INVESTIGATING THE USABILITY OF OFF-THE-SHELF SENSORS AND USING PATIENT DATA TO DIAGNOSE FRAILTY

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WEARABLE SENSOR TECHNOLOGIES
SENDoc

BACKGROUND

- Healthcare systems overwhelmed with an increasing demand due to population aging

- governments promoting remote/ in-home rehabilitation as a potential solution to reduce costs and free up resources in critical hospitals

- Remote home rehabilitation can empower patients to have control over their own rehabilitation process

- Wearable sensor technology is transforming rehabilitation processes by providing valuable information which previously was not available, to health care staff and patients
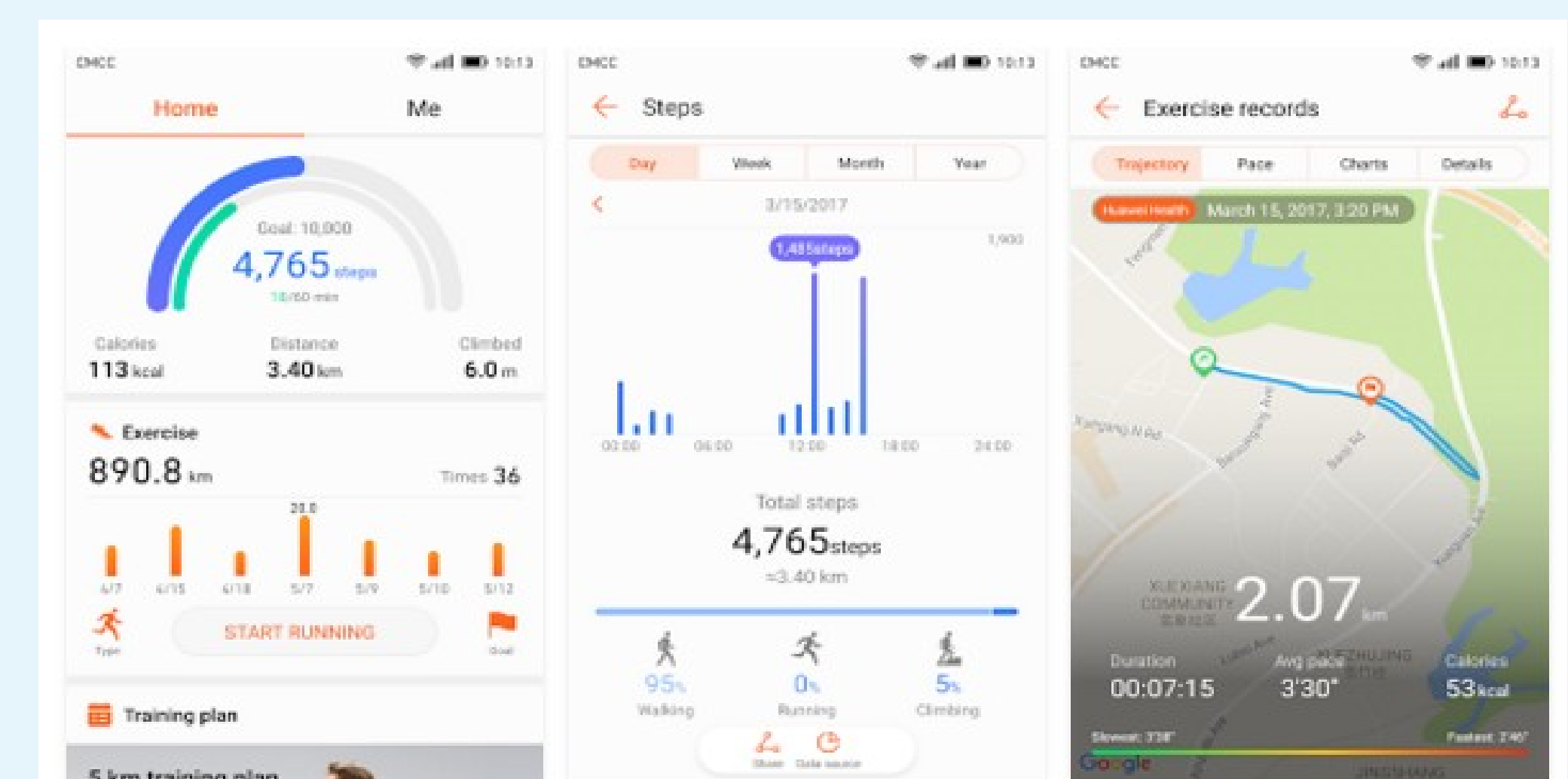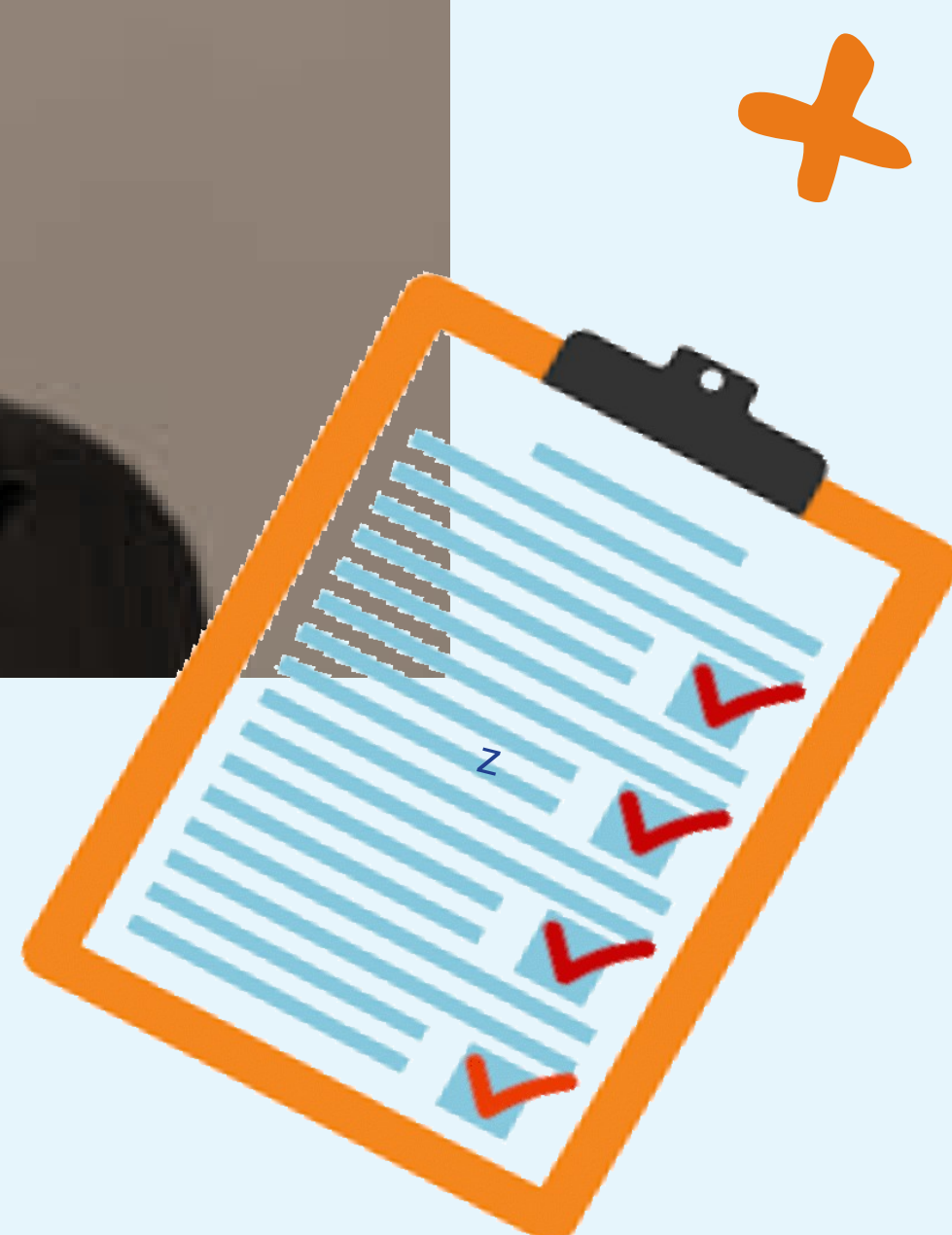
OBJECTIVES

1ST Investigate usability of wearable sensors within elderly rural population

2ND Investigate effectiveness of "off the shelf sensors", e.g. activity trackers, in detecting/diagnosing frailty

ACTIVITY MONITORING WITH OFF-THE-SHELF SENSORS

PATIENT HEALTH RELATED AND USABILITY QUESTIONNAIRES

USABILITY??

AVOID FRAILTY??

MATERIALS, METHODS AND EVALUATION

- In our SENDoc NPA project, we are evaluating the effectiveness of off-the-shelf wearables for monitoring and rehabilitating remote and rural patients

- we are conducting demonstrations in 4 partner locations, where healthy participants aged over 60 years will wear a Mi Band activity tracker (Mi Global Home, 2018), a data logger and a smartphone to attain comparable data

- The usability of this technology will be assessed from elders' perspective

- The data attained will then be analysed in combination with medical patient data to identify frailty

- We hypothesise that off-the-shelf sensors can be used to automatically identify frailty

- Look at the correlation between patient physical activity and patient data. Number of steps and physical activity and exercises performed, sleep tracking and heart rate. The latter will be looked to calculate energy expenditure.

- Statistical methods and qualitative usability questionnaires will be applied to validate or reject this hypothesis.

- Artificial Intelligence and machine learning methods will be employed to classify frail and pre-frail patients from non-frail patients

PRELIMINARY PHASE
(pre-configuration, setup and collection of patient data)

DEVICES ARE HANDED TO PARTICIPANTS
(with booklet, manual or FAQ)

PARTICIPANTS WILL RETURN DEVICES AFTER 5-7 DAYS
(fill in usability survey and data collected will be analysed)

EXPECTED OUTCOMES

Results are not available at this stage. However, we expect that on-time therapeutic and medical advice can assist patients to recover full capacity, before frailty becomes irreversible

Other expected outcomes are:
- Enhanced understanding of elders' perception about using wearable sensors to gain awareness about their level of physical activity and overall state of health
- Attaining usability metrics of the available off-the-shelf wearable sensors
- Identifying the difficulties (if any) and advantages faced by elderly people while using "off-the-shelf" wearable sensors
- Attaining patient data that can be analysed/compared across the 4 partner locations of SENDoc
- Being able to diagnose frailty using related medical and patient data. The latter captured using off-the-shelf sensors.

Very fit   Vulnerable   Mildly Frail   Severely Frail