

From an Idea to a Project

(a Ph.D. journey)

Igor Matias M.Sc., Ph.D. Student

2020-1

The Need



**Every 3 seconds
+1 demented person worldwide**



**Estimated dementia cases
not being diagnosed**



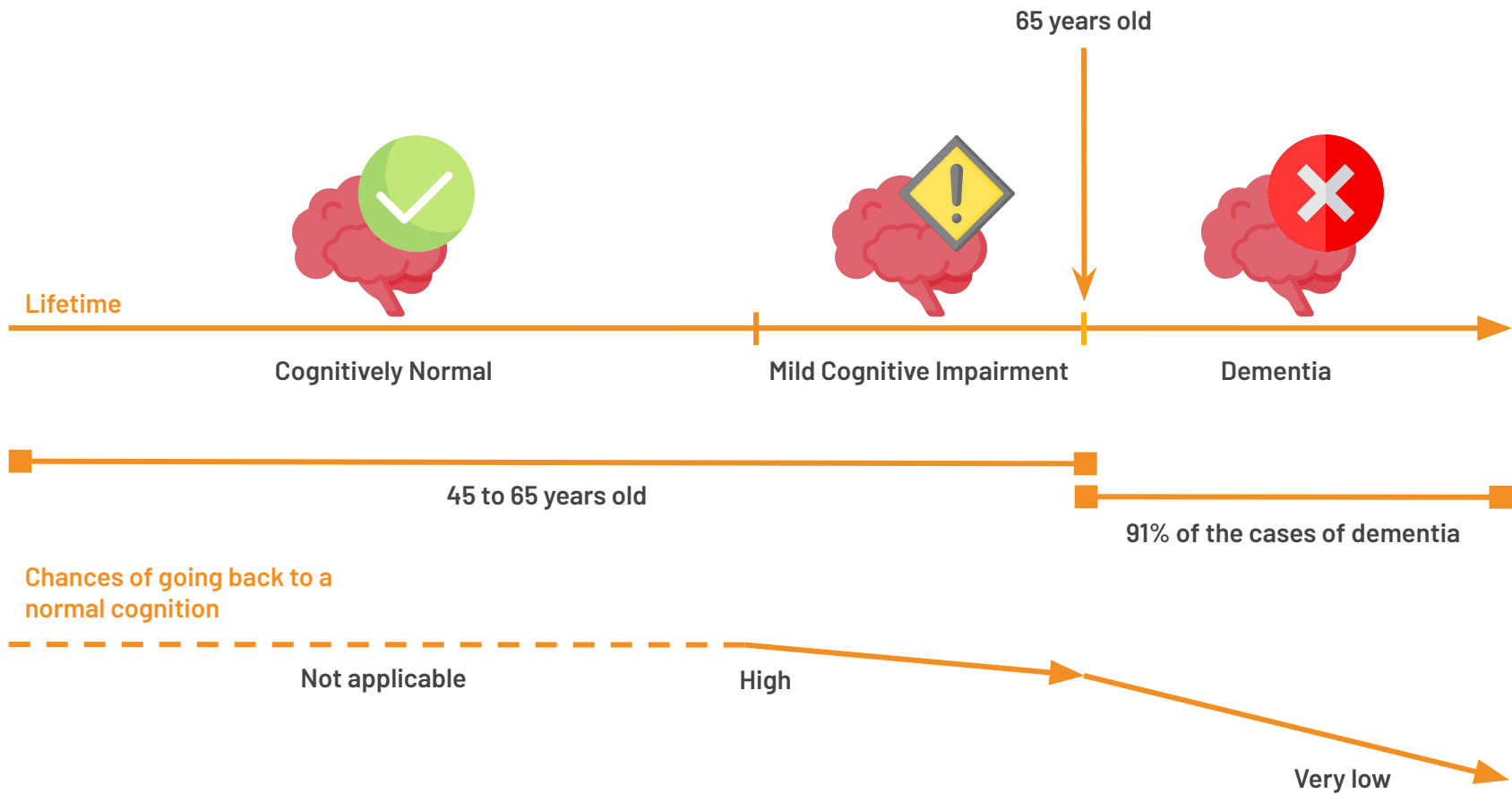
**46 M cases in 2015
153 M by 2050 worldwide**



**Dementia cases are caused
by Alzheimer's Disease (AD)**

2020-1

The Path



2020-1

What is Always There?



A smartphone is
more than **80%** of the day
around you

What about wearables?



Rhine Falls, Switzerland.



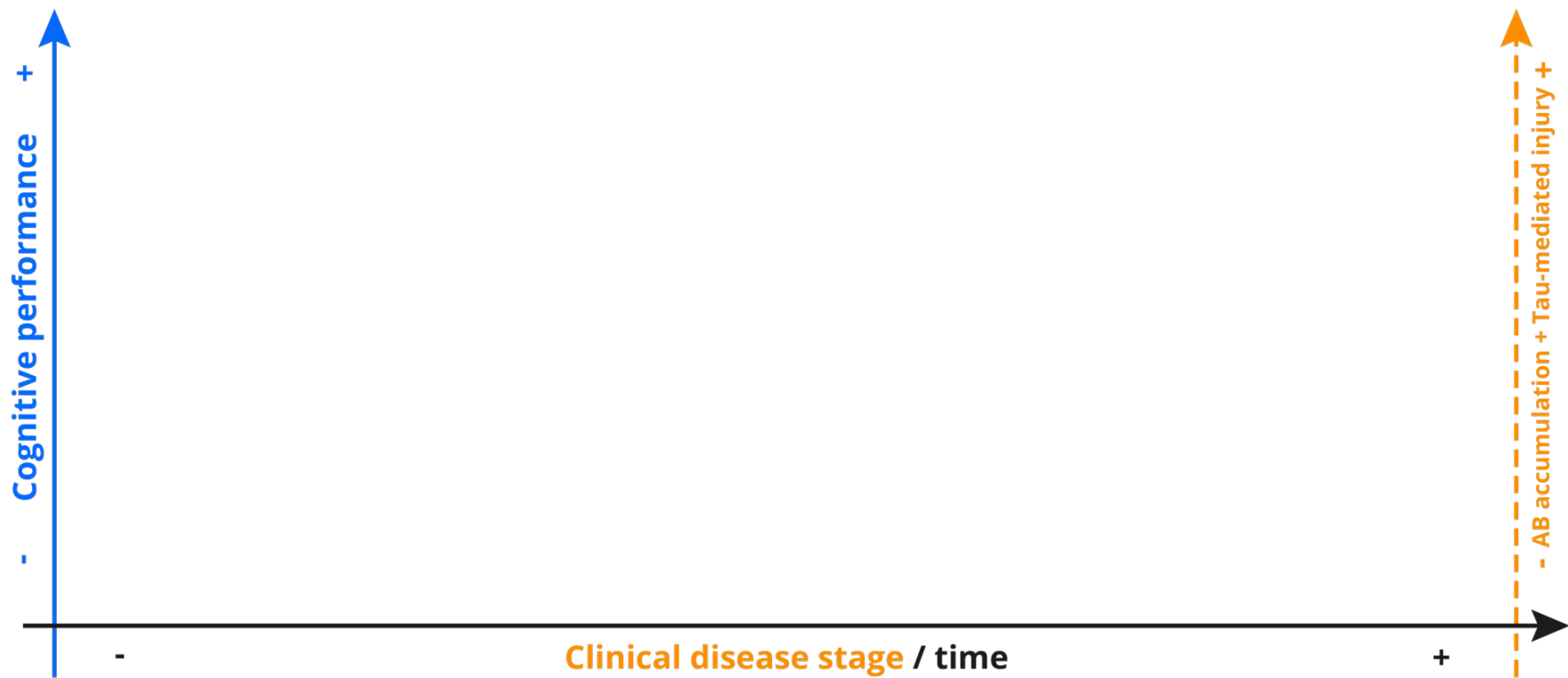
Temple of Edfu, Aswan, Egypt.



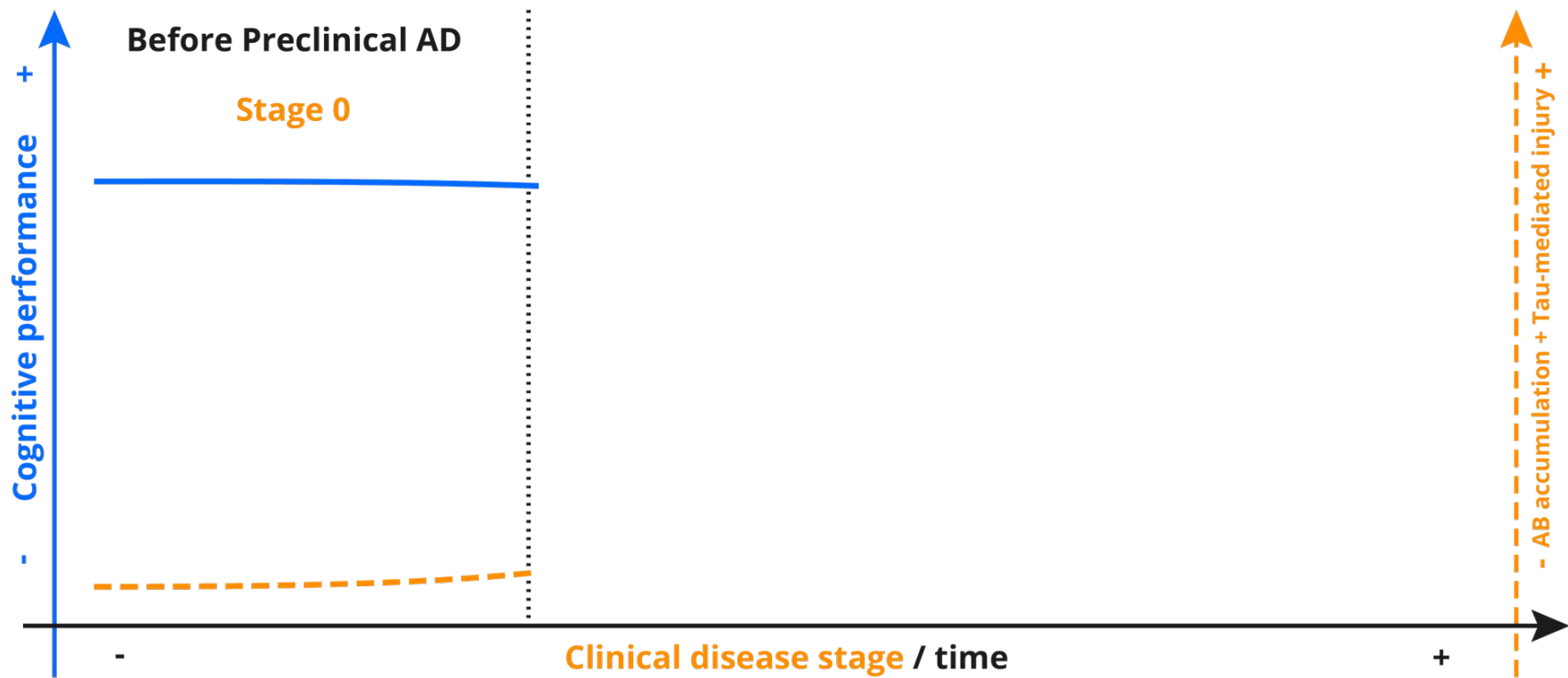
The Thinker, Paris, France.

2021

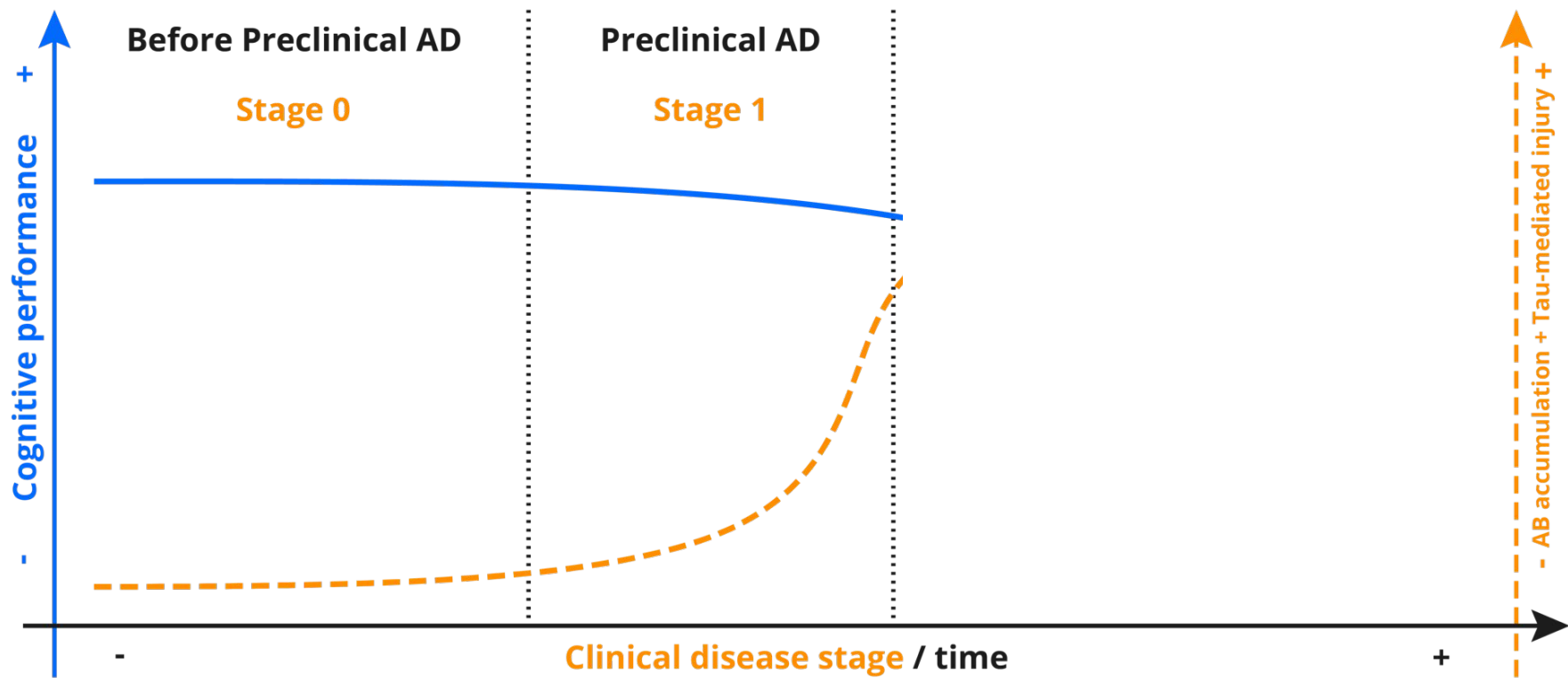
It Turns Out That



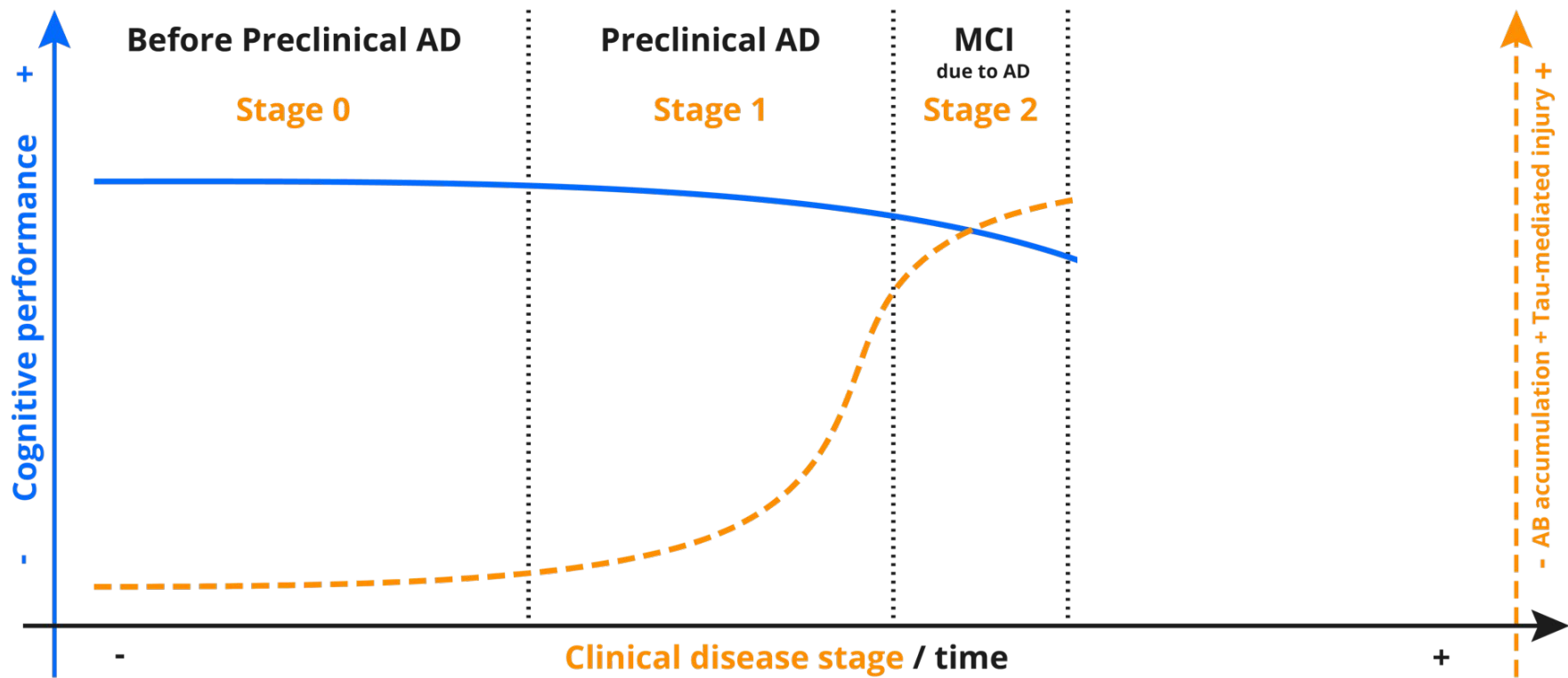
Jack CR Jr et al. "Hypothetical model of dynamic biomarkers of the Alzheimer's pathological cascade." *Lancet Neurol.* 2010 Jan; 9(1):119-28.



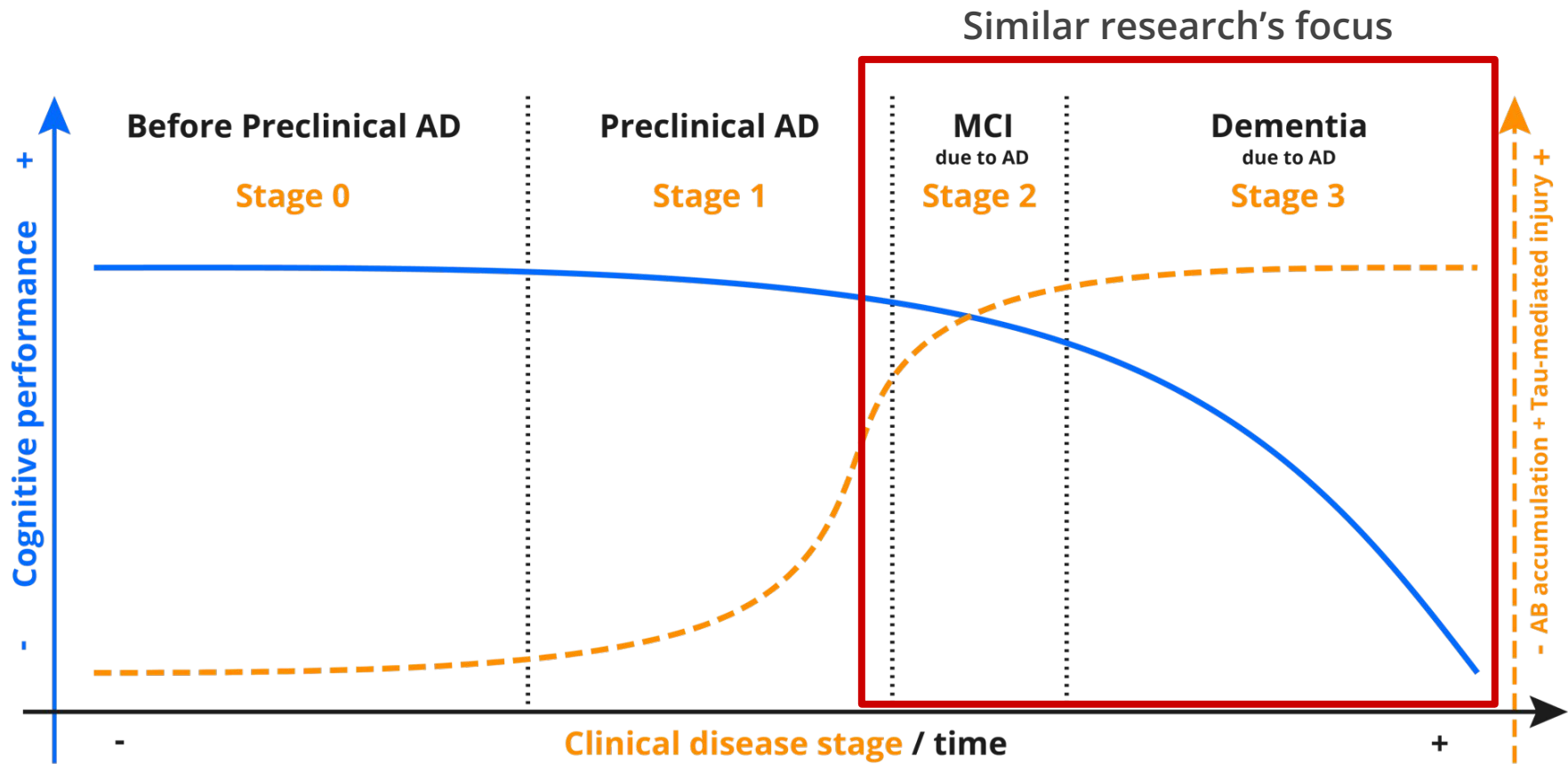
Jack CR Jr et al. "Hypothetical model of dynamic biomarkers of the Alzheimer's pathological cascade." *Lancet Neurol.* 2010 Jan; 9(1):119-28.



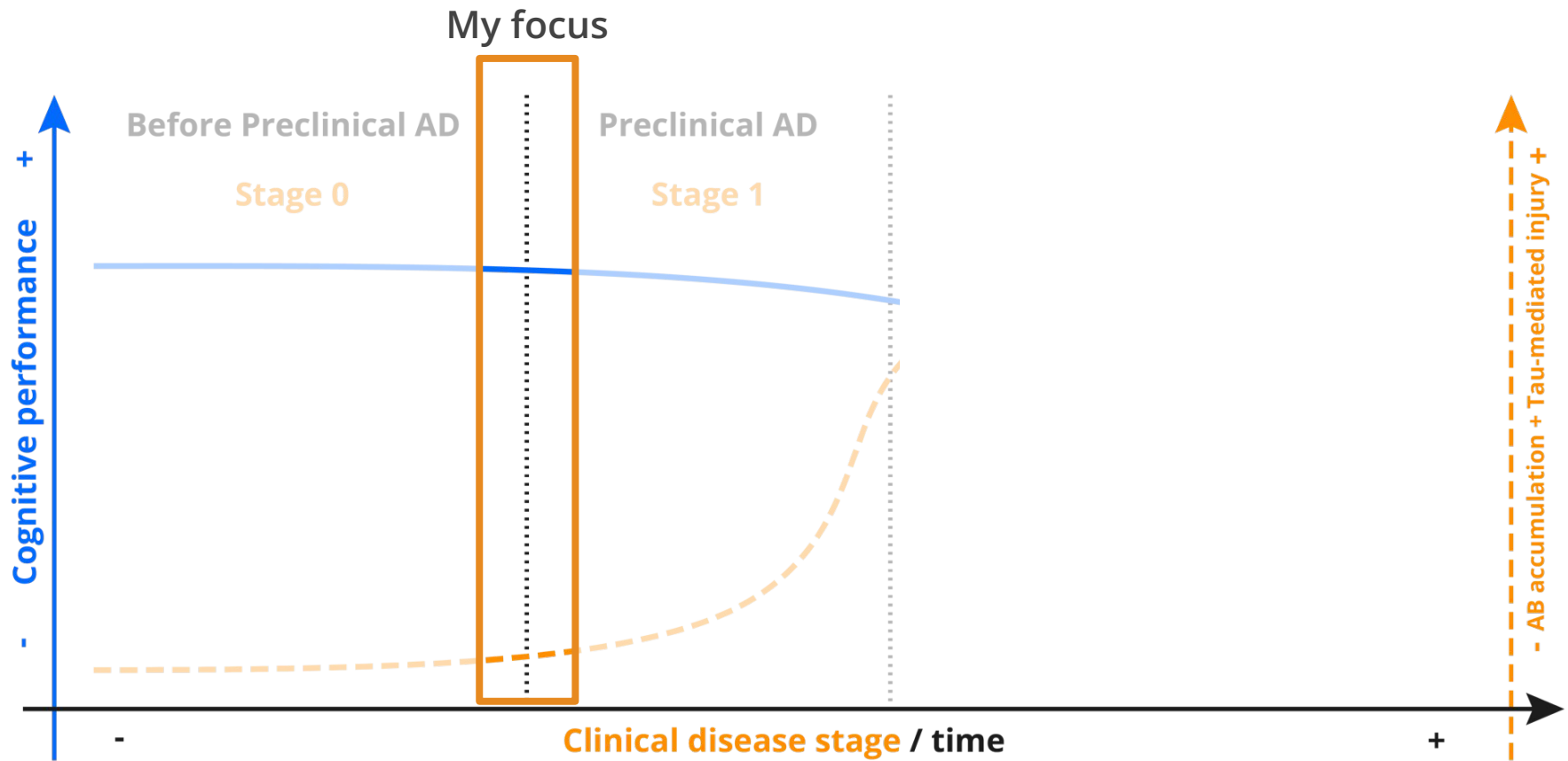
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PROVIDEMUS^{alz} : Ubiquitous preclinical Alzheimer's disease early screening



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age.int



PROVIDEMUS

From the latin

“Provideo” first-person plural

- To foresee
- To look after

To gather data
on cognitive
function

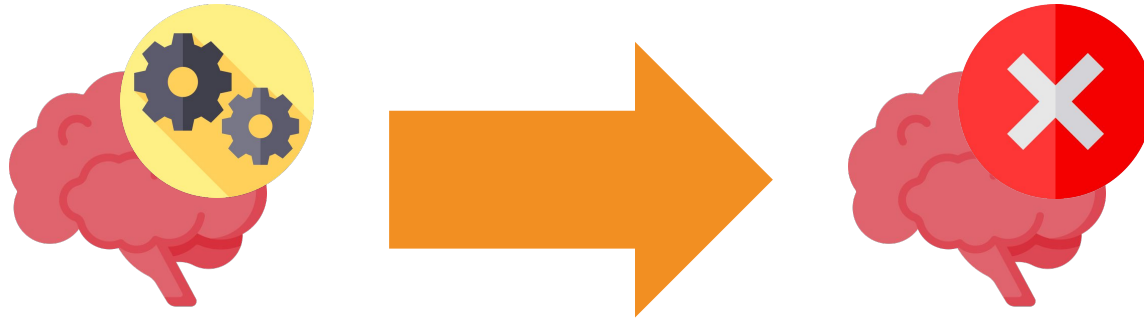


Aligned with
digital
technologies



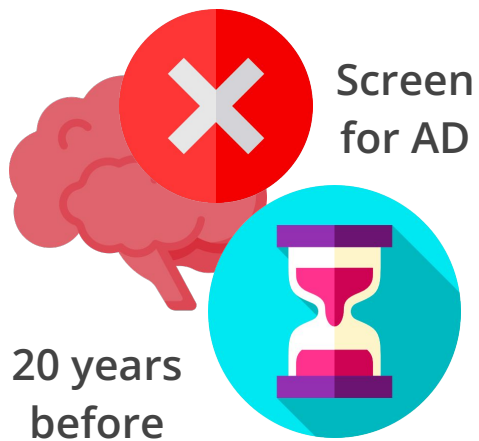
PRVIDEMUS^{alz}

Specifically applied to
Alzheimer's disease



2021

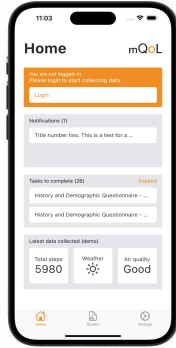
The Big Picture



2021

How?

TOOLS or SOURCES OF DATA

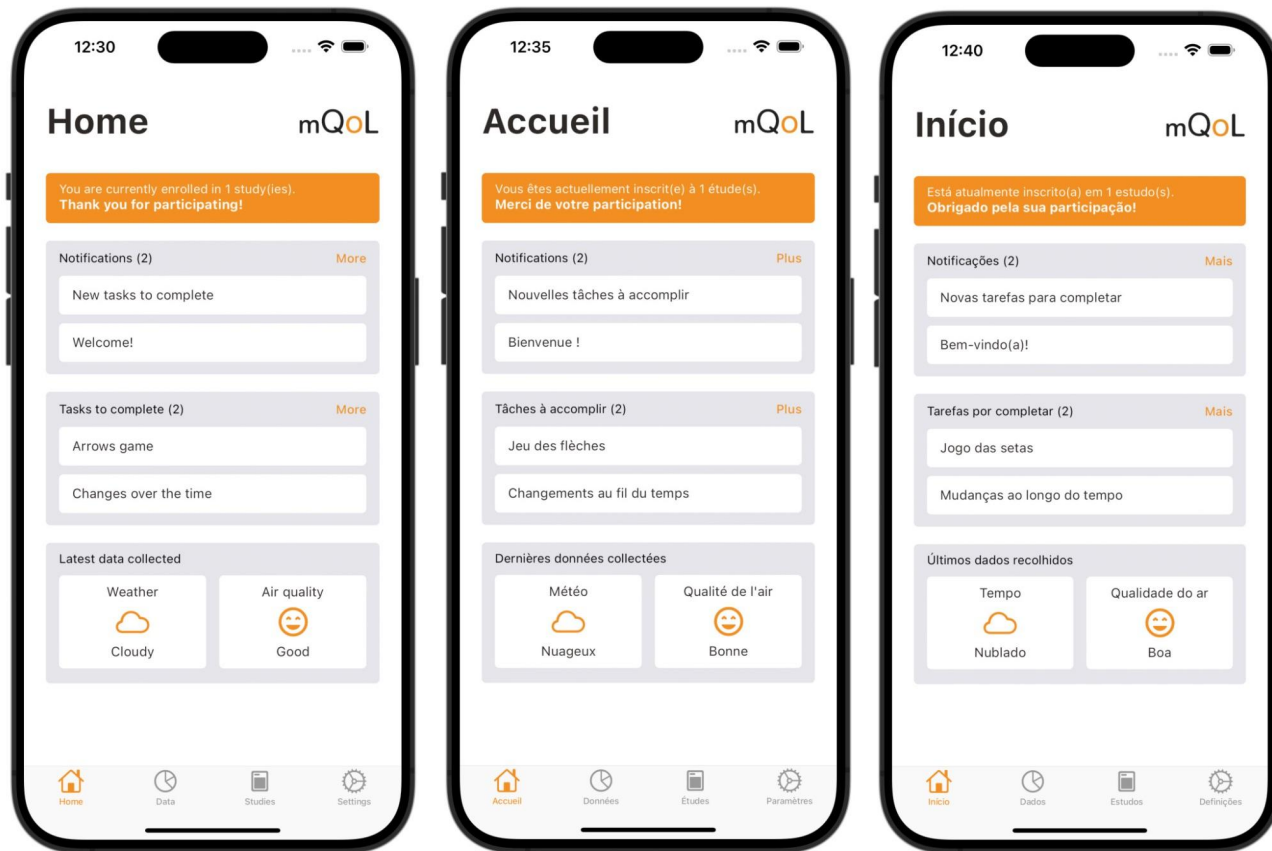


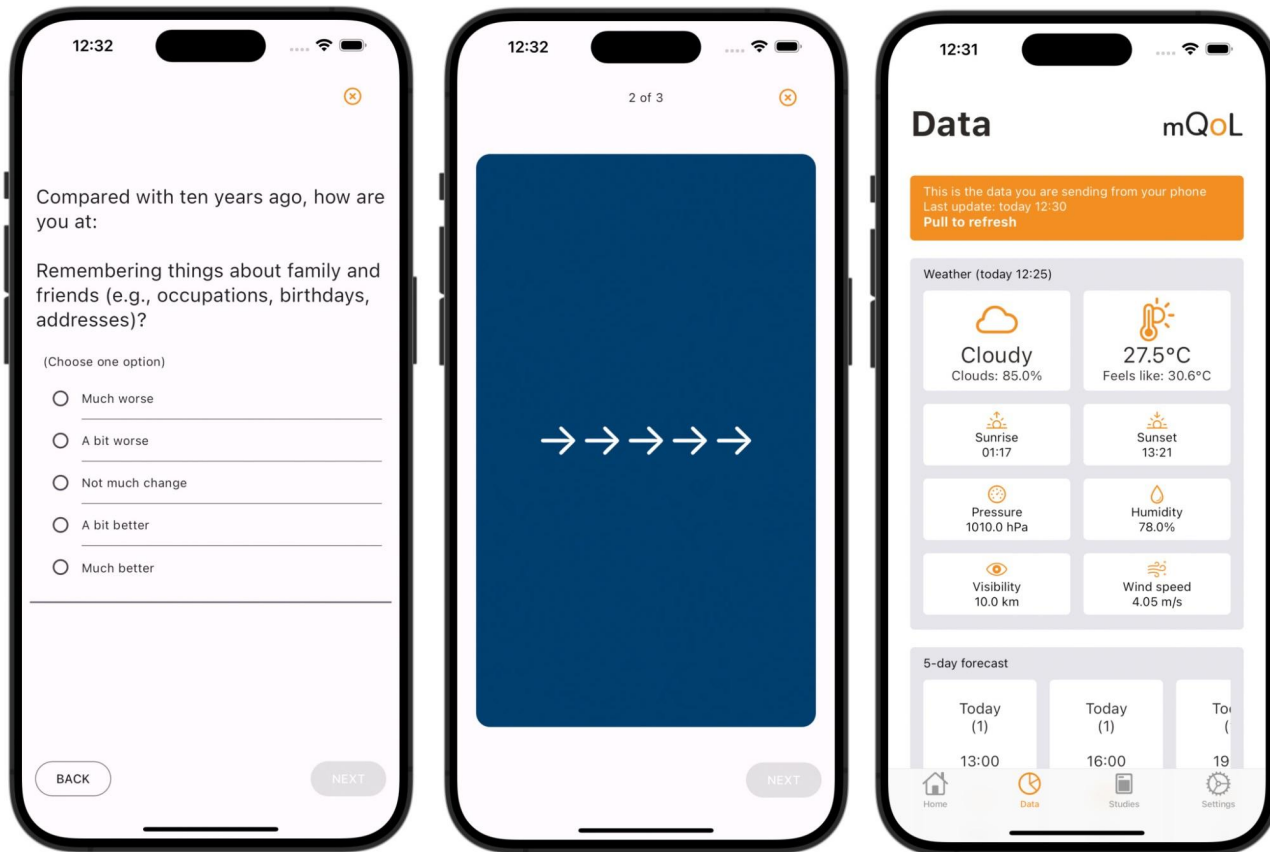
**Patient-reported
(PRO)**

**Performance-reported
(PerfRO)**

**Technology-reported
(TechRO)**

**Clinician-reported
(ClinRO)**







Douro River, Portugal.



AI Generated: First person rafting experience, rubber boat navigating a turbulent river stream, raw style, intense and detailed, capturing the adventure.



Mtskheta, Georgia.



Antalya, Turkey.

2022

Feasibility / Pilot Study

Healthy



Preclinical
Alzheimer's Disease



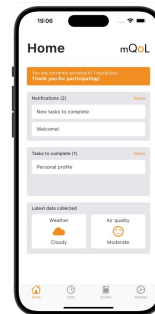
Mild Cognitively
Impaired



Dementia
due to AD

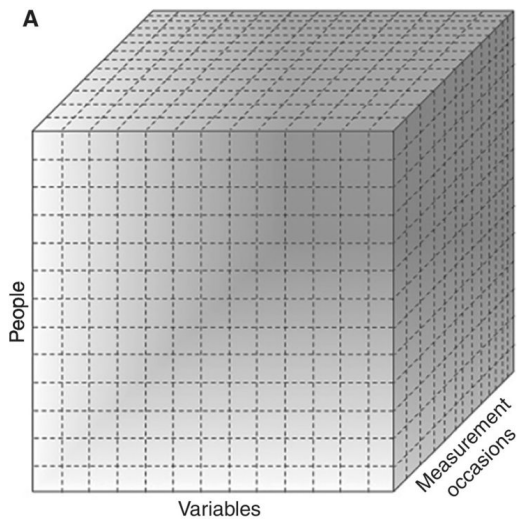
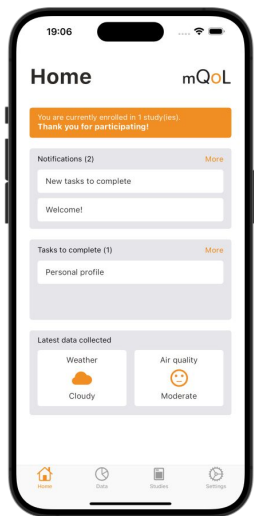


Assess
cognitive
performance
fluctuations

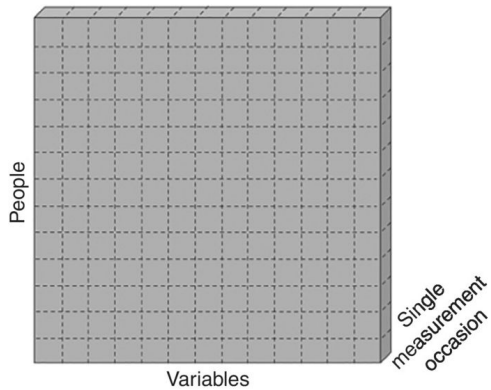


(only TechROs)

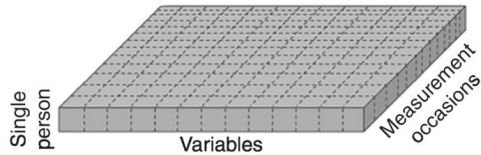
PROs and PerfROs
are for validation
only

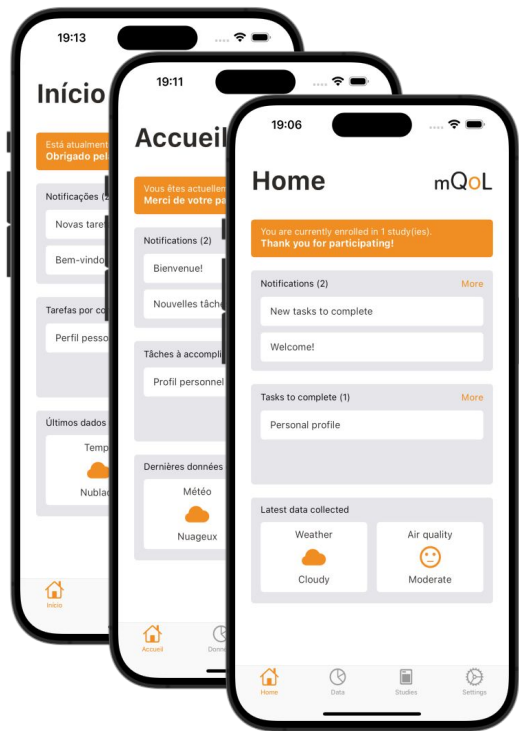


B Nomothetic approach to interindividual variation



C Idiographic approach to intraindividual variation





Memory



Stress



Speed



Heart Perf.



Sleep



Phy. Activity



RQ1: Can ML models accurately assess cognitive performance fluctuations in daily life?



RQ2: Which wearables features matter the most for those ML models?

RQ3: Any benefits of that continuous monitoring of cognitive performance fluctuations?



Unknown location.

2022-3

Ethics... and More Ethics

6

Submissions



UNIVERSITÉ
DE GENÈVE

University of Geneva's Committee for Ethical Research



POST TENEBRAS LUX

REPUBLIQUE
ET CANTON
DE GENEVE

Commission
Cantonale
d'Ethique de la
Recherche sur
l'être humain
(CCER)

18

Months

APPROUVÉ

Par la Commission cantonale d'éthique de la recherche , 15:52, 25/07/2023

Demande de participation à un projet de recherche :

Évaluation des fluctuations des performances cognitives à l'aide de technologies personnelles dans différents contextes de la vie quotidienne : Une étude de faisabilité

Madame, Monsieur

Nous vous invitons à participer à notre projet de recherche.

Votre participation est entièrement gratuite. Toutes les données collectées dans le cadre de ce projet sont soumises à des règles strictes en matière de protection des données, qui sont expliquées ci-dessous.

Le présent projet de recherche est mené par la professeure Katarzyna Wac et le laboratoire de la



Alps, Switzerland.

2024

People... and More People

Quel est l'état de votre cognition ?

How is your cognition?
Como está a sua cognição?

Votre téléphone et votre montre
peuvent vous aider à l'évaluer

Your phone and your watch
could help you evaluate it

O seu telemóvel e o seu relógio
podem ajudar a avaliá-la



LOOKING FOR VOLUNTEERS



providemus.unige.ch

PROVIDEMUS



Étude
Research study
Estudo científico

Quel est l'état de votre cognition ?

How is your cognition?
Como está a sua cognição?

RECHERCHE
DE
PARTICIPANT

Étude
Research study
Estudo científico



providemus.unige.ch



PROVIDEMUS



stpg



How is your cognition?

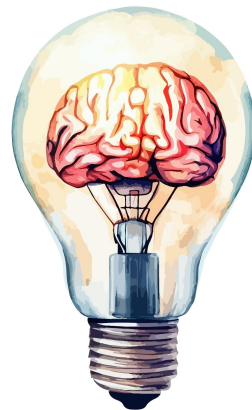
Your phone and your watch
could help you evaluate it

LEARN MORE

HELP US EVOLVE SCIENCE

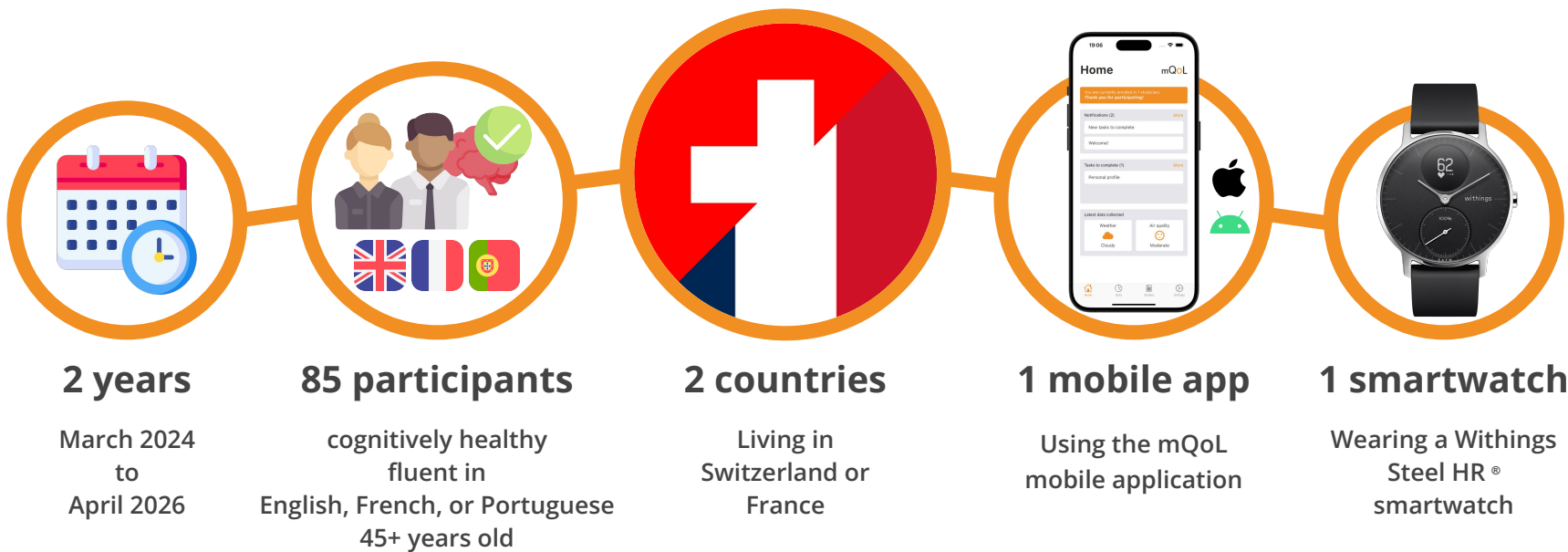
and win a
smartwatch
for your participation

LEARN MORE



2024

And Finally



2024

(Super) Preliminary Data/Results

Preliminary data $n=69$

Chronological age

Min: 45.0

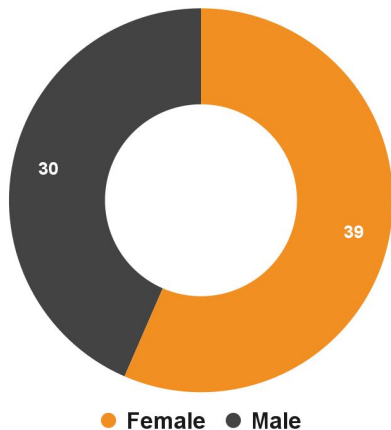
Median: 57.0

Max: 77.0

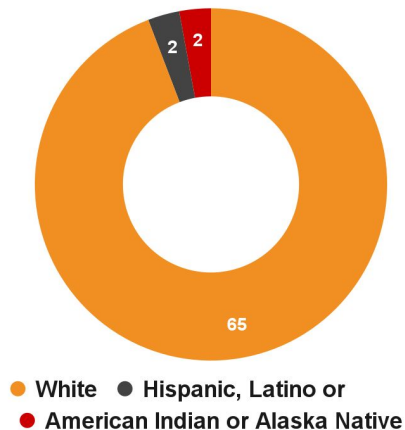
STD: 8.4

Mean: 57.4

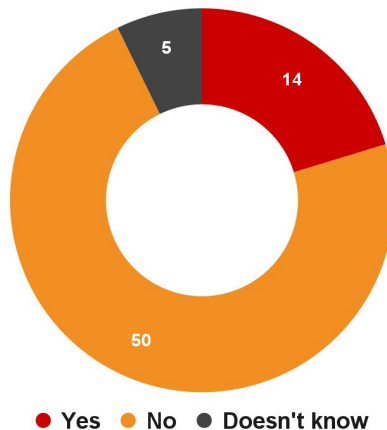
Sex at birth



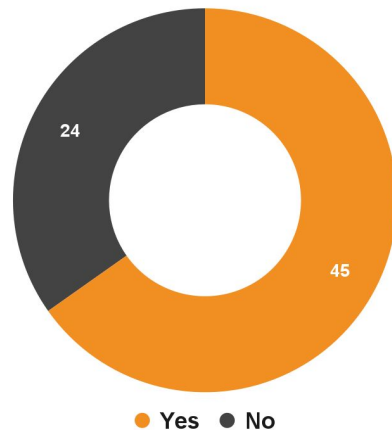
Self-identified race



Dementia in family



Covid-19 diagnosis



Preliminary data $n=77$

Cognitive Reserve

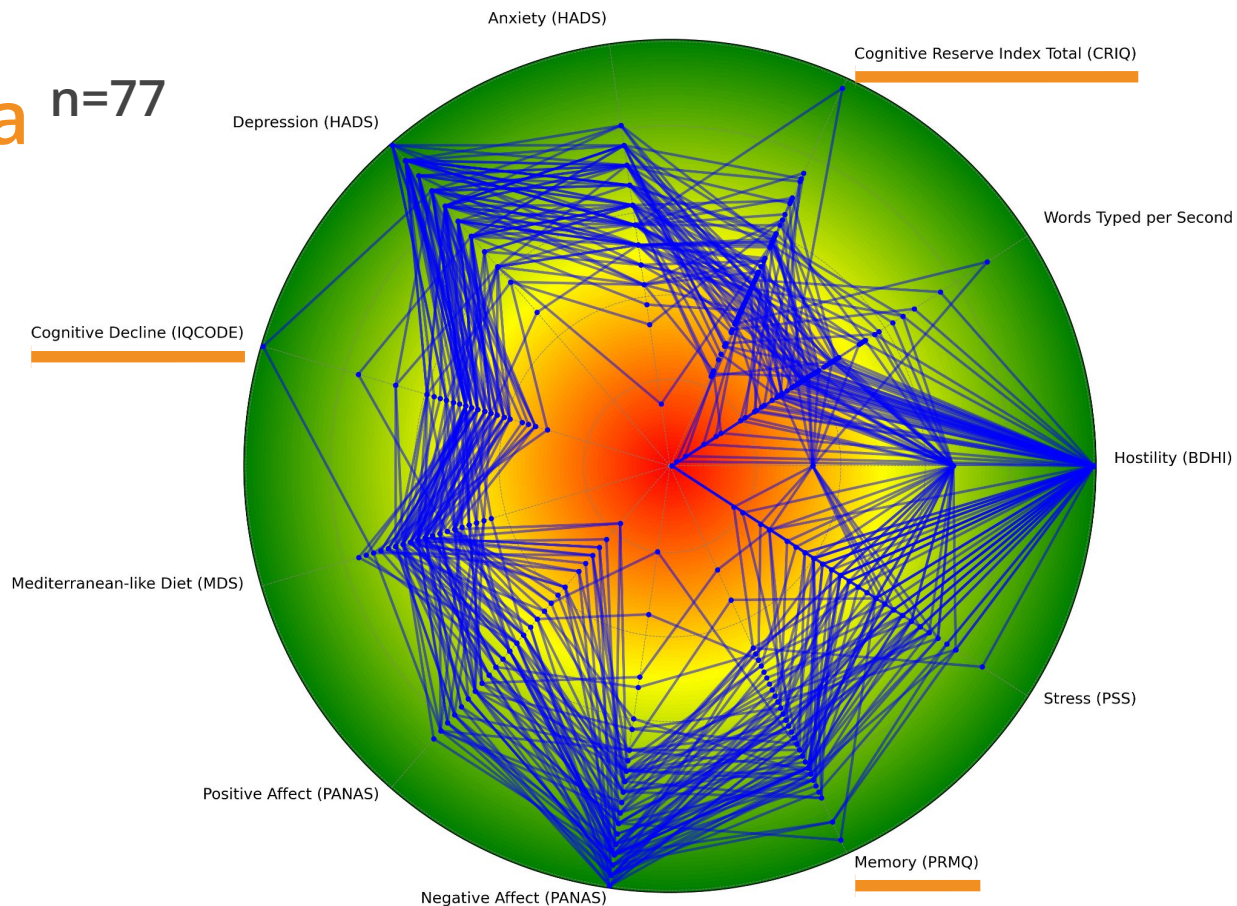
Mean: 128.0 (medium-high)

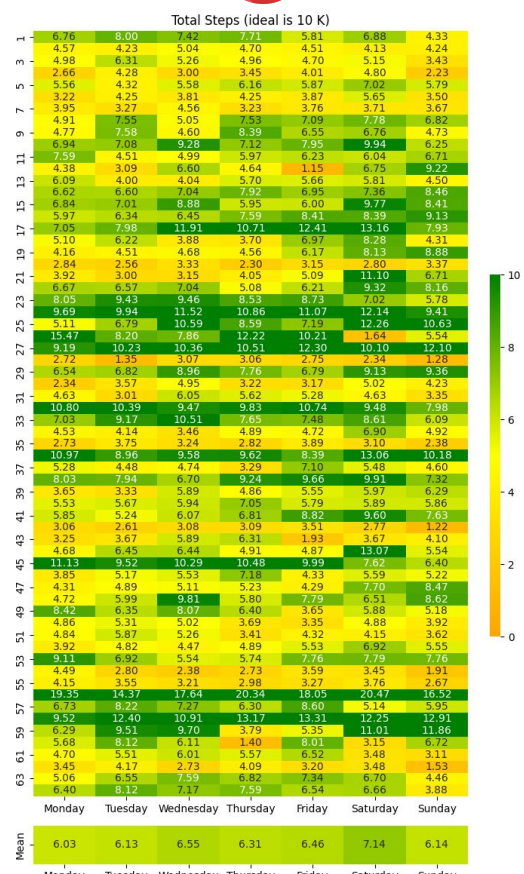
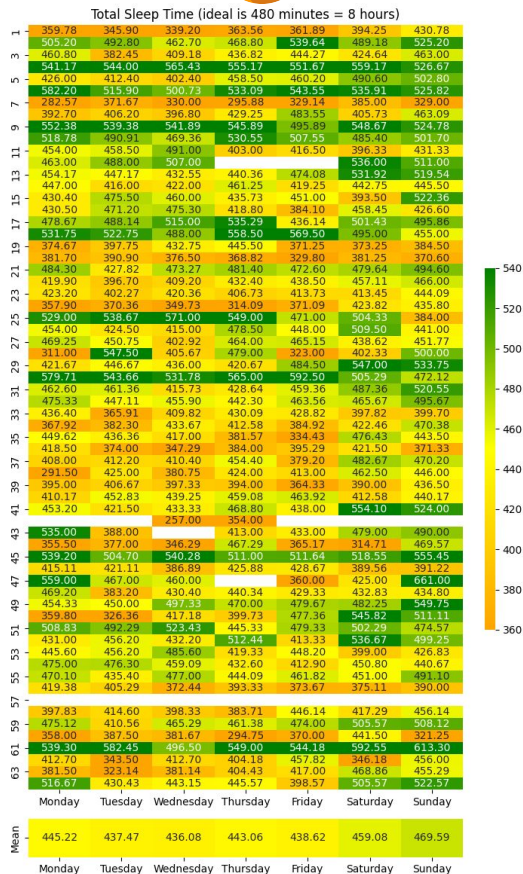
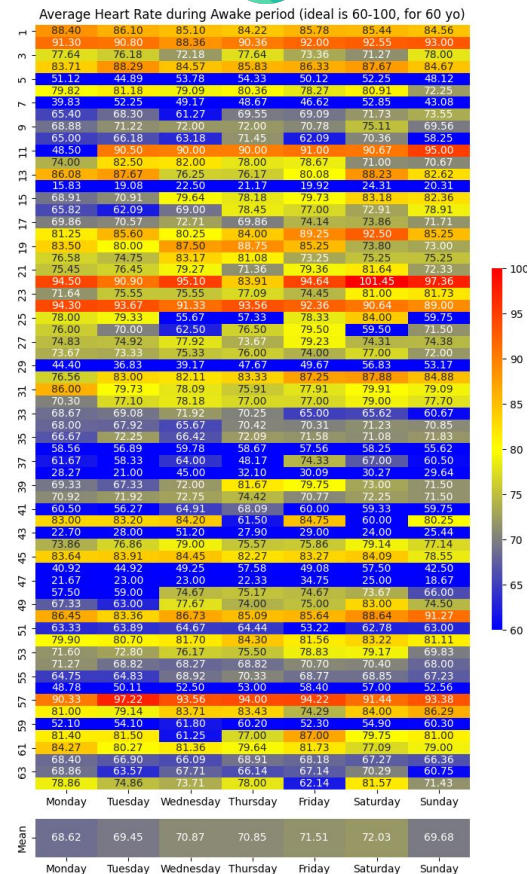
Cognitive Decline

Mean: 3.1 (no much change)

Memory Failures

Mean: 36.3 (low frequency)





Why NOT DO IT?

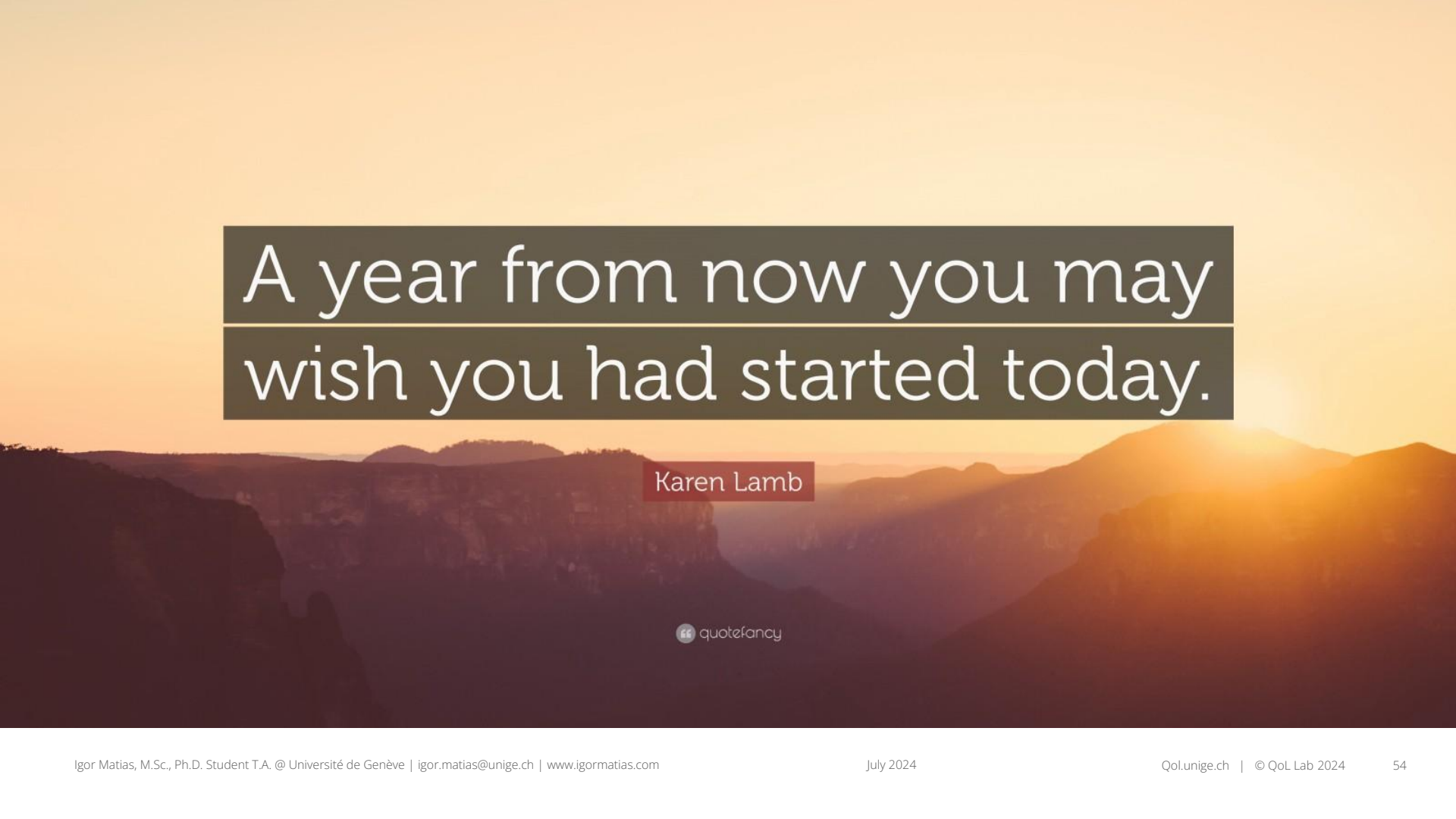


Unknown location.



Unknown location.

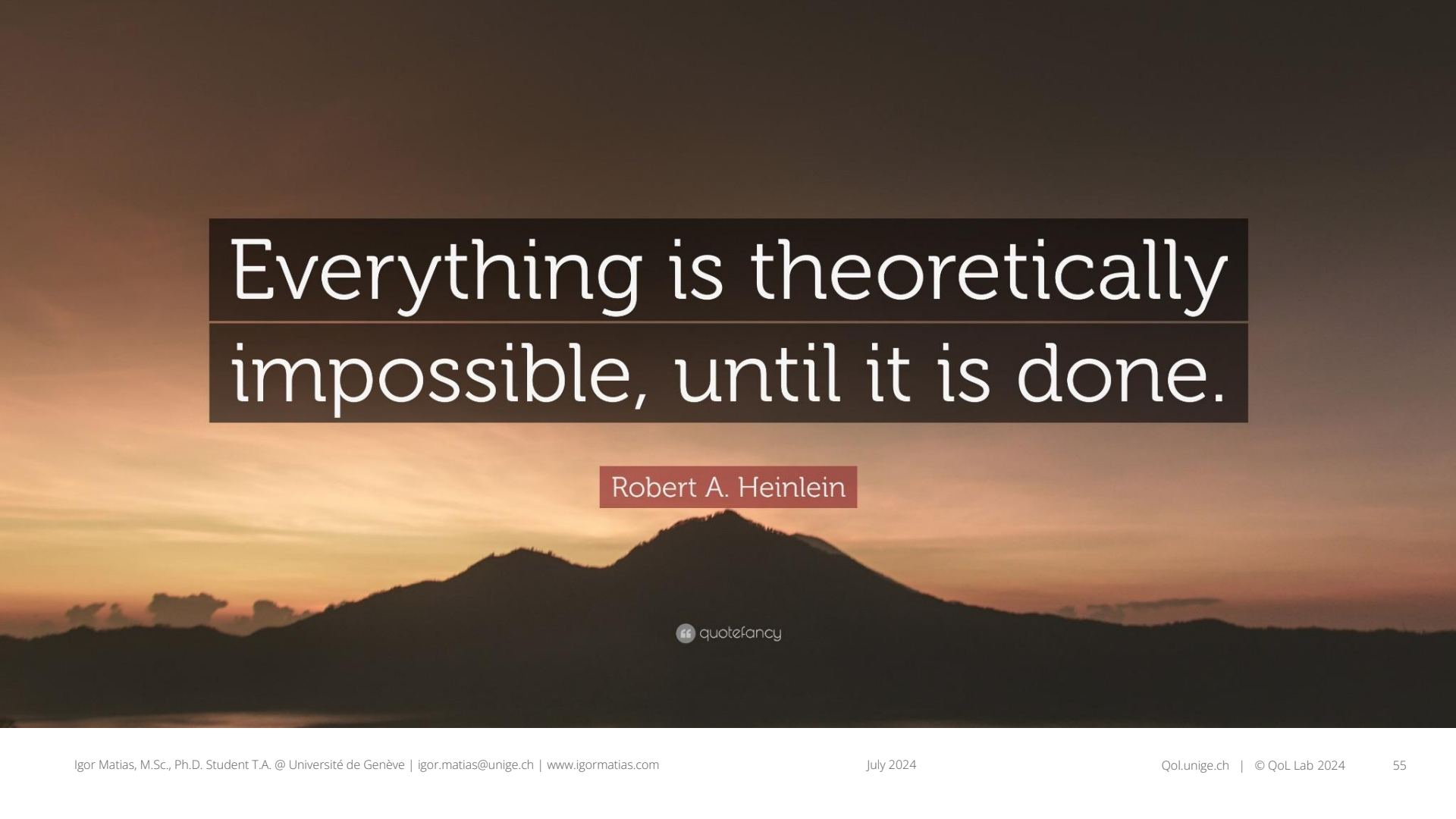
Why DO IT?



A year from now you may
wish you had started today.

Karen Lamb





Everything is theoretically impossible, until it is done.

Robert A. Heinlein



“Don’t go through life, grow through life” Eric Butterworth



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