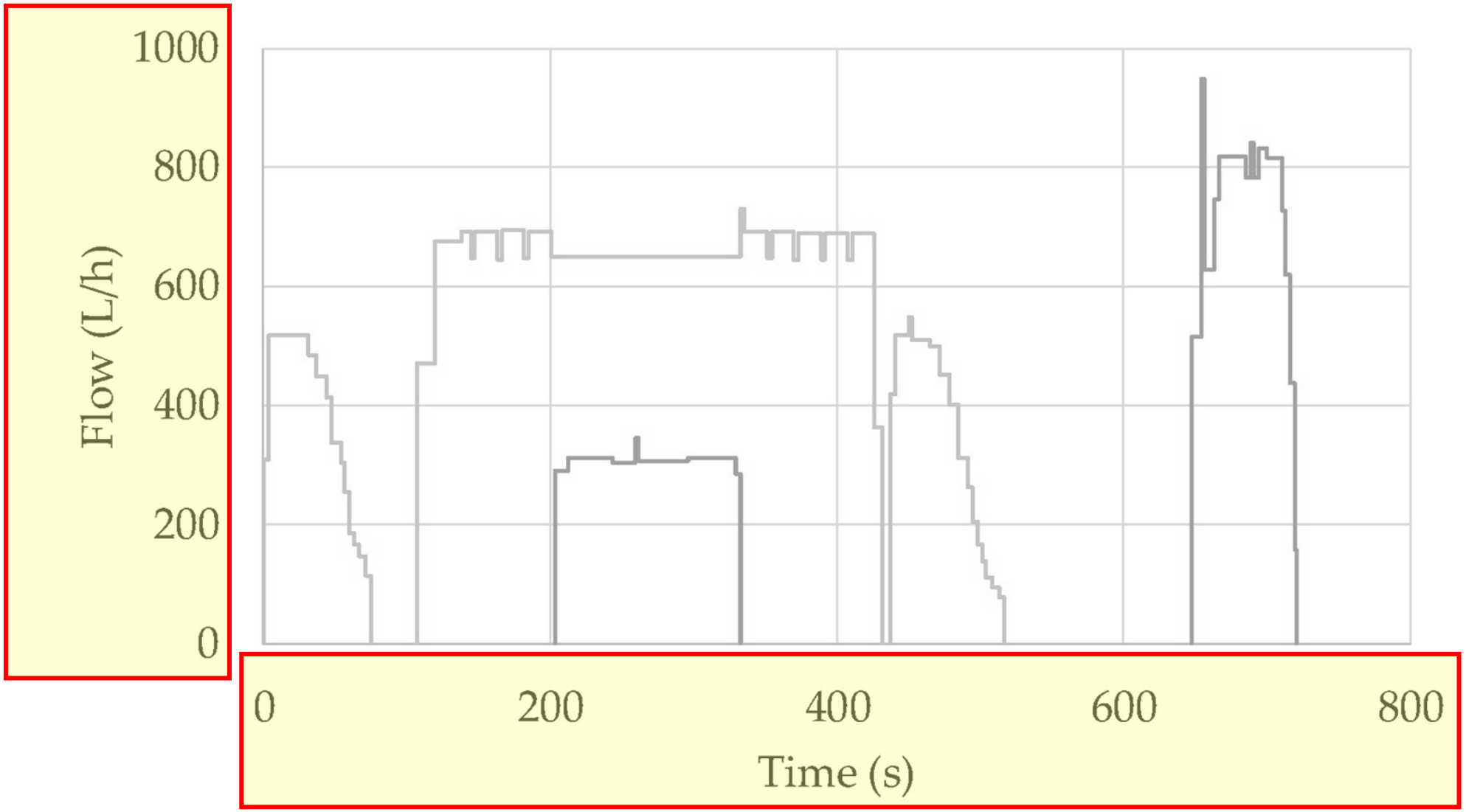
After data analysis, users will be able to access their usage details through their mobile devices

Behavioral changes in water use habits as reflected by ex post water usage pattern

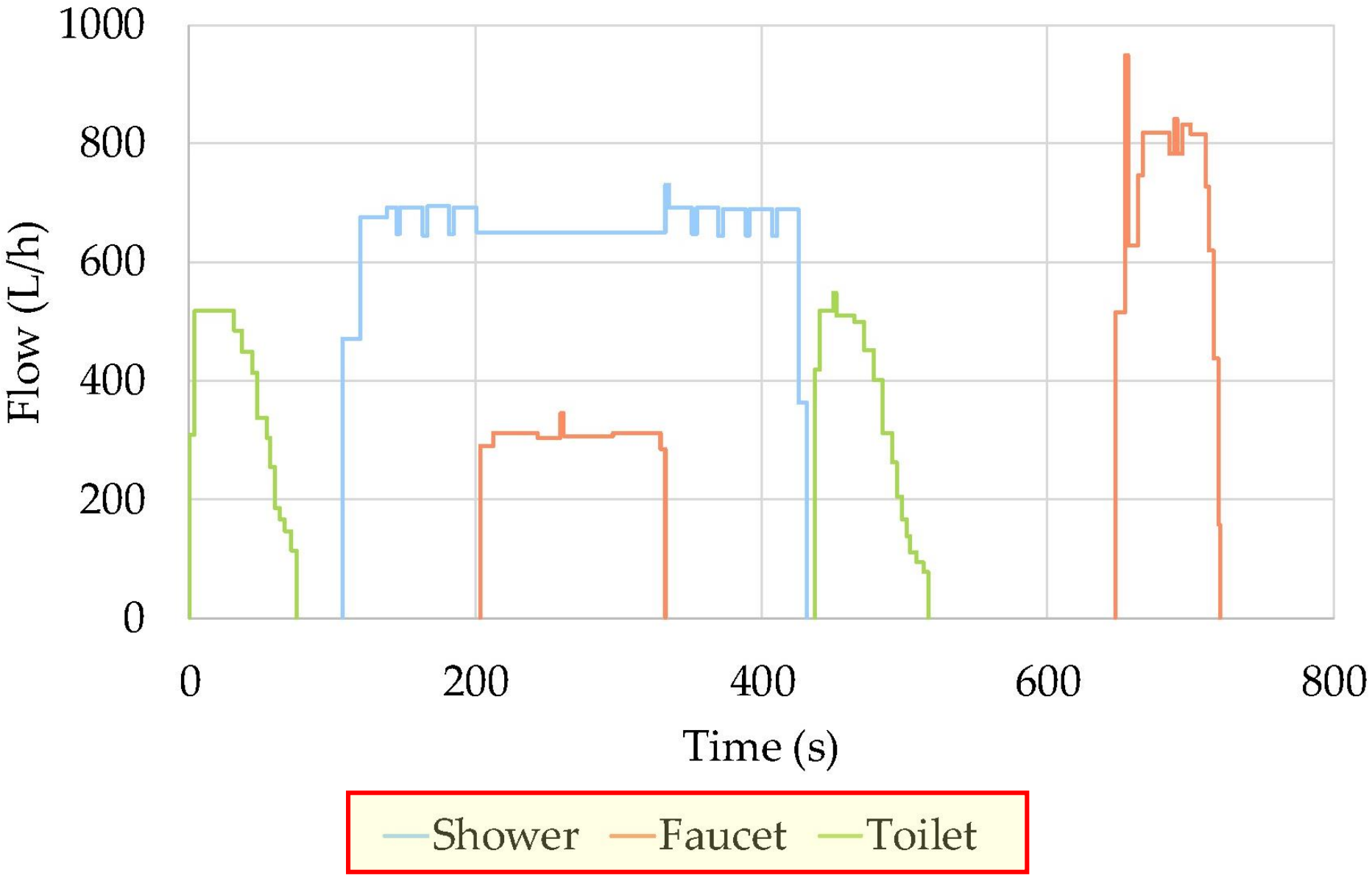


Data collection by smart meters at each household

SWAS: Require high-resolution water-use data



Machine learning: To disaggregate each water end use event



Smart meter & data transmission device: Option 1

Elster mechanical meter with an electronic register (WRAS*)

3G

*Water Regulations Advisory Scheme (UK)

Smart meter & data transmission device: Option 2

Huizhong NB-IoT
Ultrasonic meter
(Australian & EU standards)

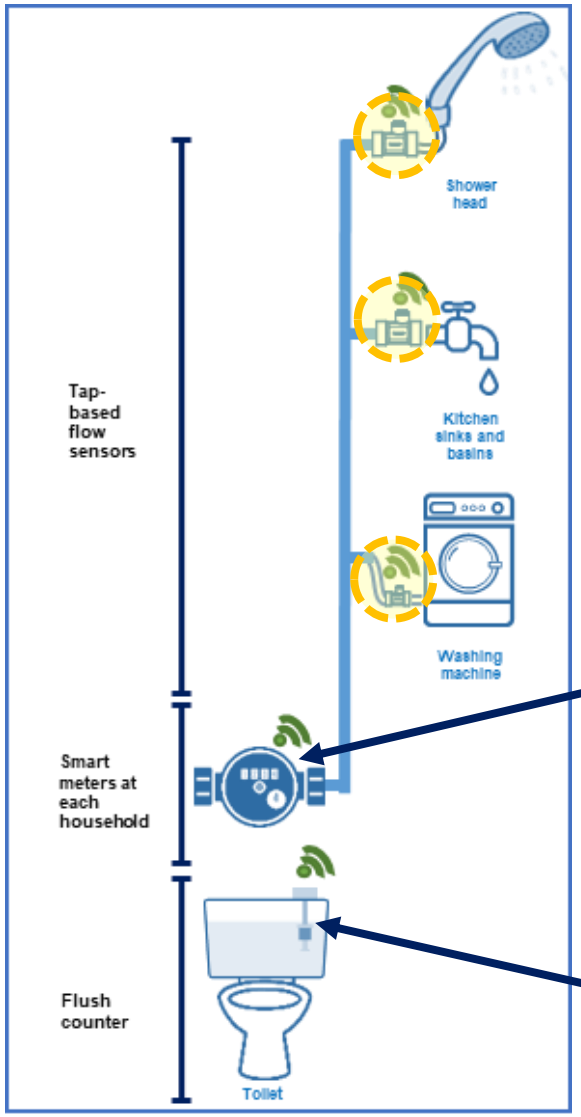
NB-IoT

Smart meter & data transmission device: Option 3

Sensus EM Meter (WRAS)

Drive-by data collection

Tap-based flow sensor



Flow sensor

Smart meter

Flush counter

- Verify & calibrate data collected by smart water meter
- Materials: plastic
- Connected to external power banks
- Send data through participant's wifi network

Tap-based flow sensor

Technical Issues:

1. Where is a good location to install a smart meter?
2. Do we need a letter to certify that the flow sensors and smart water meters comply with standards for contact with potable water?
3. Risk management measures required:
   - Contractors All Risks / Third Party Liability Insurance Policy
   - Home insurance
4. Data security & data ownership?

Research design: Issues for discussion

- Sampling strategy
  - What are the constraints posed by available technologies?
  - What are the site constraints?
- Data
  - What is the minimum resolution of data?
  - Are we going to collect empirical data on seawater usage?
  - How to ensure privacy and cyber security?
- Feedback mechanism
  - How frequent should the feedback interval be?
  - How to provide feedback to users (app vs mobile webpage)?