

Towards Personalised Virtual Coaching Based on Self-Determination Theory and Regulatory Focus Theory

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LISN
LABORATOIRE INTERDISCIPLINAIRE
DES SCIENCES DU NUMÉRIQUE

Outline

1. Introduction
2. PADME: personalised motivational application for walking
3. Personalised goal setting
4. Personalised motivational messages
5. Conclusion and future directions

1. Introduction

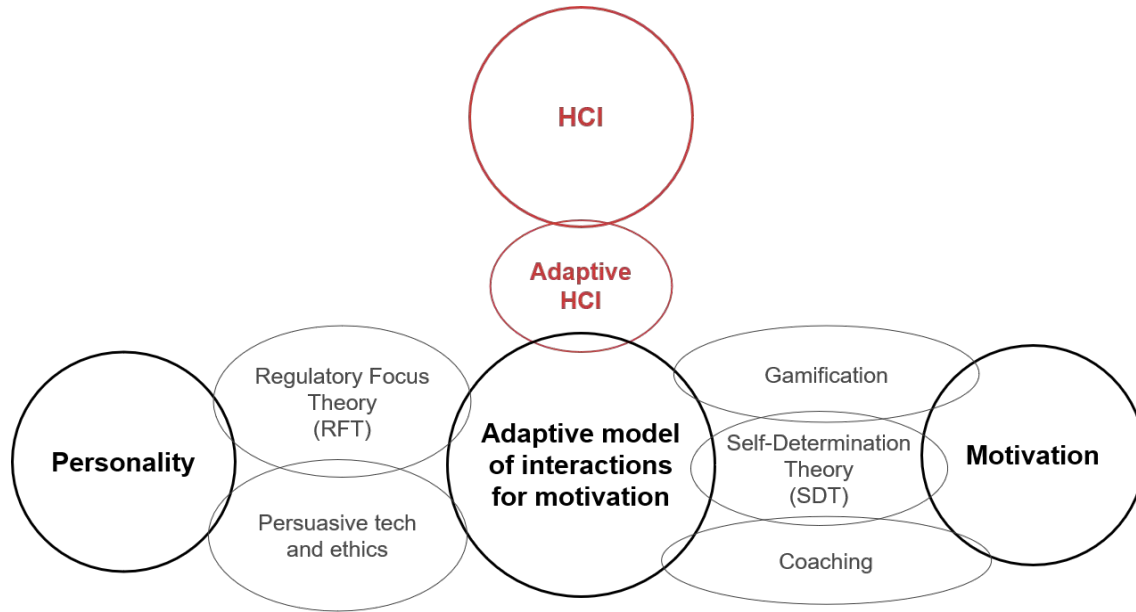
Physical activity and health

- WHO recommends at least 150 min of weekly moderate-intensity physical activity (WHO 2018)
- Physical activity is essential to prevent chronic diseases and sedentariness (Myers 2003)
- Walking interventions exist, mainly with pedometers, less frequently with smartphones (Chaudhry 2020, Monteiro-Guerra 2020)
- Several HCI adaptive models exist, but those based on Psychology theories are scarce



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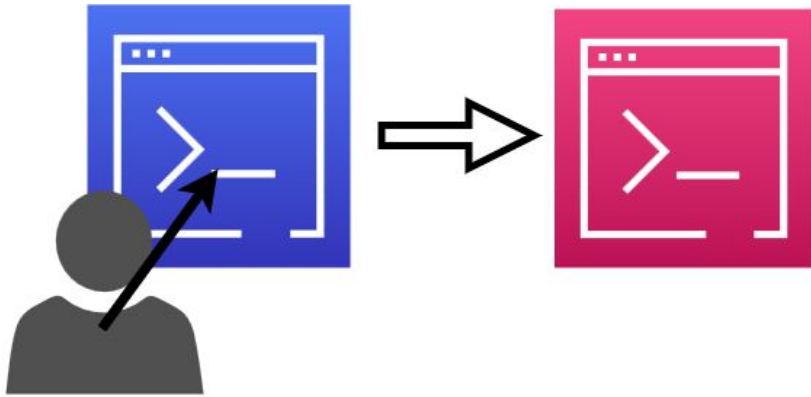
State-of-the-art



- Adaptivity and adaptability (Thevenin and Coutaz 1999)
- Adaptation from user actions (Gobert 2019, Wang and Walker 2021)
- Adaptation from a user model (Fischer 2001, Georgiou and Demiris 2017)

1. Introduction

State-of-the-art



The user changes parameters to alter the system.

Persuasive tech
and ethics

for motivation

(SUI)

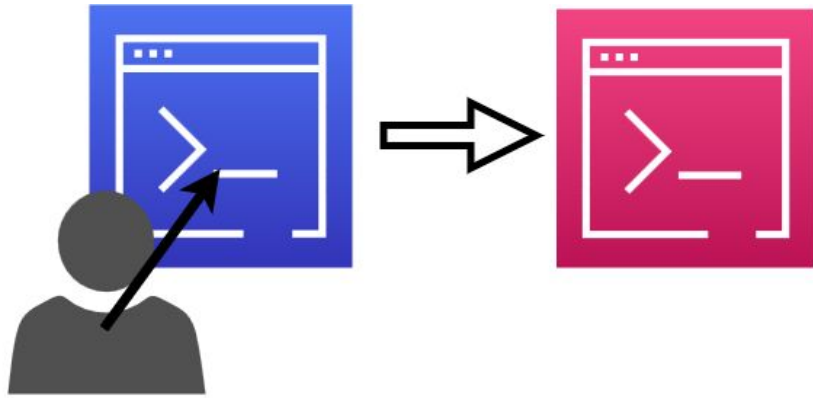
Coaching

Motivation

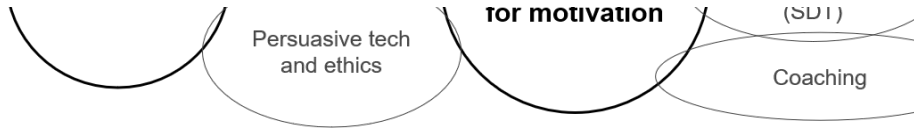
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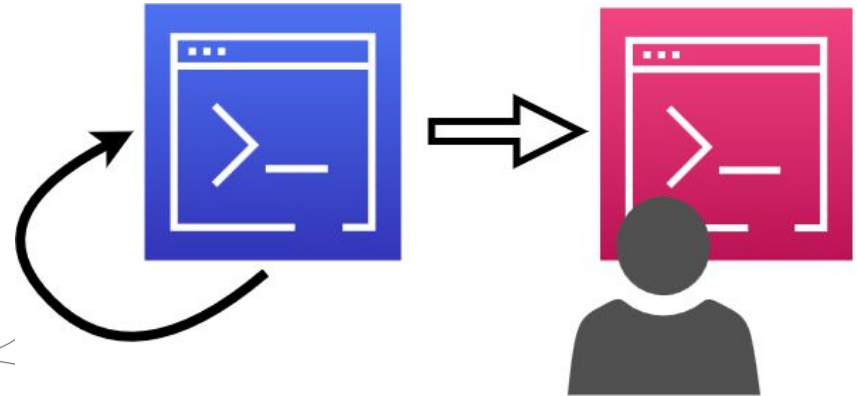
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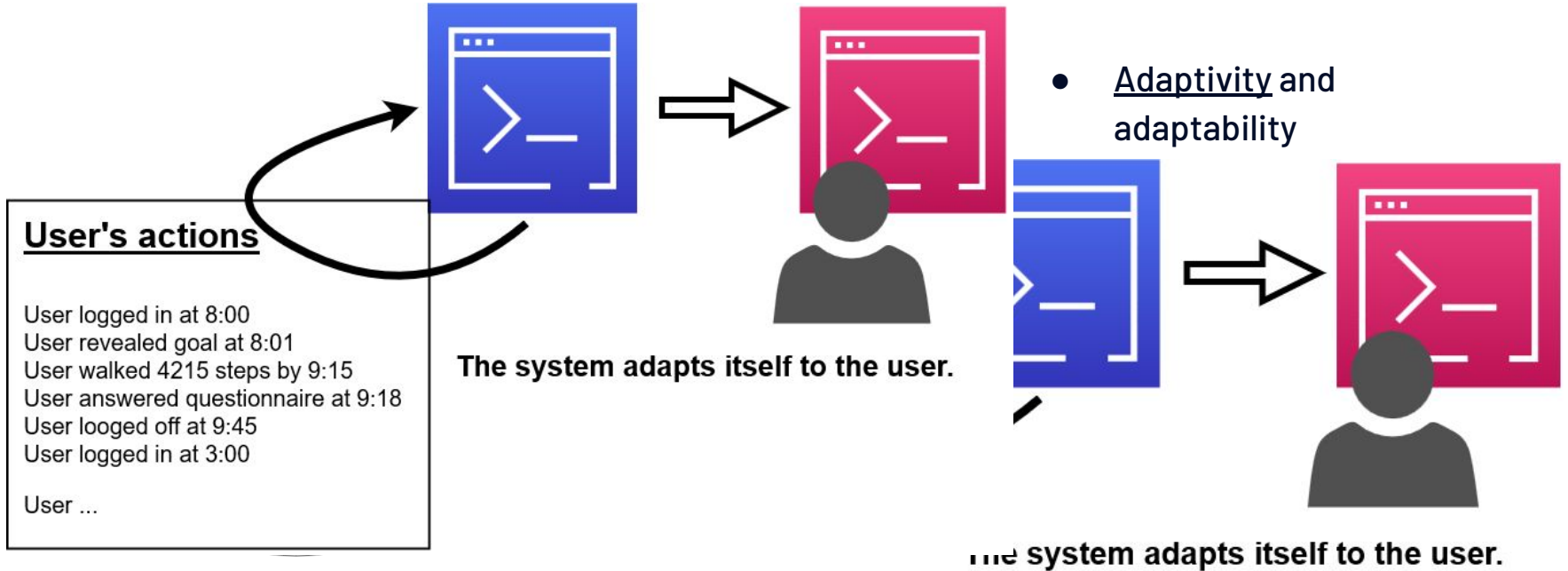
- Adaptivity and adaptability



The system adapts itself to the user.

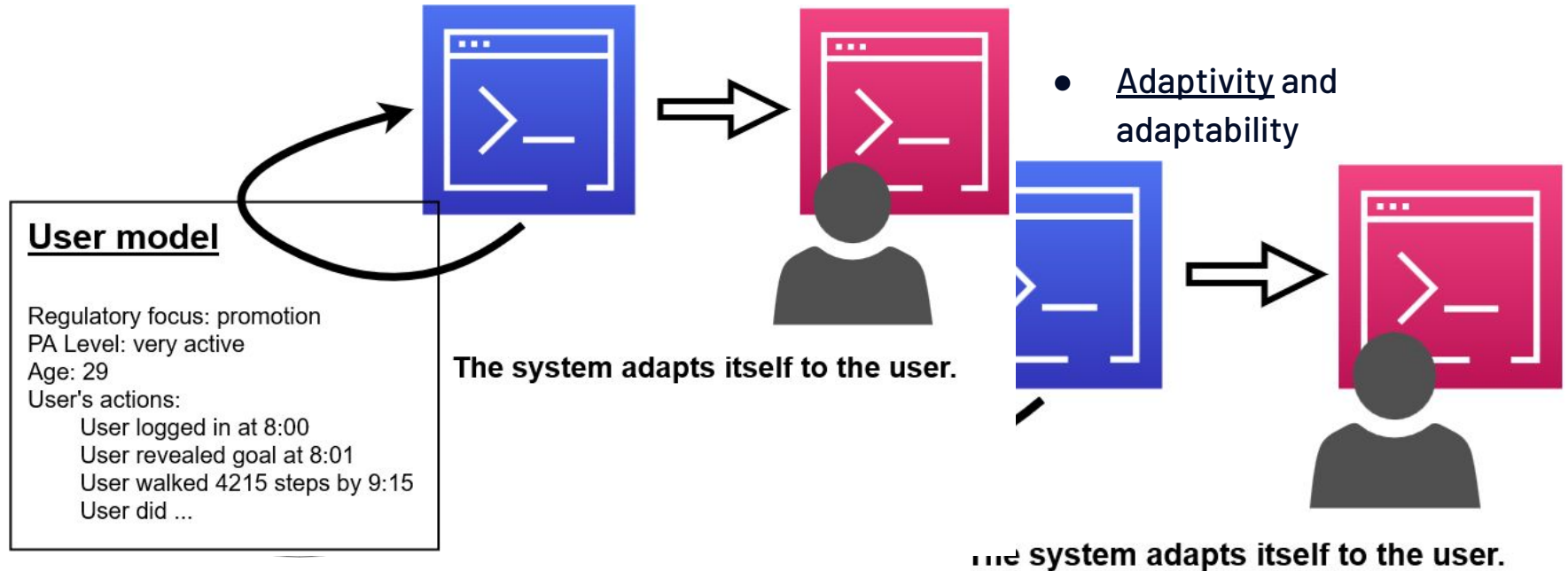
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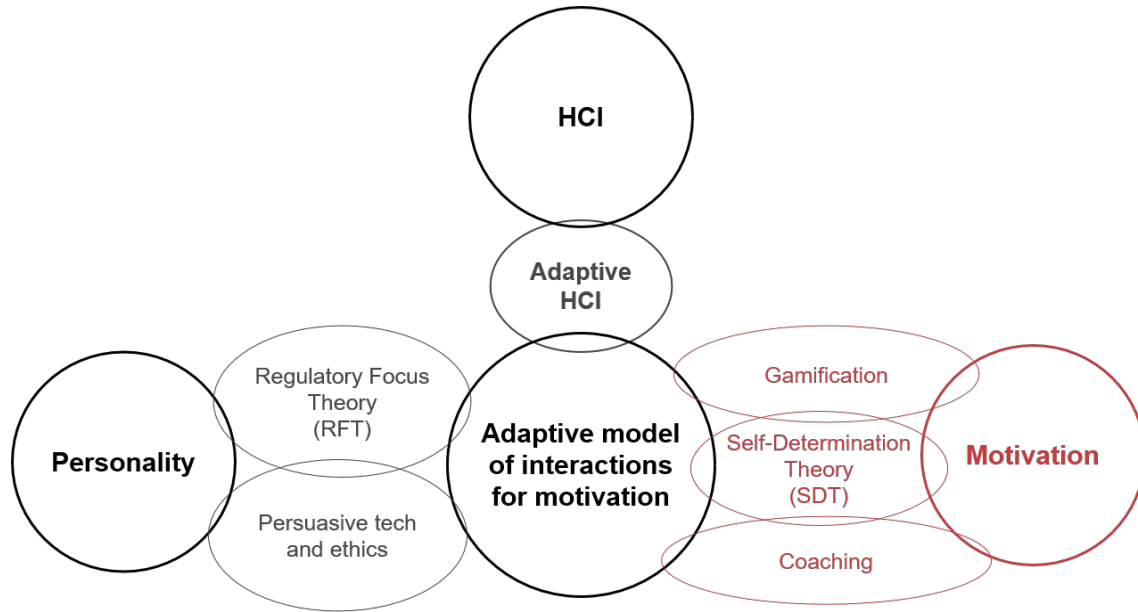
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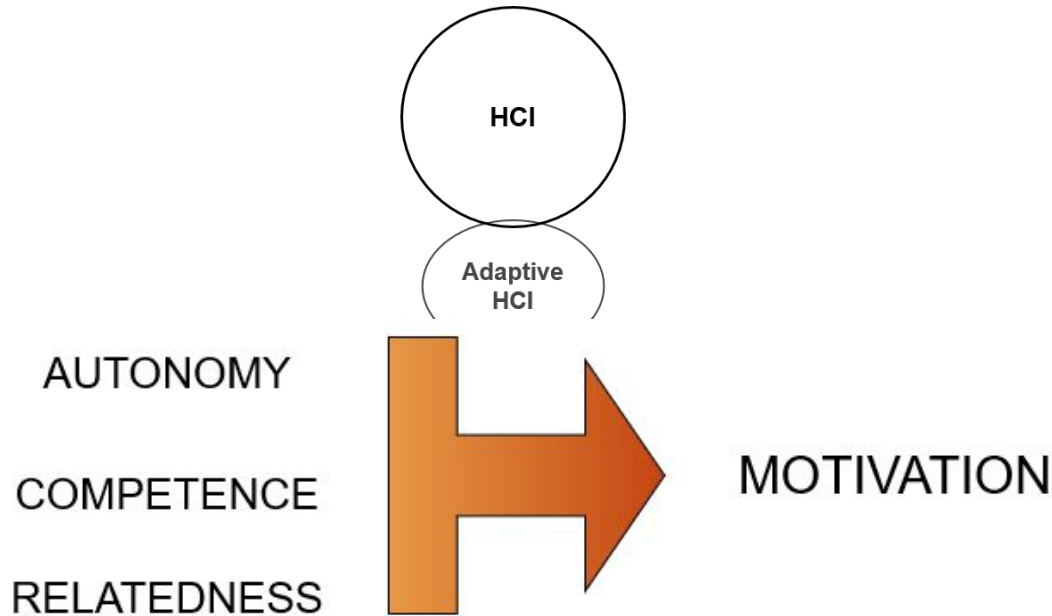
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- **Self-Determination Theory (SDT)**
(Deci and Ryan 2008)
- **Coaching and SDT**
(Spence and Oades 2011)
- **Gamification and SDT**
(Villalobos-Zuñiga and Cherubini 2020, Hallifax 2019)
- **METUX framework**
(Peters 2018)

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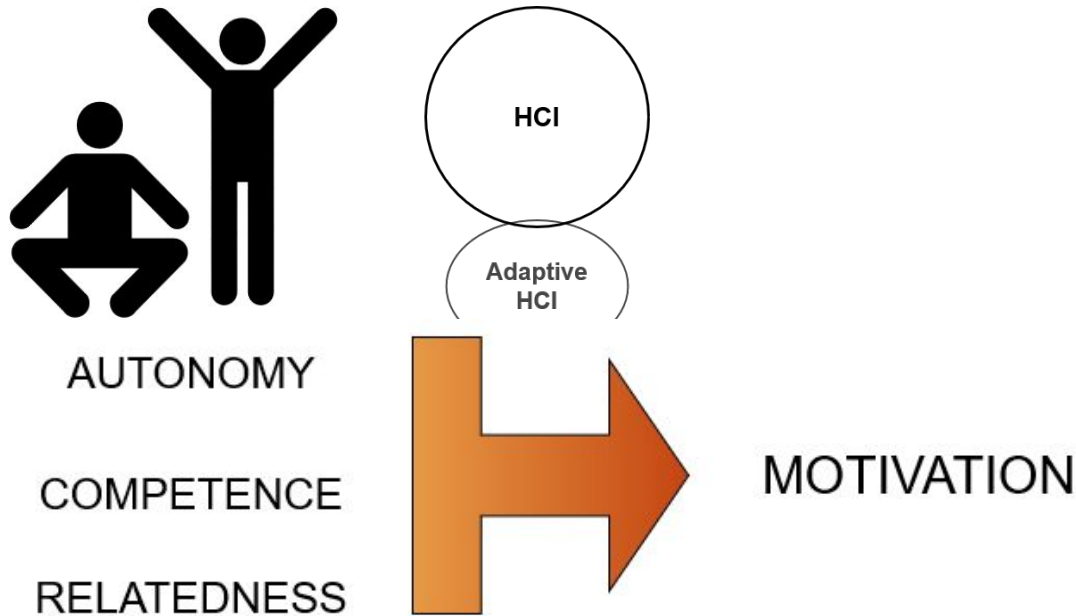
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AUTONOMY

COMPETENCE

RELATEDNESS

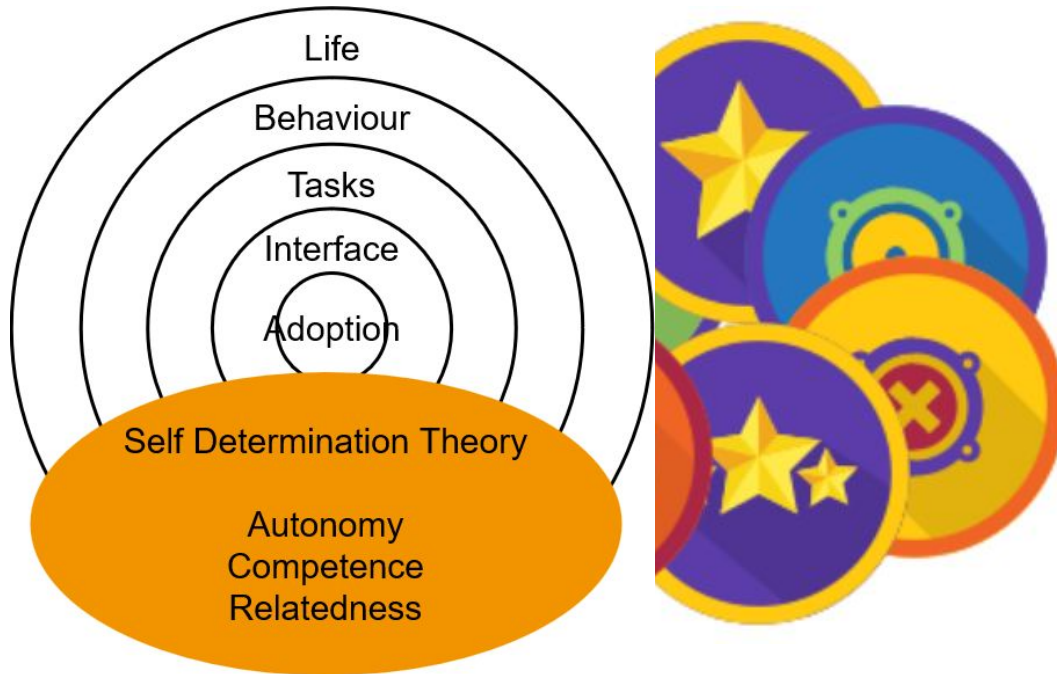


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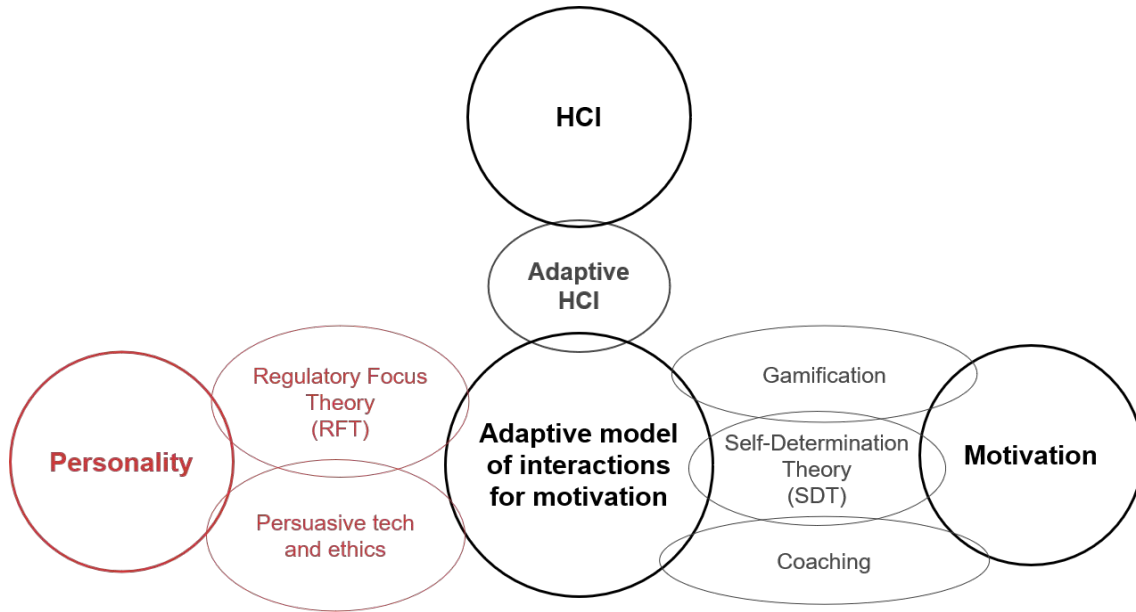


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- Regulatory Focus Theory (RFT) (Higgins 1997)
- RFT, persuasion and message framing (Lee and Aaker 2004, Cesario 2004)
- RFT and multimodal interactions (Martin and Clavel 2018)
- Ethics principles (Berdichevsky and Neuenschwander 1999)

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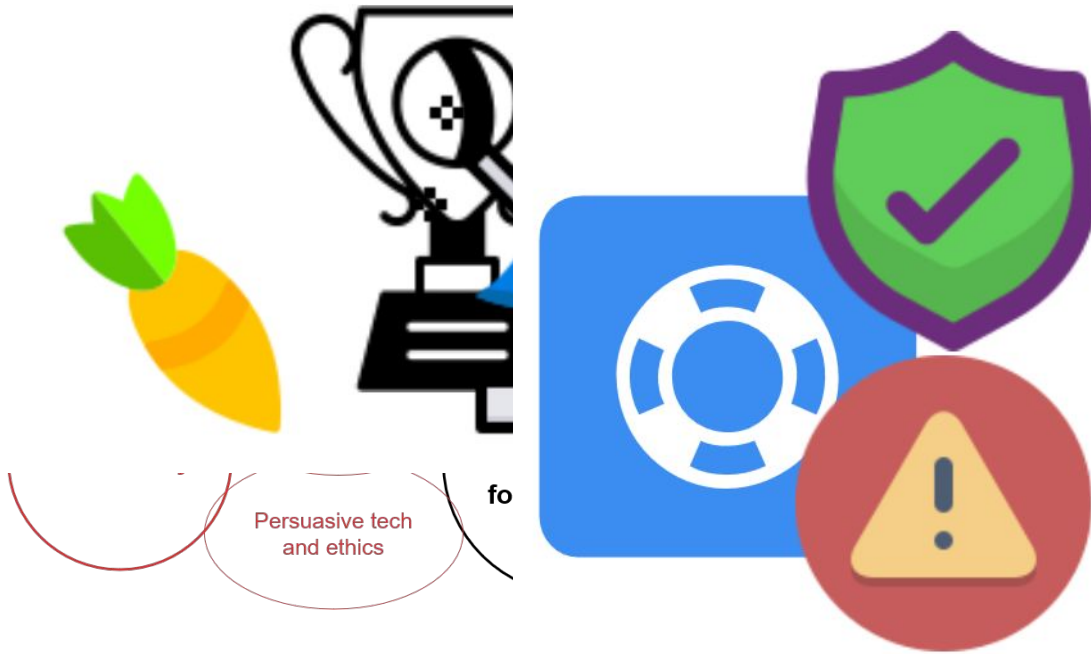
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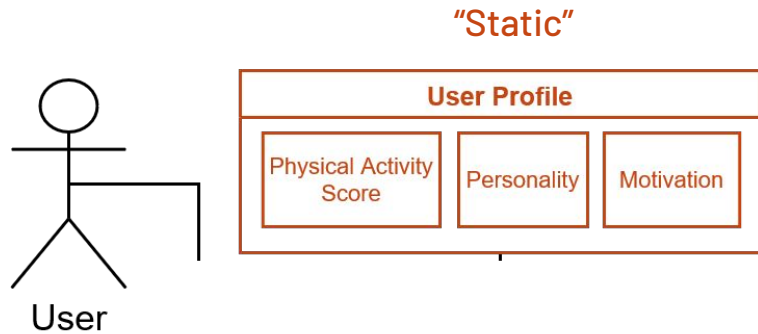
2. PADME

Personalised motivational interaction model for walking



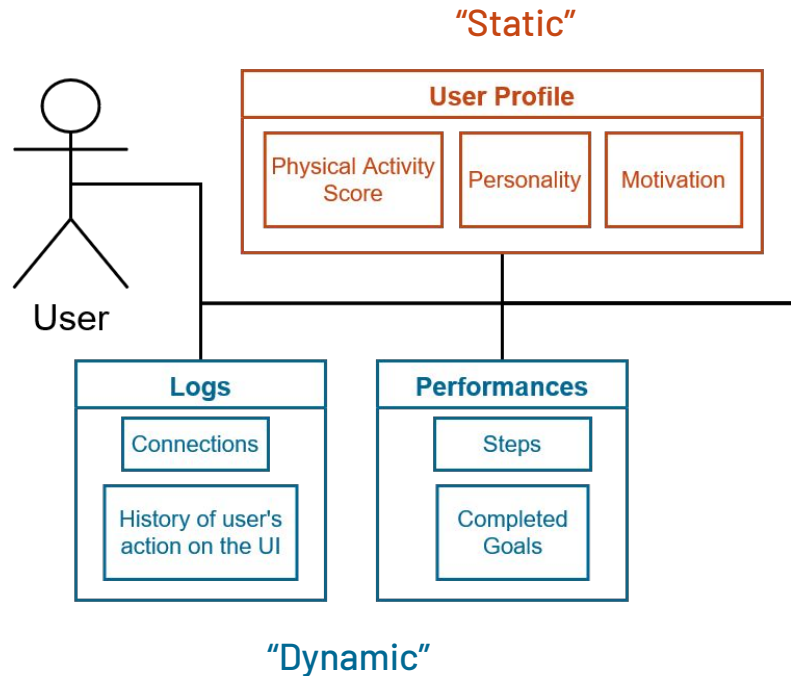
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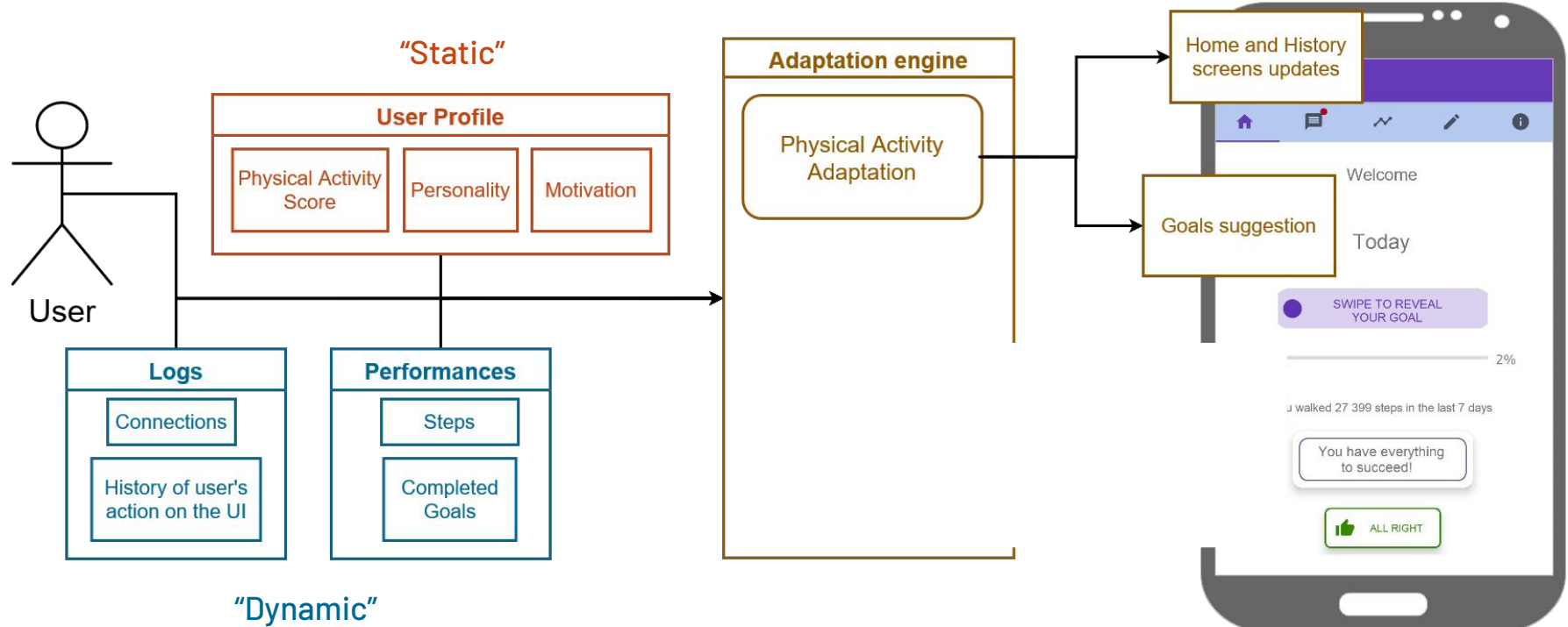
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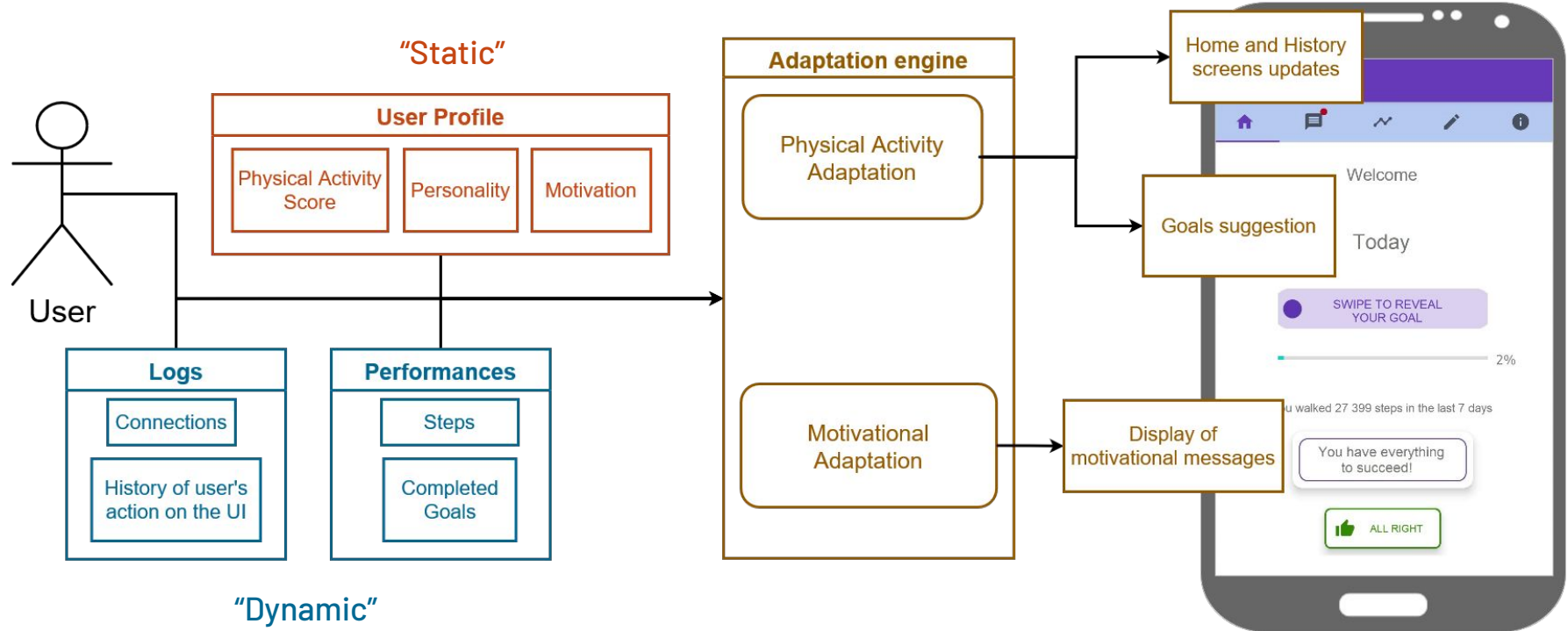
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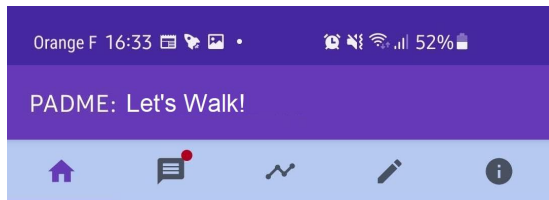
Personalised motivational interaction model for walking



2. PADME

Personalised motivational interaction model for walking





Welcome

Today

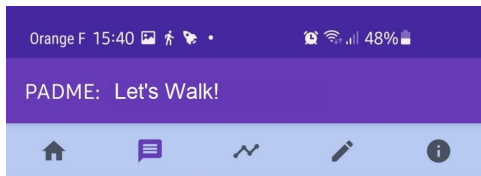
SWIPE TO REVEAL
YOUR GOAL



You walked 27 399 steps in the last 7 days

You have everything
to succeed!

ALL RIGHT



15 feb. 2022 - 19:47

You came 3602 steps closer to your goal.
Good for you! You have reached your goal!

16 feb. 2022 - 14:32

You have everything
to succeed!

16 feb. 2022 - 20:00

You have already taken
116 steps.

17 feb. 2022 - 13:21

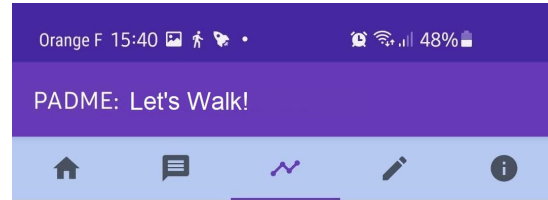
You came 4305 steps closer to your goal.
Good for you! You have reached your goal!

17 feb. 2022 - 16:29

You have already taken 6014 steps.
Goal completed for today, well done!

18 feb. 2022 - 11:01

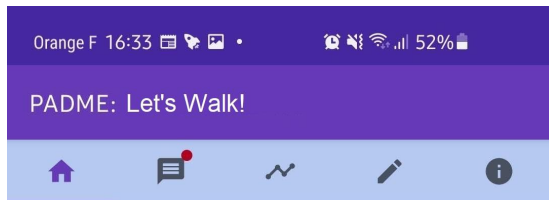
You have already taken 426 steps.
You are well on your way to your daily goal!



History

UPDATE

Date	Steps taken	Goal
8 feb. 2022	3580	5000
9 feb. 2022	236	6000
10 feb. 2022	193	3600
11 feb. 2022	303	300
12 feb. 2022	7074	400
13 feb. 2022	8984	3600
14 feb. 2022	4237	3600
15 feb. 2022	6492	10000
16 feb. 2022	116	4300
17 feb. 2022	7281	10000
18 feb. 2022	814	6500



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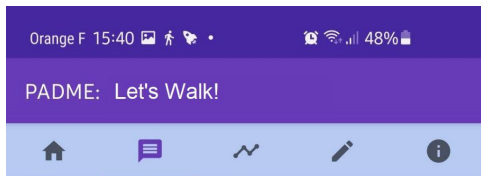
116 steps out of a goal of

5800 steps



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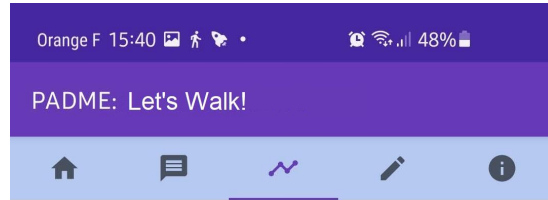
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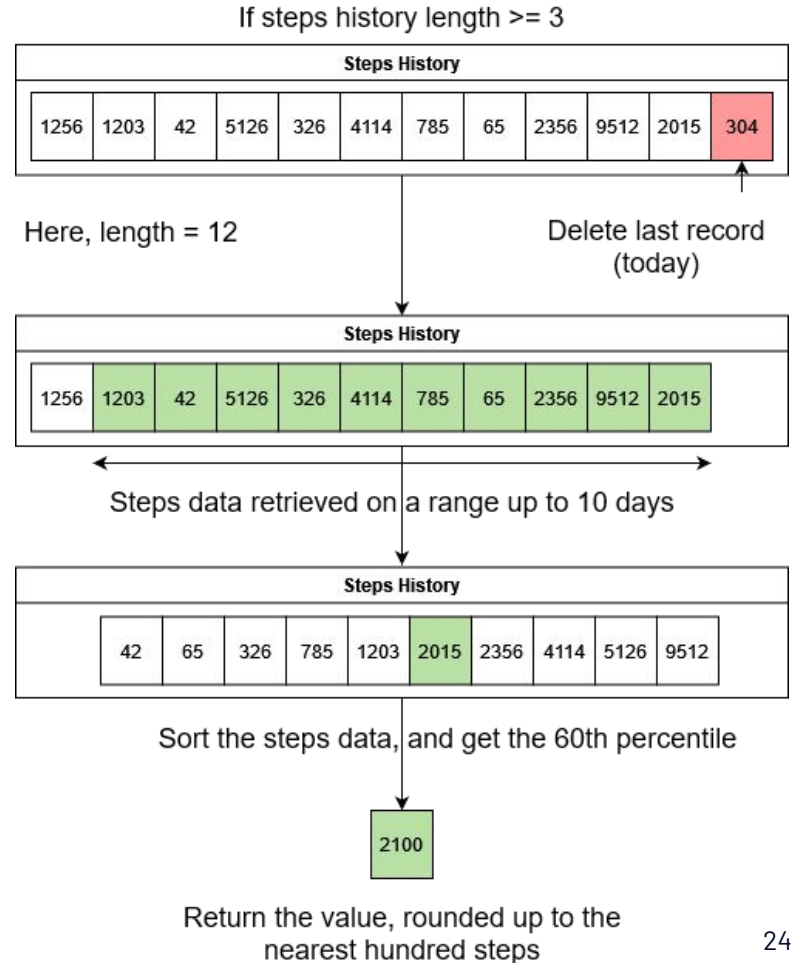
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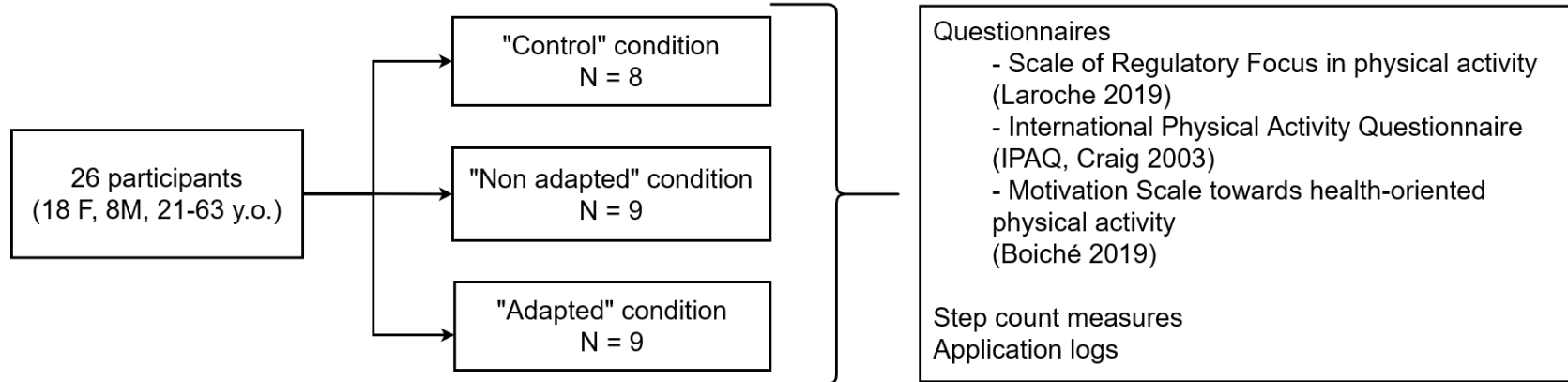
3. Personalised goal setting

- No adaptation before 3 days: IPAQ score is used to set a goal
- The percentile algorithm computes a new personalised goal every day (Adams 2013)
- Goals are computed on a 10-days moving window



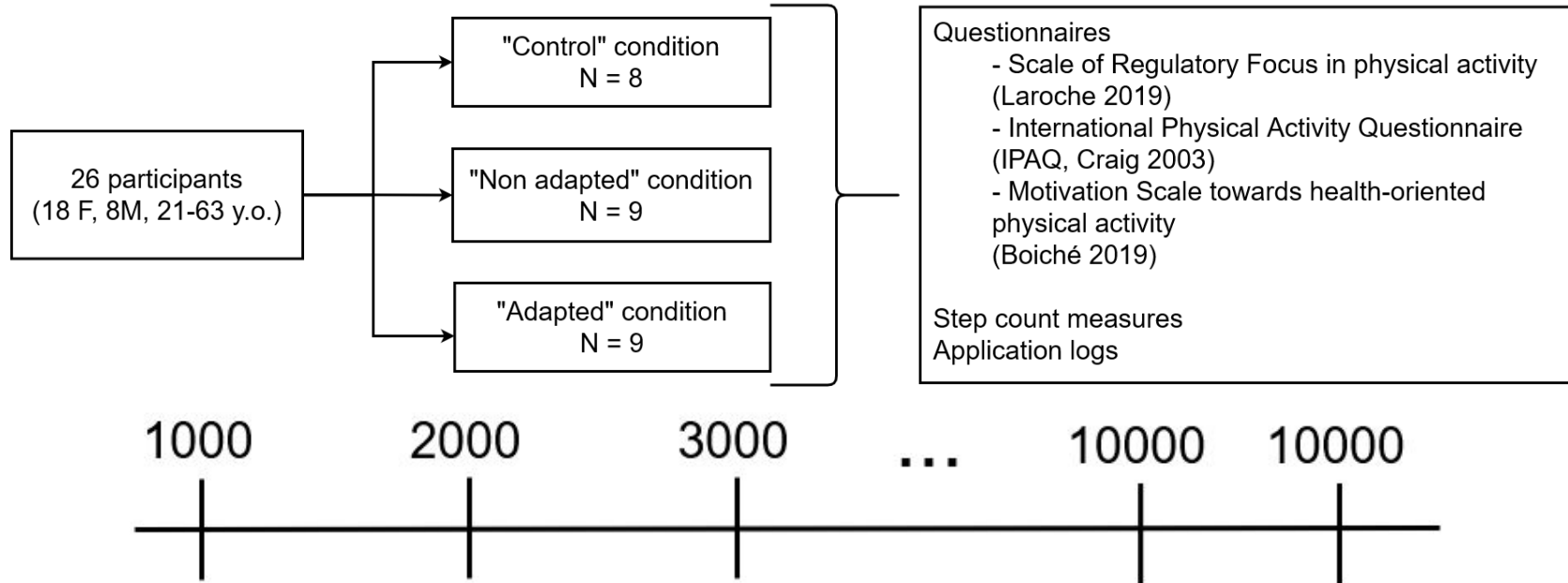
3. Personalised goal setting Between subjects field study

4-weeks study
(Feb. to May 2021)



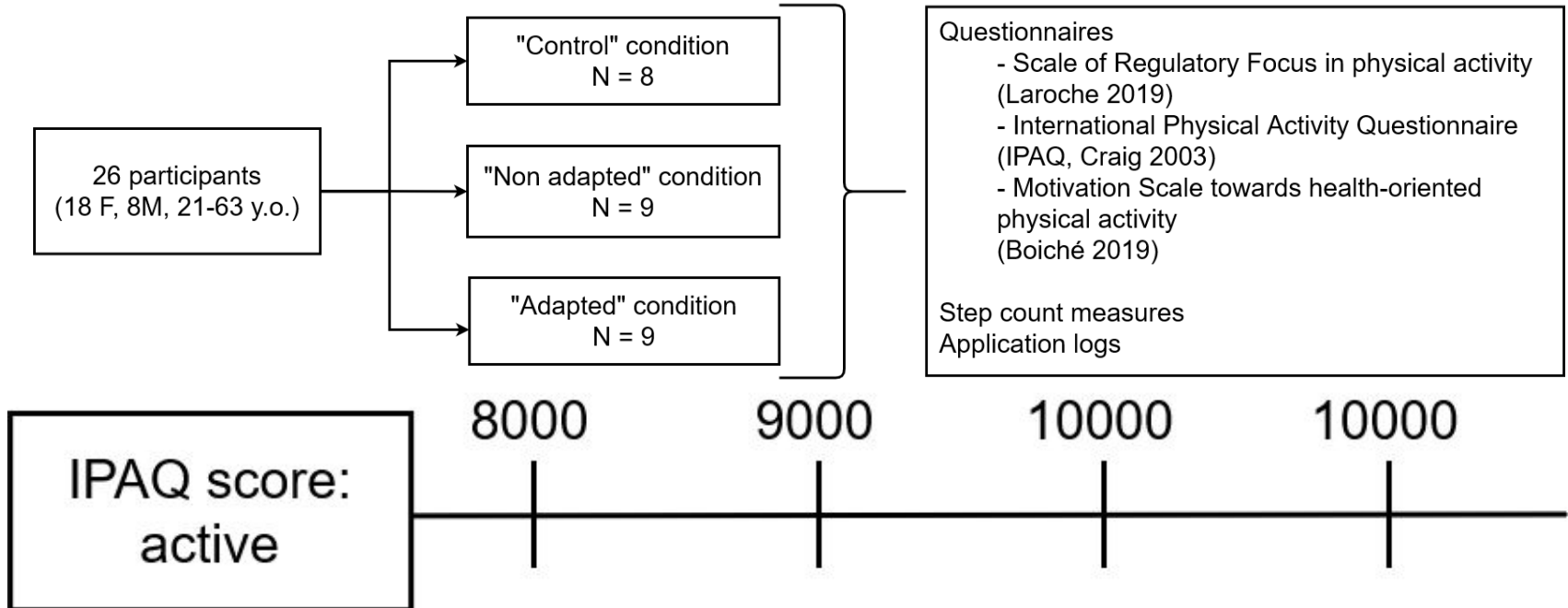
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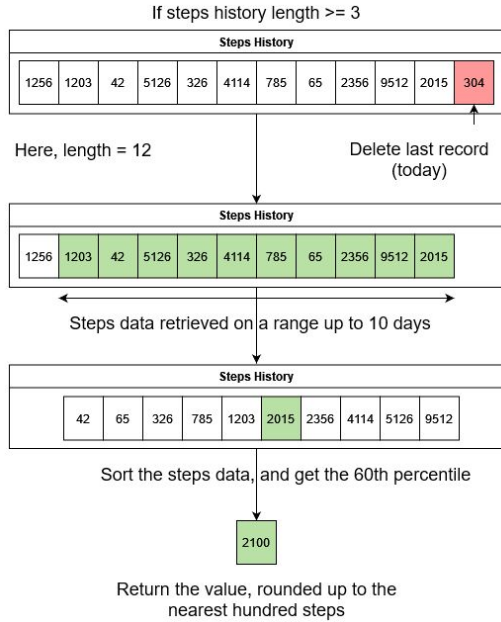
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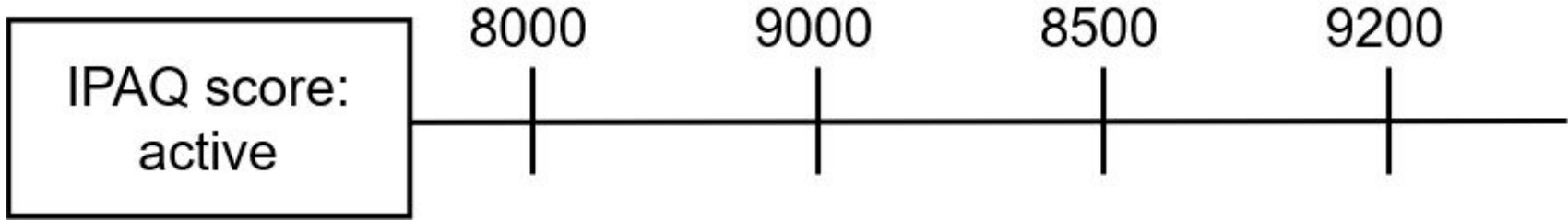
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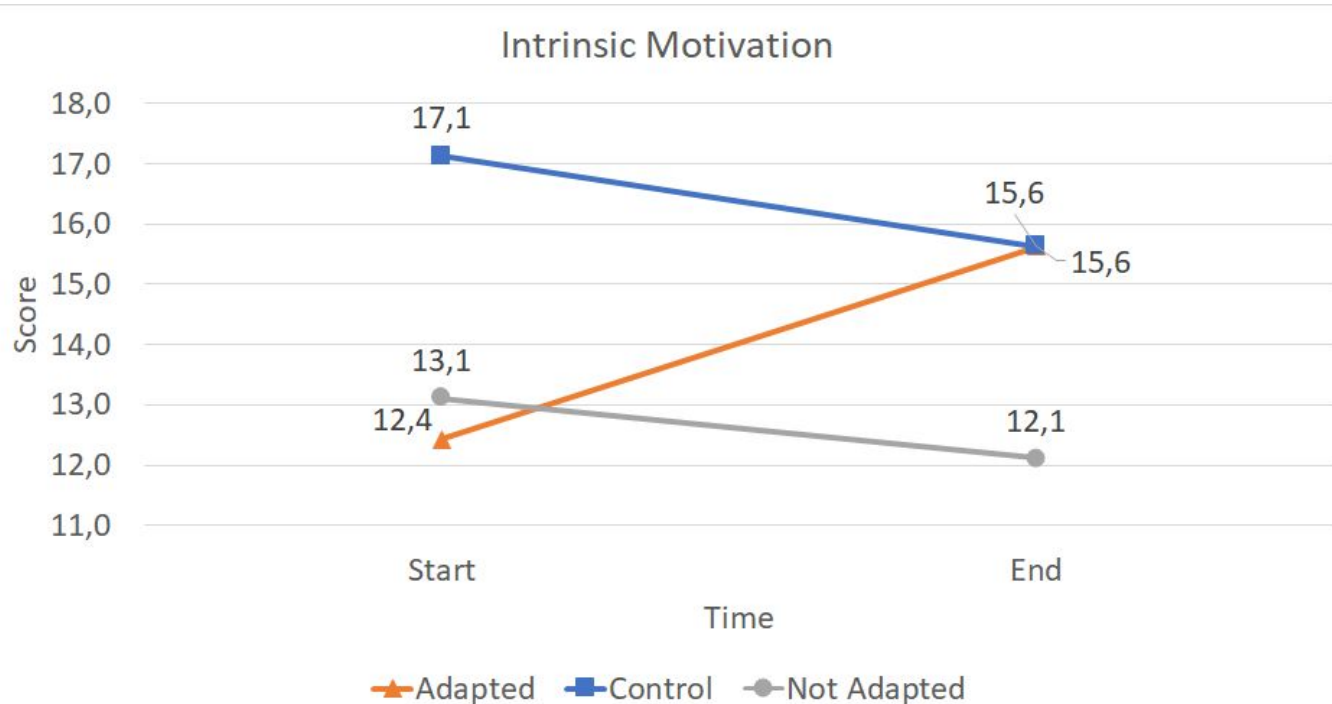


- "Control" condition
N = 8
- "Non adapted" condition
N = 9
- "Adapted" condition
N = 9

- Questionnaires
- Scale of Regulatory Focus in physical activity (Laroche 2019)
 - International Physical Activity Questionnaire (IPAQ, Craig 2003)
 - Motivation Scale towards health-oriented physical activity (Boiché 2019)
- Step count measures
Application logs



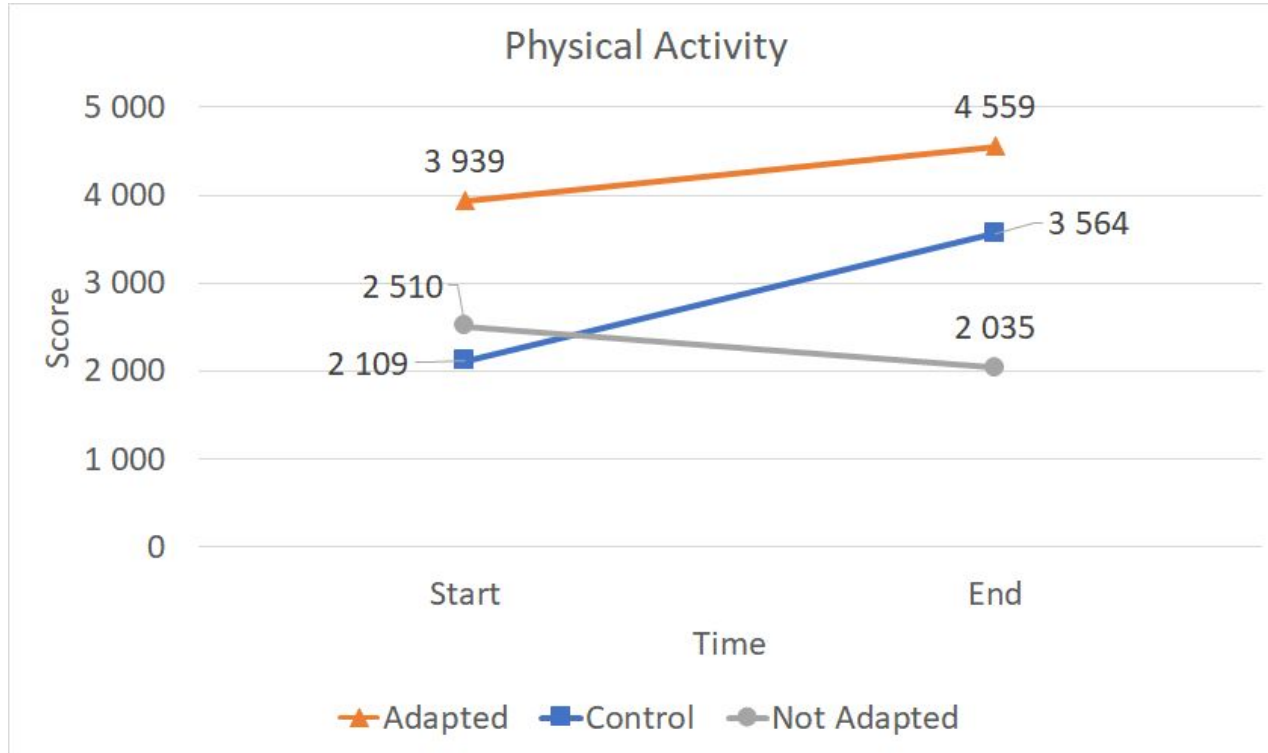
3. Personalised goal setting Results



Increasing
Intrinsic motivation for
adapted condition
 $p = 0.04$; $F = 7.30$

Increasing
Physical Activity level
between adapted and
non-adapted conditions
 $p = 0.05$; $F = 3.55$; $\omega^2 = 0.07$

3. Personalised goal setting Results



- Increasing Intrinsic motivation for adapted condition
 $p = 0.04$; $F = 7.30$
- Increasing Physical Activity level between adapted and non-adapted conditions
 $p = 0.05$; $F = 3.55$; $\omega^2 = 0.07$

4. Personalised motivational messages

Messages adaptation

- Inspired by the Message Generation Framework (Op Den Akker 2015)
 - Adding RFT and SDT where relevant
- Goal reveal interaction (autonomy)

Your efforts will pay off!
(promotion)

Your health is at stake, don't forget it!
(prevention)

Well done, you have already
taken 5230 steps.
(promotion)

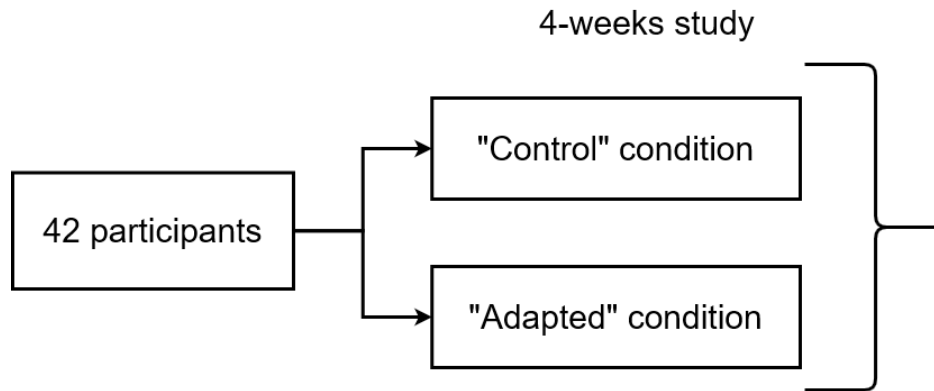
You can become more active by going
for a walk.
(neutral)

You have become more active! Sit down
for a moment.
(promotion)

You're doing very well this morning, but don't forget to
save some energy for the evening.
(prevention)

4. Personalised motivational messages

Future directions: field study



Questionnaires

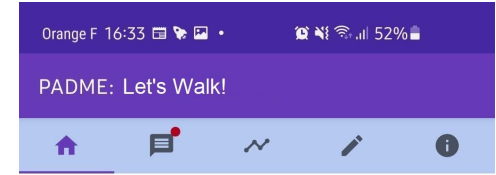
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- Hexad User Types for gamification (Tondello 2016)

Step count measures
Application logs

5. Conclusion and future directions

Gamification

- Use of game elements in a non-game context (Deterding 2011)
- Gamification for physical activity motivation
 - Step count mainly used (Koivisto and Hamari 2019)
 - Valid for all groups of participants (Mazeas 2020)
- Link between RFT and gamification?



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👍 ALL RIGHT

10 000





**Thank you for your attention
Questions?**

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