

FRAGILE

D1.3 Tools and components packaged in frAAgiLe v2

ANA, UNIGE, SLO, IDE, DEU



frAAgile

GDPR

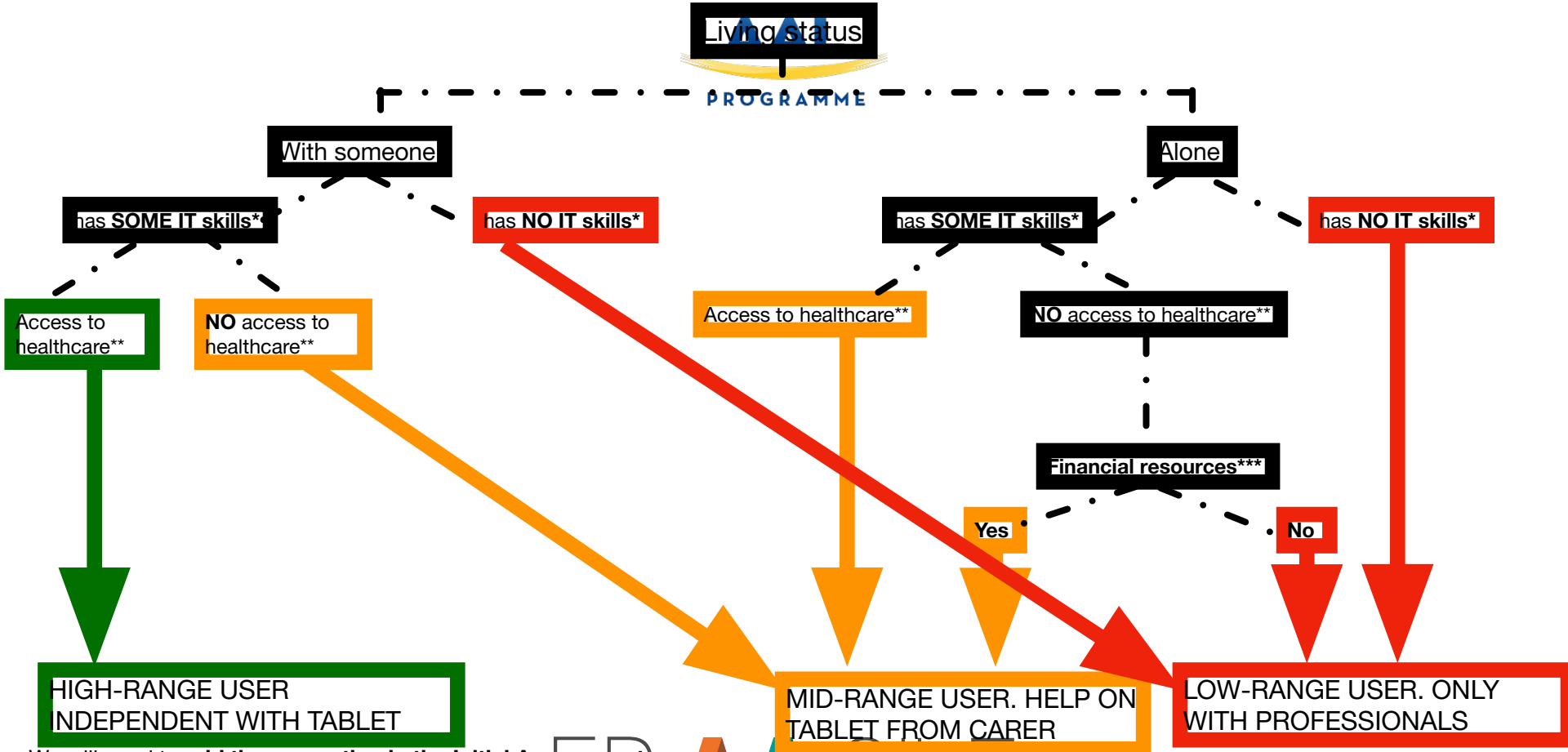
- As mentioned in the “D3.1. Field trials’ validation plan”, the apps do not store any credentials. The full authentication system is based on a JWT token given by the backend, this token is not shared with third party applications. This token as well as the first name, last name and the language of the user are stored in the private SharedPreferences folder of the Android application (UserDefaults on iOS). Only frAAgiLe application can access it, so the user, according to Android data policy. Moreover, this stored data is cleared if the app is uninstalled.
- The Android application does not store any other information, since it is a stateless application, all the information is retrieved from the backend
- Standards are respected to guarantee the safety of the data. HTTPS, hashed password SHA-512, secured database, user's role in database.
- For tracking movements, every image is captured in the client, not sent to any external system.
- The smartbands and Squegg devices, do not send any information to any external cloud, they connect directly to the tablet app using BT.

Tablet app

- We have created an algorithm to indicate if the user is following the suggestions & using the app normally.
- The messages section is receiving direct feedback from the professionals & therapists after they have checked all the evaluations and games results.
- Evaluations and games help the professionals checking the frailty status of the patients in their web backend.

Tablet app usability

- We have created an algorithm to adapt training plan to the inputs off the different evaluations, exercices and devices.
- Some evaluations appear in the patient role or in the caregivers' profile.
- This algorithm is a result of the initial assessment that now can be done more than once.

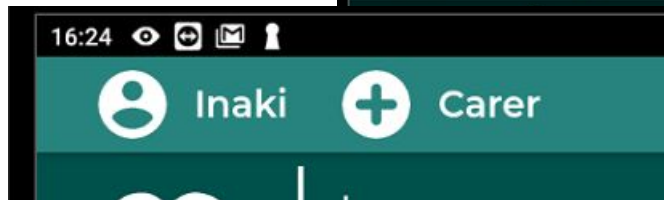
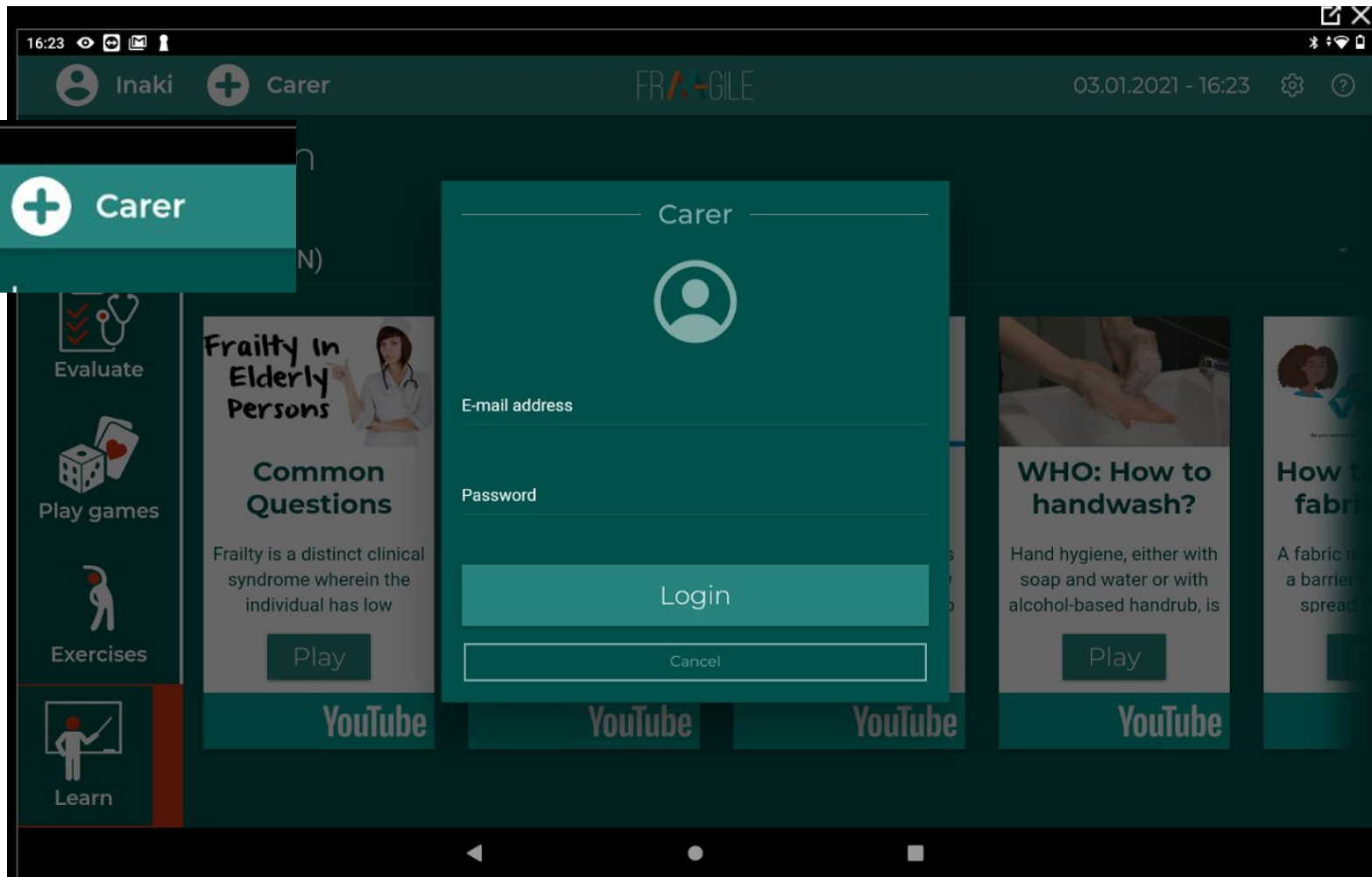


We will need to **add three question in the Initial Assessment:**

* For **IT skills** e.g. How confident are you in using Smart Devices? Not at all; Fairly Confident; Confident; Proficient User.

** For **Access to Healthcare** e.g. How easy is it to get access to a healthcare provider (e.g. geriatrician, neurologist)? Very difficult; Difficult; Moderate Easy; Very easy.

*** For **Financial Resources** e.g. Do you experience financial difficulties? Regularly; Sometimes; Rarely; Never..



Health score

- The different apps have been developed using Android for a better user experience and for a better integration with the hardware (Bluetooth connections, using of the camera, etc.).
- For this final version, the apps are published in Google Play, only in tester channels.
- The app, after login, presents all the information related to that specific patient and their engagement score.



Inaki



Carer

FRAGILE



4



My health



Tests



Games



Exercises



Learn

Engagement Score



Trend



Messages



01.02.2023 - 01:00
BMI lower than expected.



08.01.2023 - 01:00
It seems that you are less active than expected.



08.01.2023 - 01:00
Focus on mementia.

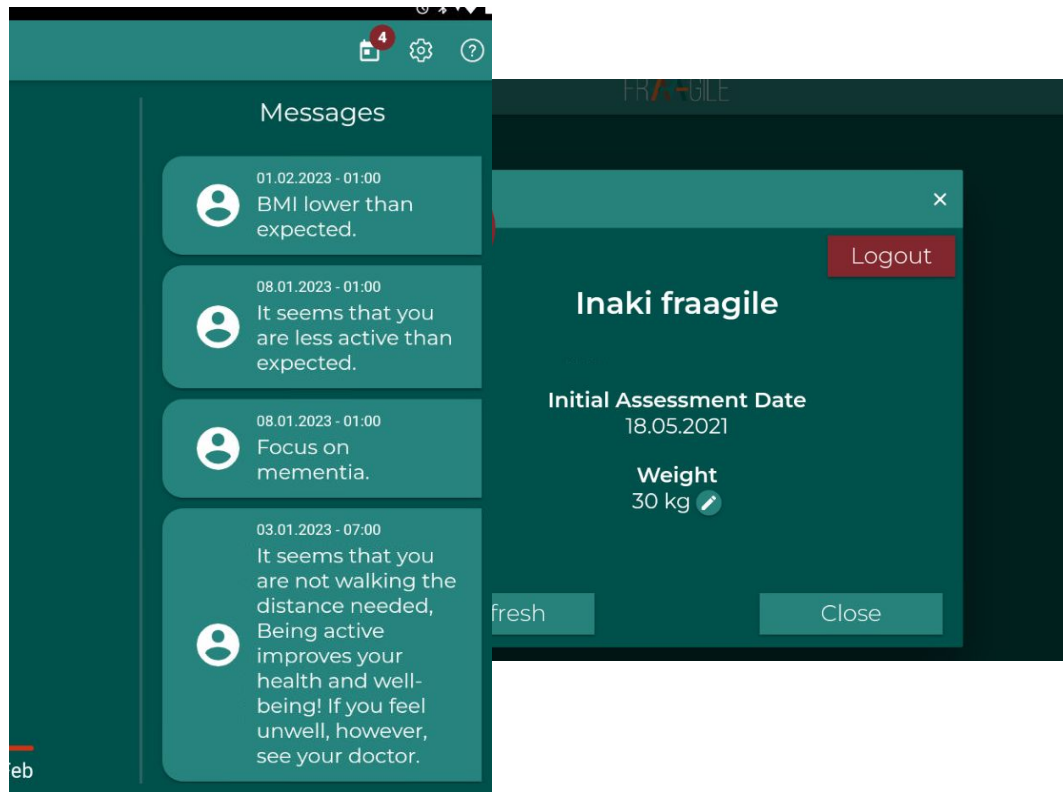
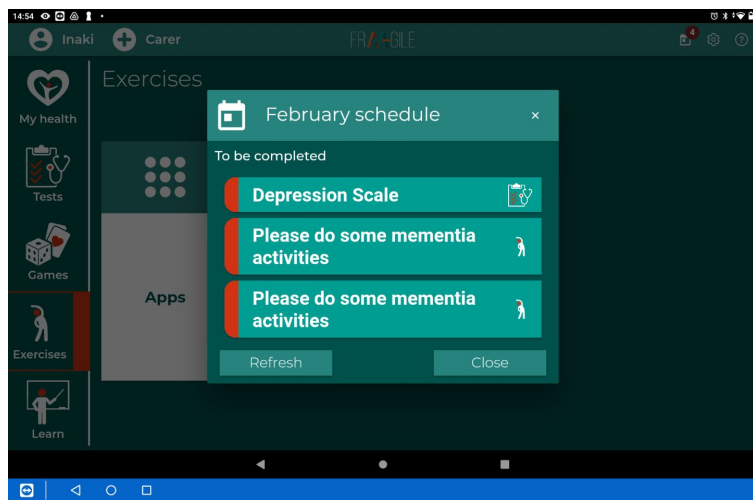


03.01.2023 - 07:00
It seems that you are not walking the distance needed, Being active improves your health and well-being! If you feel unwell, however, see your doctor.

Tailored training

- The app sends messages and creates calendar events depending on the inputs from the evaluations and exercises.
- The algorithm has been designed to be run in the background.
- Other values as weight, BMI, Squegg, SPPB app, etc. are also part of the algorithm.

Tailored training

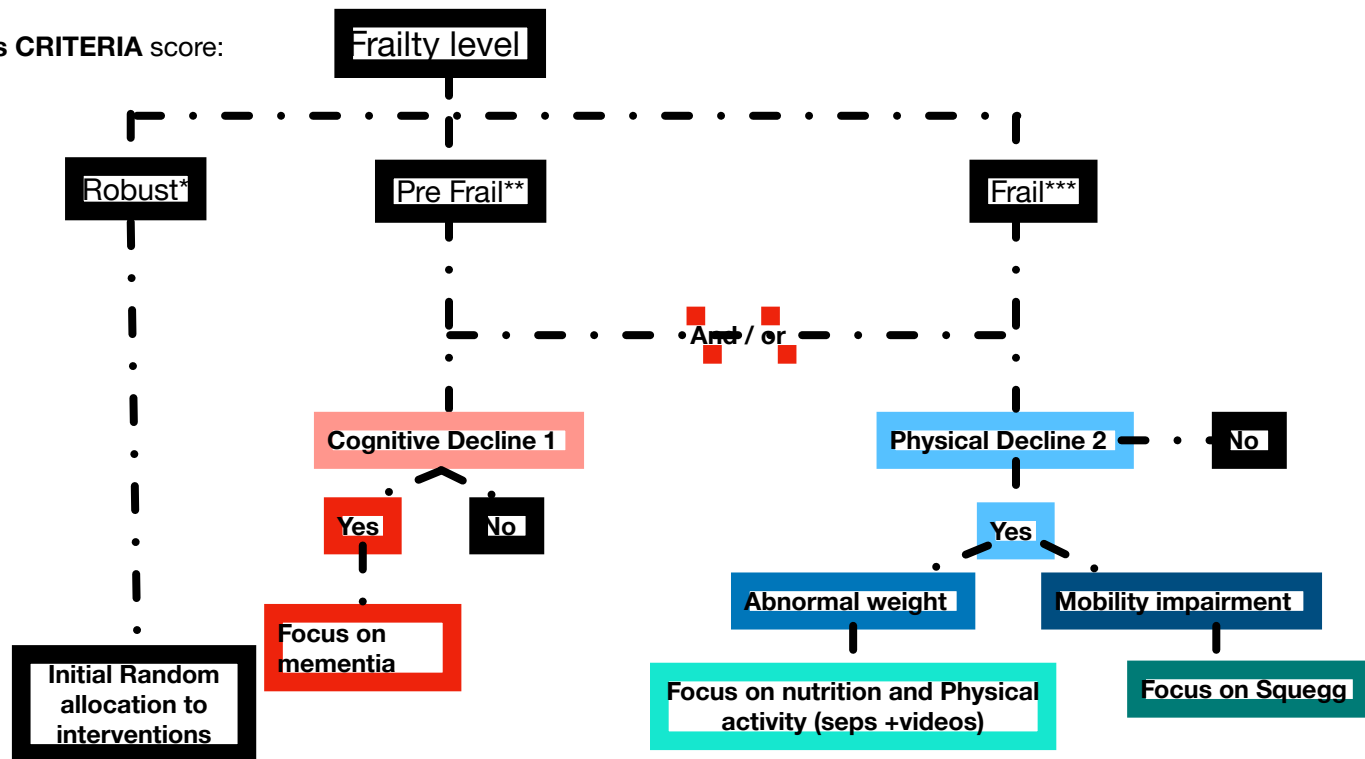


Frailty level Allocated based on **FRIED's CRITERIA** score:

* **0 points** out of 5

** **1 or 2 points** out of 5

*** **3 or more points** out of 5



Breakdown of scores, allocation to 1. Cognitive or 2. Physical decline:

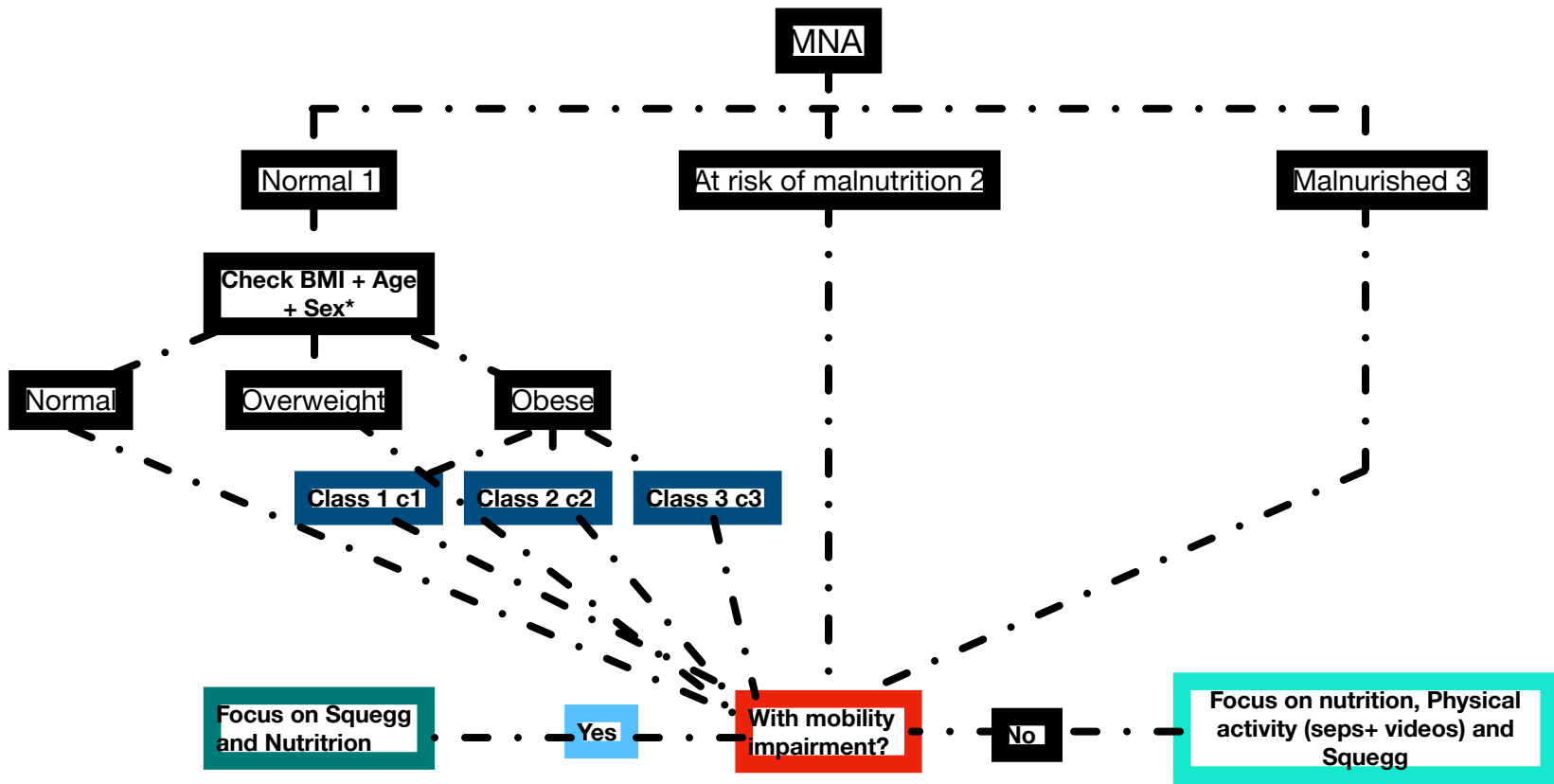
Level 1 deciding if its 1 or 2 based on **FRIED's CRITERIA** items (questions)

1. Q3 answers: 1-2 days; 3-4 days or 5-7 days

2. Q1 answer Yes, and/or Q2 low grip strength, and/or Q4 answer Less than

Level 2 better allocation to 1 or 2 with input from other tests:

1. AMT-10 score 6 or less and/or IQCODE score 4 or above
2. MNA scores 11 or lower and/or Squegg abnormal score for sex/age and/or SPPB score 6 or lower.

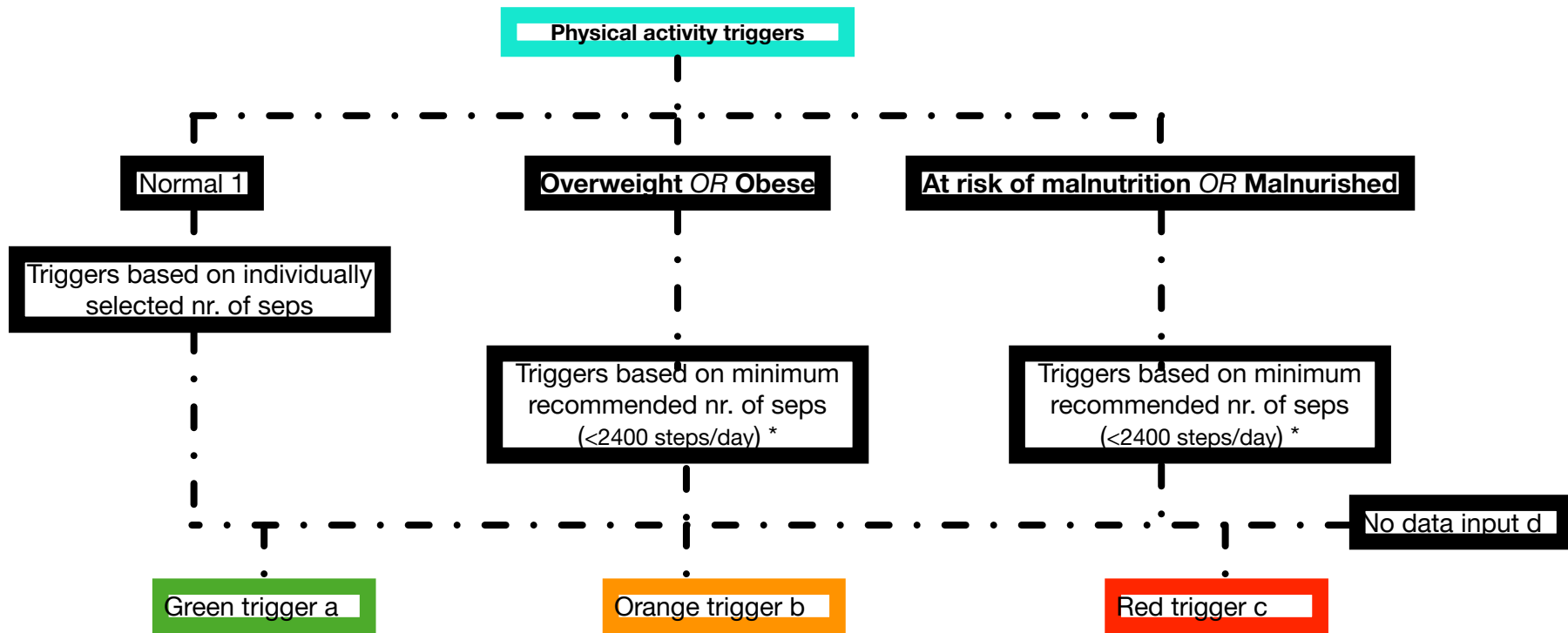


Breakdown of scores, allocation to 1. MNA= 24 - 30 -> Normal nutritional status; 2. MNA= 17 - 23.5 -> At risk of malnutrition; 3. MNA= >17 -> Malnourished

*

Could be classified as Normal (as in, not underweight) based on MNA BUT they may be **overweight**, we thus check for BMI

a. Normal - BMI values between 18.5-24.99



a. Green congratulating message

b. Orange to remind targets - Daily count (<2400 steps/day) and weekly 16800 steps exercise/week

c. Red alert caregiver

a. Well done! You keep yourself active!

b. It seems that you are less active than expected, do you feel unwell?

c. Yes – Please inform your next of kin/doctor

No – Being active improves your health and well-being! Try to achieve your step target!
d. Please check that your data is being recorded. Or if you feel unwell, should we ask for help?

1 • *Physical activity*

- a. Weekly physical activity within optimal range on each measurement and weekly average
- b. Weekly physical activity below optimal range on each measurement
- b. Physical activity outside optimal range on weekly average

Algorithm will be:

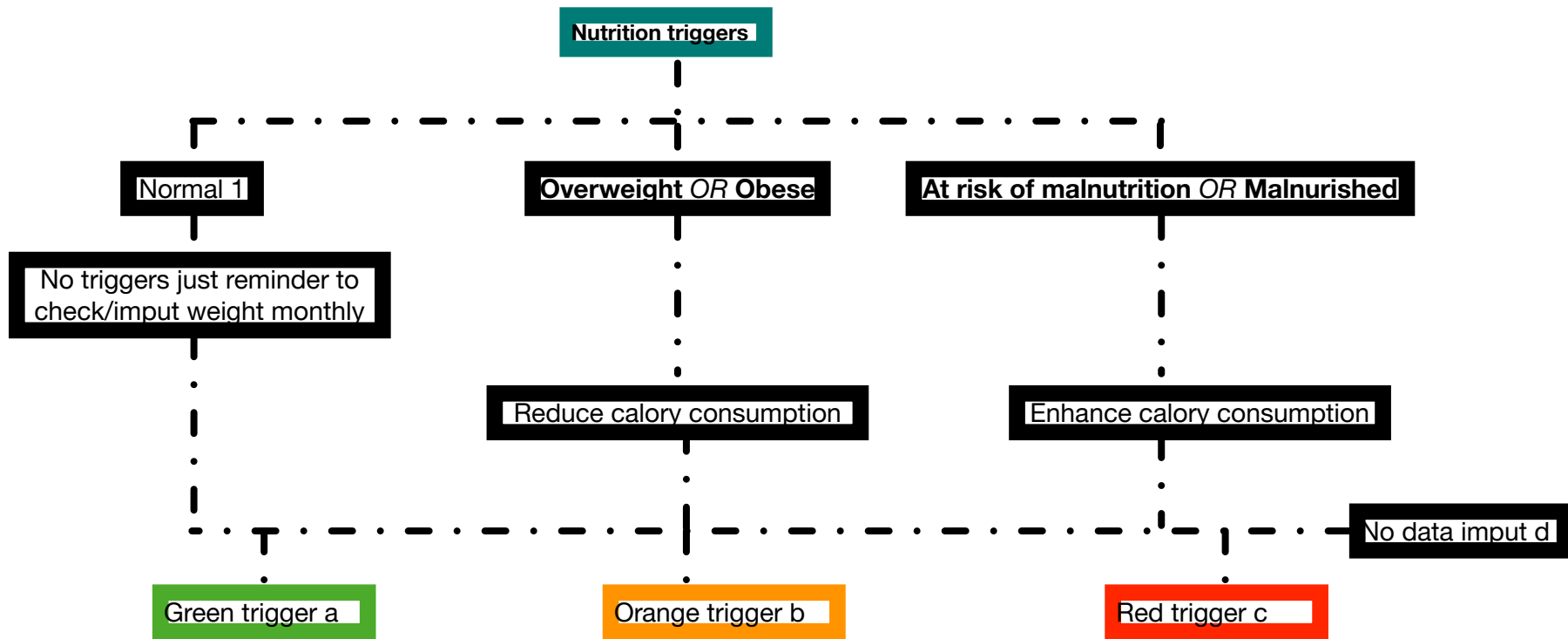
If daily/weekly target is <2400 steps/day -> **a. Well done! You keep yourself active!**

If daily/weekly target is >2400 steps/day -> **b. It seems that you are less active than expected, do you feel unwell?** -> Yes -> **c. Please inform your next of kin/doctor**

If daily/weekly target is >2400 steps/day -> **b. It seems that you are less active than expected, do you feel unwell?** -> No -> **Being active improves your health and well-being!**

If data is missing for <3 consecutive days -> **d. Please check that your data is being recorded. Or if you feel unwell, should we ask for help?** -> No -> **Please check fitness band and/or MiFit app.**

If data is missing for <3 consecutive days -> **Please check that your data is being recorded. Or if you feel unwell, should we ask for help?** -> Yes -> **c. Please inform (your next of kin / doctor)**



- a.** Green congratulating message
- b.** Orange to remind targets - weekly BMI and monthly BMI
- c.** Red alert caregiver
- d.** No data input

a. BMI levels seem good.

You're losing weight, well done!

You're gaining weight, well done!

b. Your weekly/monthly BMI does not seem to be in target.

BMI higher than expected.

or

BMI lower than expected.

c. Please inform (your next of kin / doctor)

2) *Diet*

- a. BMI within optimal range on weekly measurement and monthly average
- b. BMI above optimal range on weekly measurement
- b. BMI below optimal range on weekly measurement
- b. BMI outside optimal range on monthly average
- d. Missing data
- c. Red alert

*Weight loss/gain 1.5kg/week or 2,5kg /month.

Algorithm will be:

If Target BMI – Current BMI = 0 -> a. **BMI levels seem good.**

If Target BMI – Current BMI <0 -> b. **BMI higher than expected.**

If Target BMI – Current BMI >0 -> b. **BMI lower than expected.**

If Target BMI – monthly average BMI is either $\neq 0$ -> **b. Your monthly BMI does not seem to be in target. Keep trying to adhere to the nutritional recommendations.**

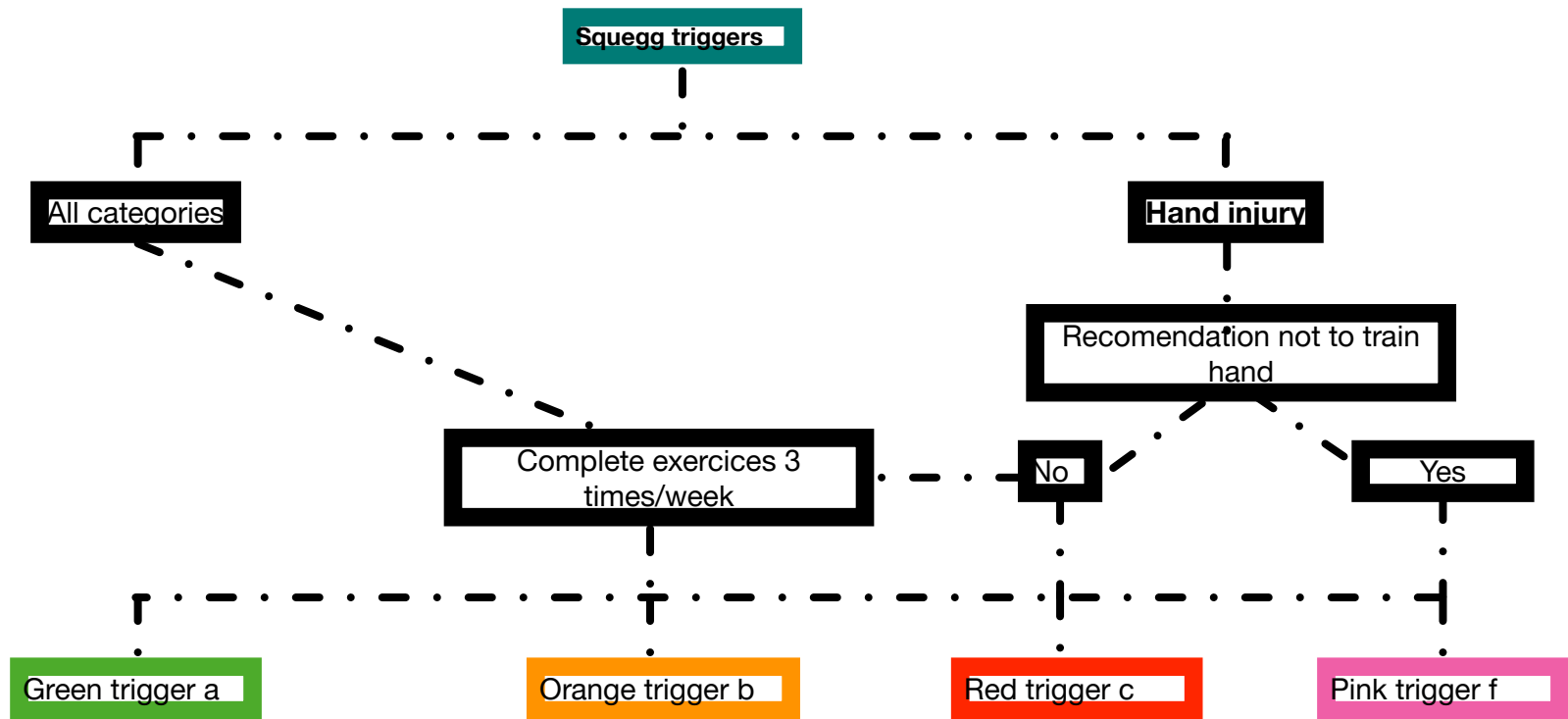
If weight loss <3kg monthly average for **At risk of malnutrition OR Malnourished** -> **d. Please inform (your next of kin / doctor)**

If weight loss <3kg monthly average for **Overweight OR Obese** -> **a. You're losing weight, well done!**

If weight gain <2kg monthly average for **At risk of malnutrition OR Malnourished** -> **a. You're gaining weight, well done!**

If data is missing for <2 consecutive weeks -> d. **Do you feel unwell, should we ask for help?** -> No -> **Please enter measurement**

If data is missing for <2 consecutive weeks -> **Do you feel unwell, should we ask for help?** -> Yes -> **d. Please inform (your next of kin / doctor)**



a. Green congratulating message

b. Orange to remind targets - weekly target

c. Red alert caregiver

d. No data input

f. Pink trigger message “Do not use squegg with injured hand until otherwise instructed by your formal or informal caregiver”

a. Well done! You’re on track!

b. It seems that you are less active than expected, do you feel unwell?

Yes – Please inform your next of kin/doctor

No – Improving your grip strength can have many advantages, including enhanced well-being! Try to achieve your target!

d. No – Improving your grip strength can have many advantages, including enhanced well-being! Try to achieve your target!

f. Do not use squegg with injured hand until otherwise instructed by your formal or informal caregiver

1. Squegg training

- a. Weekly training within optimal range on weekly average
- b. Weekly average activity below optimal range
- c. Monthly Grip Strength value dropped by 30% from initial measurement

Algorithm will be:

If weekly target is equal or over target (exercise 3 times/week) -> a. Well done! You're on track!

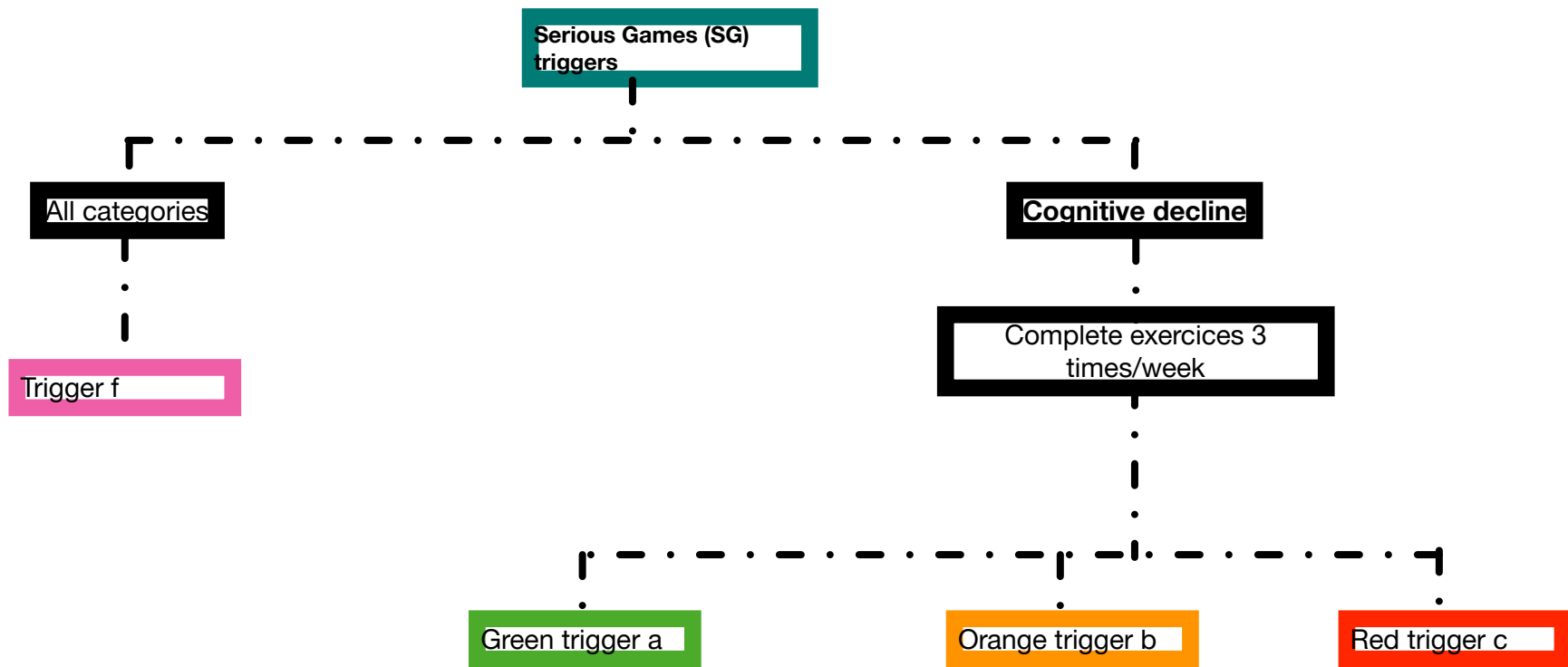
If weekly target is below target (exercise 3 times/week)-> b. It seems that you are less active than expected, do you feel unwell? -> Yes -> c. Please inform your next of kin/doctor

If weekly target is below target (exercise 3 times/week)-> b. It seems that you are less active than expected, do you feel unwell? -> No -> Improving your grip strength can have many advantages, including enhanced well-being! Try to achieve your target!

If data is missing for <3 consecutive days -> d. Please check that your data is being recorded. Or if you feel unwell, should we ask for help? -> No -> Please check internet connection and/or that the device is charged.

If data is missing for <3 consecutive days -> Please check that your data is being recorded. Or if you feel unwell, should we ask for help? -> Yes -> c. Please inform (your next of kin / doctor)

If hand injury is selected -> Yes -> f. Do not use squegg with injured hand until otherwise instructed by your formal or informal caregiver



- a.** Green congratulating message
- b.** Orange to remind targets - weekly target

a. Well done! You're on track!

b. It seems that you are training less than expected, do you feel unwell?

c. Yes – Please inform your next of kin/doctor

b. No – Keeping mentally active is very important! Try to achieve your target!

d. No – Keeping mentally active is very important! Try to achieve your target!

f. Try some of our games from time to time, you'll have fun and it also keeps your brain active!

1. *SG training*

- a. Weekly training within optimal range on weekly average
- b. Weekly average activity below optimal range
- f. No usage for over 3 weeks

Algorithm will be:

If weekly target is equal or over target (exercise 3 times/week) -> a. Well done! You're on track!

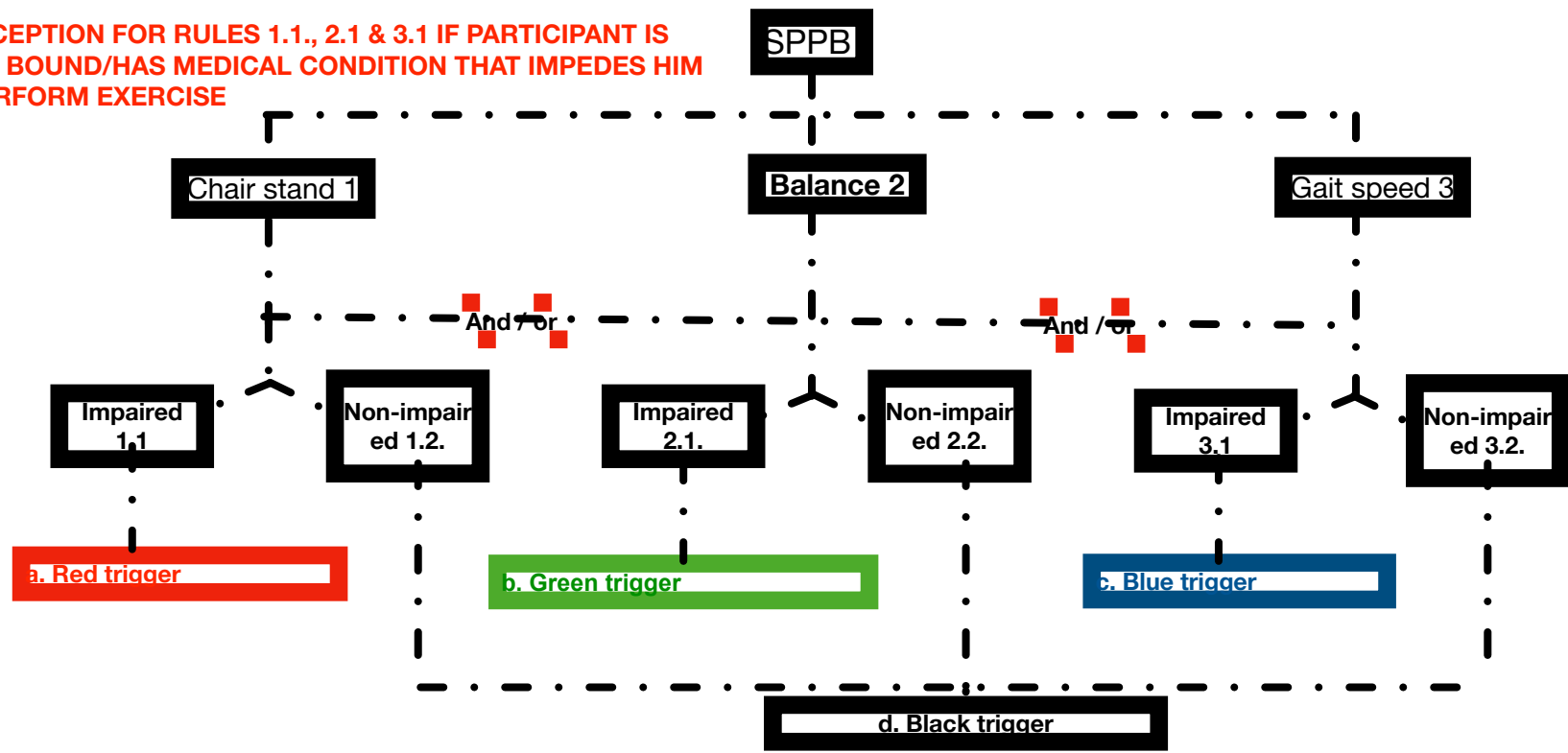
If weekly target is below target (exercise 3 times/week)-> b. It seems that you are less active than expected, do you feel unwell? -> Yes -> c. Please inform your next of kin/doctor

If weekly target is below target (exercise 3 times/week)-> b. It seems that you are less active than expected, do you feel unwell? -> No -> Keeping mentally active is very important! Try to achieve your target!

If data is missing for <3 consecutive days -> d. Please check that your data is being recorded. Or if you feel unwell, should we ask for help? -> No -> Keeping mentally active is very important! Try to achieve your target!

If data is missing for <3 consecutive weeks -> f. Try some of our games from time to time, you'll have fun and it also keeps your brain active!

*** EXCEPTION FOR RULES 1.1., 2.1 & 3.1 IF PARTICIPANT IS CHAIR BOUND/HAS MEDICAL CONDITION THAT IMPEDES HIM TO PERFORM EXERCISE



Breakdown of scores, allocation to 1.1. Chair stand + Impaired; 2.1. Balance + Impaired & 3.1. Gait + Impaired

- 1.1. If score is 0 or 1
- 1.2. If score is 1 or 2
- 2.1. If score is 0 or 1
- 2.2. If score is 0 or 1
- 3.1. If score is 0 or 1
- 3.2. If score is 1 or 2

***Ideally we would ask them if they have such problems before starting the test or at the end
 E.g. Do you have a medical condition that impedes you from performing certain exercises (e.g. hip replacement, back problems, significant hand injury, wheelchair bound, etc.)? Answers: Yes/No
 If yes, skip recommendations.

1. *Physical activity triggers based on SPPB*

- a. Weekly physical activity within optimal range on each measurement and weekly average
- b. Weekly physical activity below optimal range on each measurement
- b. Physical activity outside optimal range on weekly average

Algorithm will be:

If classed as 1.1. trigger -> **a. Red trigger recommendation “Focus on lower extremity strength training and balance you can find some videos here [link to video].”**

If weekly target is >3 videos watched -> **b. It seems that you are not using the exercise videos, do you feel unwell? -> Yes -> c. Please inform your next of kin/doctor**

If weekly target is >3 videos watched-> **b. It seems that you are not using the exercise videos, do you feel unwell? -> No -> Being active improves your health and well-being!**

If weekly target is <3 videos watched-> **You’re doing great! Well done, keep it up!**

If classed as 2.1. trigger -> **b. Green trigger recommendation “Focus on balance exercises (e.g. yoga) [link to video]”**

If weekly target is >3 videos watched -> **b. It seems that you are not using the exercise videos, do you feel unwell?** ->

Yes -> **c. Please inform your next of kin/doctor**

If daily/weekly target is <3 videos watched-> **b. It seems that you are not using the exercise videos, do you feel unwell?** -> No -> **Being active improves your health and well-being!**

If weekly target is <3 videos watched-> **You’re doing great! Well done, keep it up!**

If classed as 3.1. trigger -> **c. Blue trigger recommendation “Focus on strengthening exercises of the lower body [link to video]”**

If weekly target is >3 videos watched -> **b. It seems that you are not using the exercise videos, do you feel unwell?** ->

Yes -> **c. Please inform your next of kin/doctor**

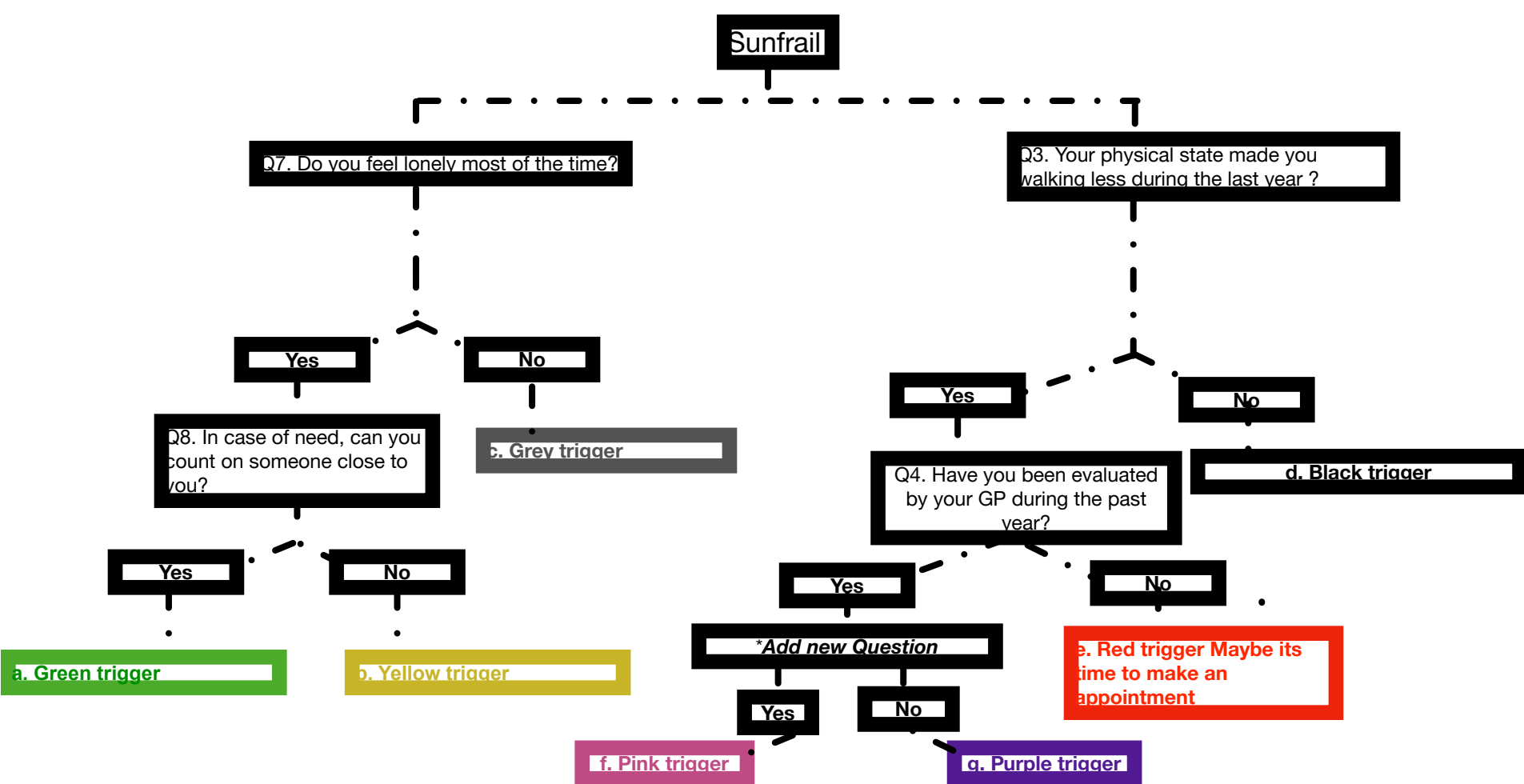
If daily/weekly target is <3 videos watched-> **b. It seems that you are not using the exercise videos, do you feel unwell?** -> No -> **Being active improves your health and well-being!**

If weekly target is <3 videos watched-> **You’re doing great! Well done, keep it up!**

If classed as 1.2.; 2.2. & 3.2. trigger -> d. **Black trigger “Focus on keeping active either by setting a number of steps/day on your smart band or use range of videos that we have made available [video links].”**

If biweekly target is >3 videos watched -> b. **It seems that you are not using the exercise videos, Being active improves your health and well-being! If you feel unwell, however, see your doctor.**

If biweekly target is <3 videos watched-> **You’re doing great! Well done, keep it up!**



* Has your GP advised against certain exercises? Answers: Yes/No; If Yes trigger-> **Pink trigger**. If No trigger-> **Purple trigger**

Algorithm will be:

a. Green trigger -> “You said you feel lonely, how about you invite a friend or family member for tea. If you're feeling down and alone, it's tempting to think nobody wants to visit you. But often friends, family and neighbours will appreciate receiving an invitation to come and spend some time with you.”

b. Yellow trigger -> “You said you feel lonely how about starting up a new hobby. Learning something new is the best way to keep your brain young. Taking up a new hobby is a good means of staying active and meeting new people. You can start a knitting circle, or head to the local community centre to participate in weekly activities.”

c. Grey trigger -> “We’re happy you don’t feel lonely. Don’t forget that its important to socialise, it builds confidence, resilience and connection.”

d. Black trigger -> “It sounds like you are not in physical pain and that you are still mobile, how about trying something new? Like taking up a class or seminar to get out of the house and meet new people. Check with your local community centre or community college because many of these places offer free classes for seniors. Also, try asking around at your local library to see what events are coming up.

e. Red trigger -> “You said you’re in some physical pain but haven’t seen your doctor this year, maybe its time to make an appointment! If you cannot do it yourself ask your carer or someone close to you to help with this.”

f. Pink trigger -> “You said you have been advised against certain forms of exercises, please ask your doctor or carer whether you should perform any of the exercises in the videos we provide. Before you do ask, please do not use the training videos!”

g. Purple trigger -> “ Sounds like you are feeling some physical discomfort but have no contraindication for exercising. Why don’t you start by walking in the park, if that feels good maybe you can try some moderate exercises, like yoga see [\[link\]](#).”

SUMMARY OF SCORE RANGES

For Fried's Assessment, score range 0-5, 3 appraisals: 0, 1-2, 3-5

Sunfrail evaluations, score range 0-2, 2 appraisals: 0-1, 2

Specifically, for

AD8 – high scores are bad (worst possible - 8)

FAQ – high scores are bad (worst possible - 30)

GDS - high scores are bad (worst possible - 15)

Frieds – high scores are bad (worst possible - 5)

IQCODE – high scores are bad (worst possible - 5)

MNA – high scores are GOOD (best possible - 14)

SPPB – high scores are GOOD (worst possible - 12)

Sunfrail – high scores are bad (worst possible - 2)

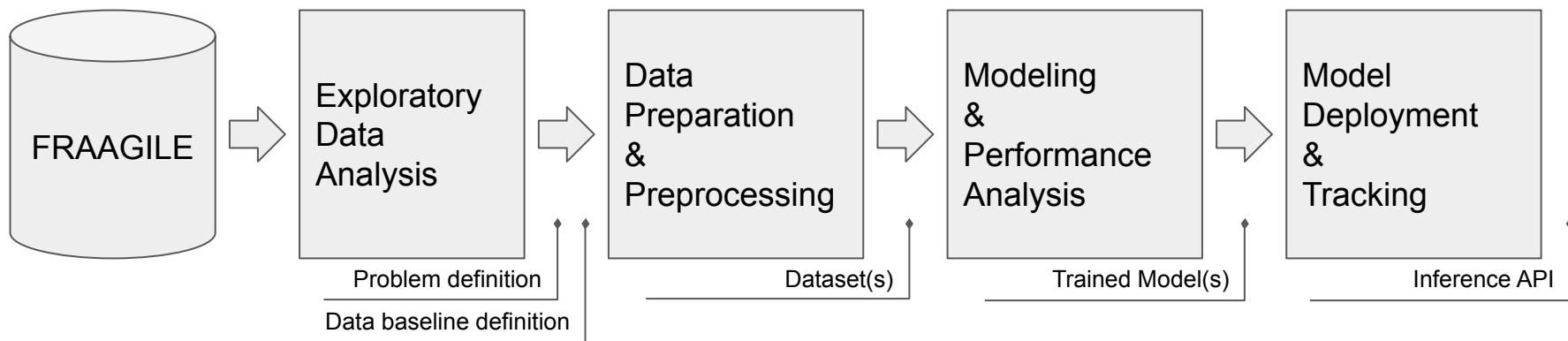
MMSE - Mementia

Evaluation	Worst possible – Best possible	Appraisal Ranges
AD8	8-0	3 appraisals: 0-1, 2-3, 4-8
FAQ	30-0	2 appraisals: 0-8, 9-30
GDS	15-0	4 appraisals: 0-4, 5-8, 9-11, 12-15
FRIED'S ASSESSMENT	5-0	3 appraisals: 0-1, 1-2, 3-5
IQCODE	5-1	3 appraisals: 1-3, 4, 5
MNA	0-14	3 appraisals: 0-7, 8-11, 12-14
SPPB	0-12	4 appraisals: 0-3, 4-6, 7-9, 10-12
SUNFRAIL	2-0	2 appraisals: 0-1, 1-2
AMT	0-10	-

Artificial intelligence

- IDE has introduced prediction in fraagile using Artificial Intelligence.
- Trends are shown to the professionals based of the former results.
- The trends appear both in individual evaluations, health data and even in the engagement score.

Data-Driven Artificial Intelligence

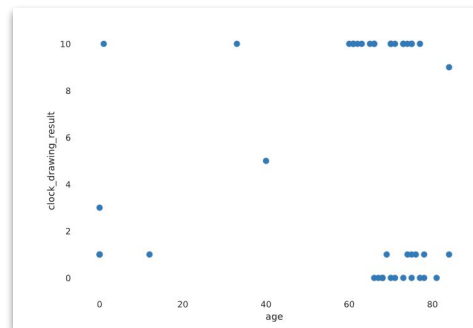


Exploratory Data Analysis

- **Investigate data** in order to check assumptions, discover anomalies and/or patterns.
- **Discover/Determine** categorical, numerical **variables**, univariate, multivariate **time series**, ...
- **Study the data quality.**
- **Summarize the data** with statistical and graphical representations.

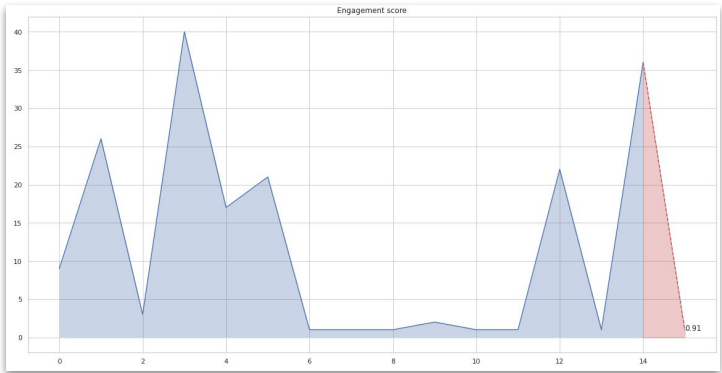


- **Determine problem definition**, prediction, forecasting, clustering, ...
- **Generate a Data baseline definition**, which data will be used, in which way, what is needed in order to use the data, is this data enough?, ...



Exploratory Data Analysis

- Possible problem definition based on Fraagile:
 - Health/Engagement score forecasting / Future health score decay warning.
 - MNA score forecasting / Future malnourishment warning.
 - Depression Scale forecasting / Future depression risk warning.
 - Fried's Assessment forecasting / Future frailty risk warning.
 - Sunfrail forecasting / Future frailty risk warning.



MNA

The electronic Mini Nutritional Assessment [Chart](#)

The Mini Nutritional Assessment is a simple tool that can be used by adults 65 years of age and older or their caregivers. This test is as effective in identifying individuals who are malnourished or at risk of malnutrition. Older adults are more likely to have chronic conditions that put them at risk for malnutrition. Malnutrition in older adults can lead to various health concerns, including: a weak immune system, which increases the risk of infections.

Date	Appraisal Value	Score	Screening Score
--	0.21	3	Malnourished
26/10/2021, 18:00:50	0.40	6	
25/10/2021, 19:04:36	0.57	8	

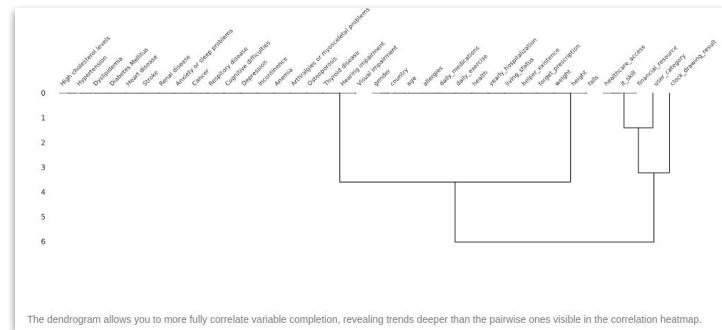
Data preparation & preprocessing

- **Fill missing data**, mean imputation, regression imputation, interpolation, ...
- **Remove noisy data**.
- **Remove inconsistent data**.
- **Generate synthetic data** (e.g. libs, SDV, Gretel,...).
- **Transform the data** in order to be used as an entry to an Artificial Intelligence model (normalization, aggregation, ...).



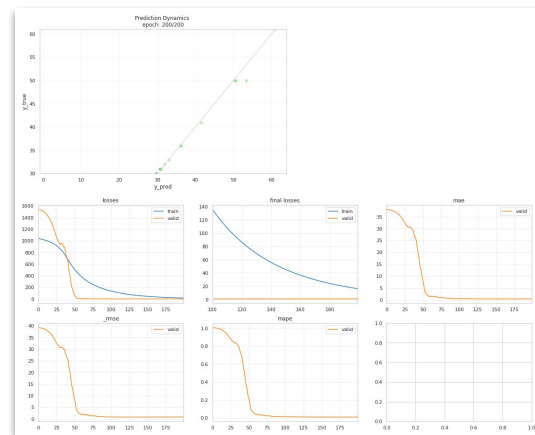
- **Generate datasets** that will be used as an entry to a specific set of models. **Tabular datasets** and/or **Multiple-series datasets** (univariate or multivariate).
- **Determine training, test and/or validation splits.**

Dataset statistics		Variable types	
Number of variables	38	Categorical	9
Number of observations	82	Numeric	10
Missing cells	405	Boolean	19
Missing cells (%)	13.0%		
Duplicate rows	0		
Duplicate rows (%)	0.0%		
Total size in memory	25.0 KiB		
Average record size in memory	312.0 B		

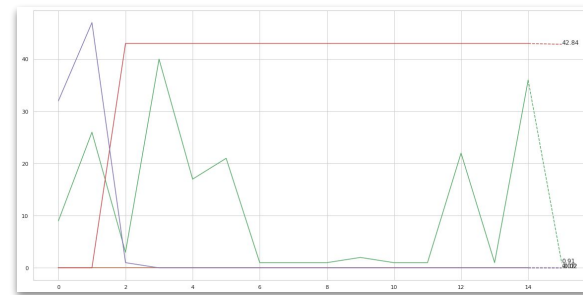


Modeling & Performance Analysis

- **Determine ML/AI libraries** will be used based on the problems and data definition.
 - State-of-art libraries and models will be used, **TSAI**, **DARTS**, Prophet, ...
- **Determine set of models** that will be evaluated for each problem.
 - E.g. Random Forest, Neural Basis Expansion Analysis, Temporal Fusion Transformer, ...
- **Determine metrics to evaluate** model performance.
 - Mean absolute error, root mean square error, mean absolute percentage error, ...
- **Determine multimodal or ensemble techniques** for performance improvement if needed.



- **Generate trained model(s) for each problem definition.**



Model Deployment & Tracking

- Having the problem definition, data definition and trained models.
- Develop a **REST API for consuming models and making predictions**.
- Develop **endpoints based on problem and data definitions**.
- Define a **common schema for data consumption**.
- Study the possibility of adding **retraining endpoints** based on updated data from FRAAGILE.
- Study the possibility of adding **model tracking techniques** for detecting data drift, concept drift, ...



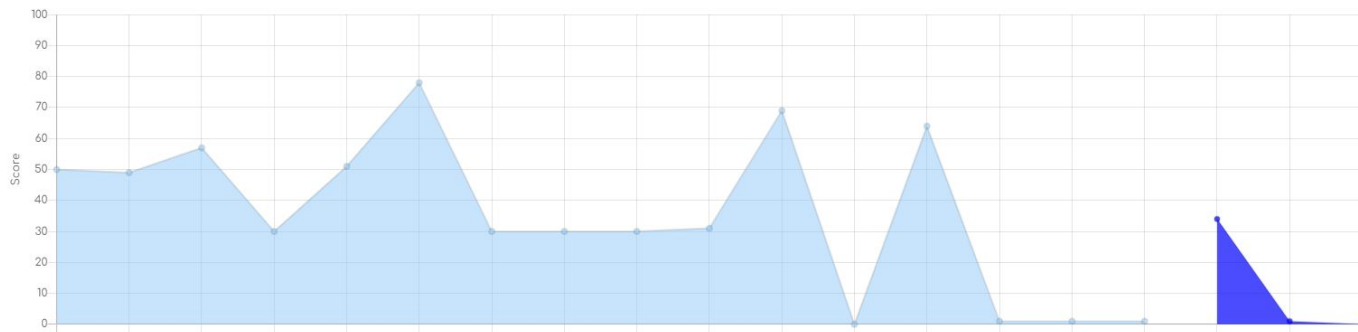
- **Generate an Inference REST API** (with possible retraining, model tracking endpoints).
- Integrate the new Inference API with FRAAGILE platform.

MNA

The electronic Mini Nutritional Assessment **Chart**

The Mini Nutritional Assessment is a simple tool that can be used by ac
effective in identifying individuals who are malnourished or at risk of m

Engagement score: 1



Graph

Games

- DEU has created 8 games to work with logic, physical activity and cognitive stimulation.
- IDE has also integrated its own cognitive stimulation platform, Kwido Mementia, that works 8 different mental capacities.
- UNIGE has created one exercises app and one game to be used using the Squegg hand trainer.



My health



Tests



Games



Exercises



Learn

Games



Leaderboard

NEW



Basic



NEW



Sapa Cars



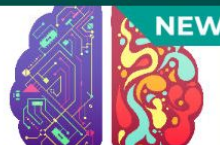
NEW



Throughout
the World



NEW



Trivial



Rabbit Finder



CHOP IT!



Play



You can play
with your
children too.



SAPA

Play ▶

FRAGILE

Dex



12:04

Kwido Mementia



¿Cuántas alfombras hay en la imagen?



10
9
8



Arrastre cada imagen de arriba con su nombre correspondiente



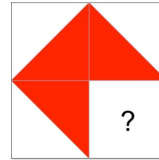
Pato de goma

Minibar

Despertador



Marque de las opciones de abajo la que completa correctamente la matriz presentada



Marque todos los números mayores que 15



13	14	16	17	11
13	2	17	21	18
10	21	23	13	12



Physical tracking

- IDE has developed 2 apps for tracking physical activity. One is the SPPB automatic test performed using the camera and tracking movements.
- Also, a connection to Xiaomi Mi Band, Lifevit and Leotec smartbands to track the steps walked a day by the end users. With these last smartbands, the connection problems disappeared.
- UNIGE has also integrated the Squegg, a handgrip strength assessment that serves as a feasible, quick, and reliable biomarker to examine vitality and physical function in the elderly people.



My health



Tests



Games



Exercises



Learn

Exercises - Apps

< Back



Grip Me



NEW

kwido®

Kwido
Mementia



FRAAGILE
Motion



FRAAGILE
SPPB



SPPB tests

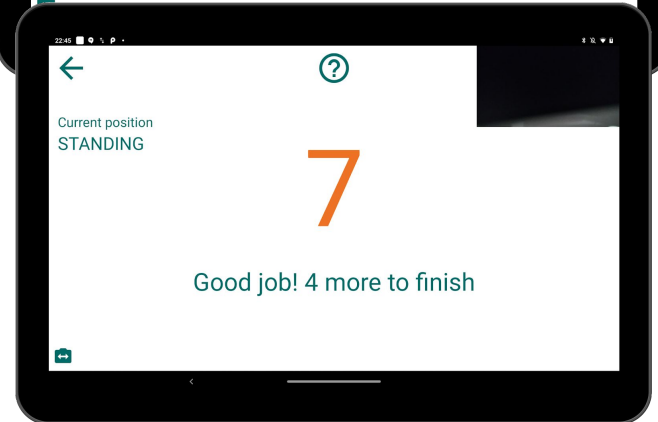
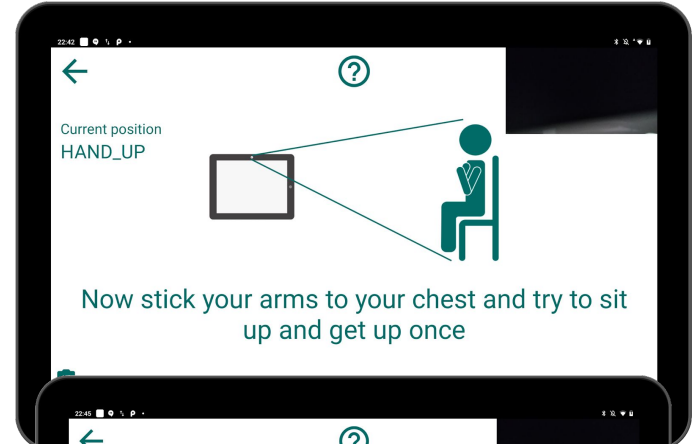
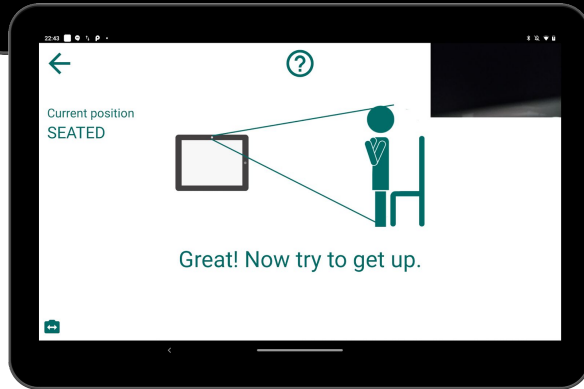
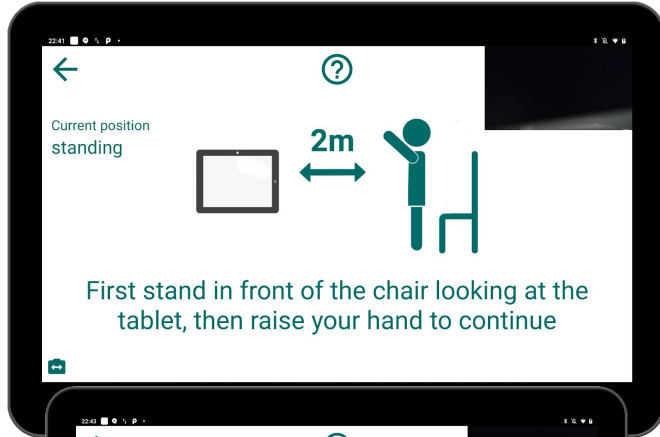
FRAGILE

Balance Tests

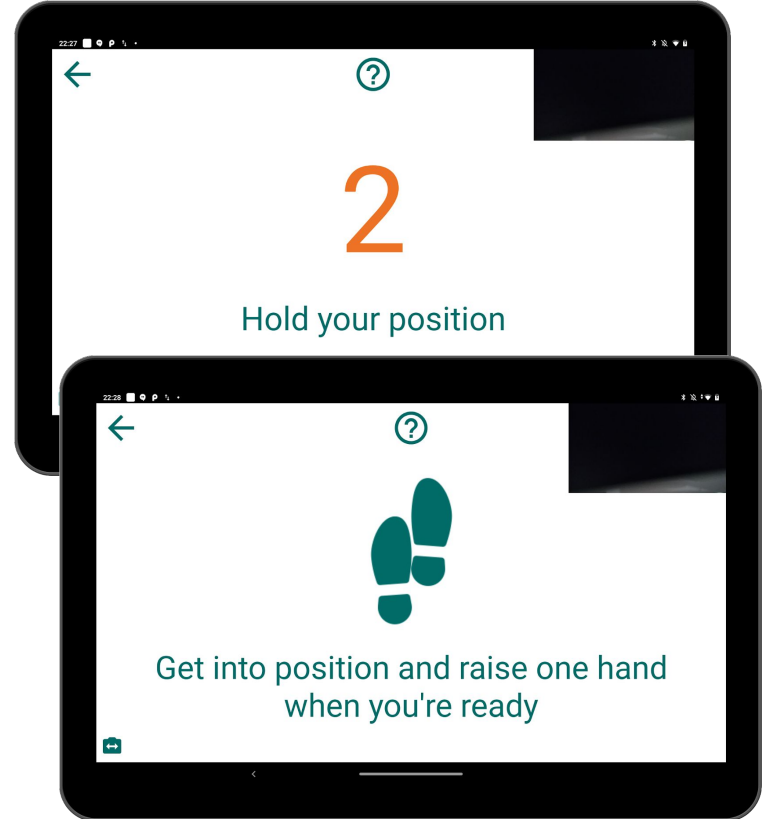
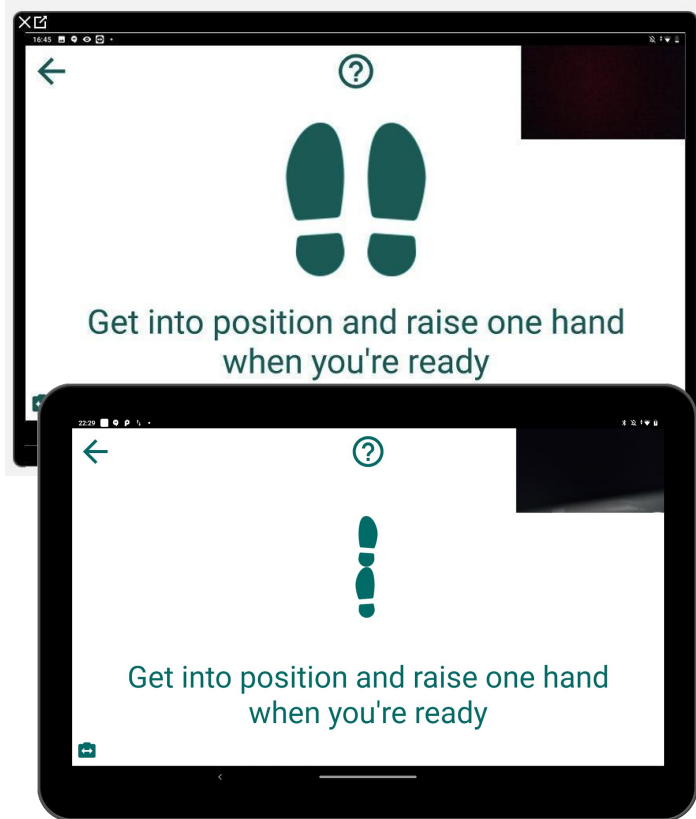
Gait Speed Test

Chair Stand Test

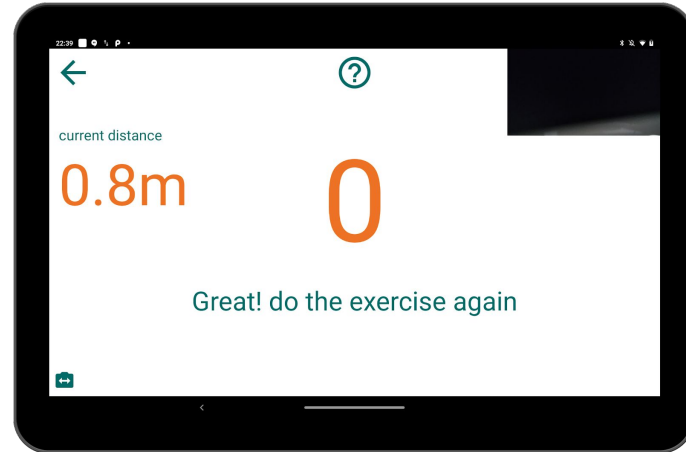
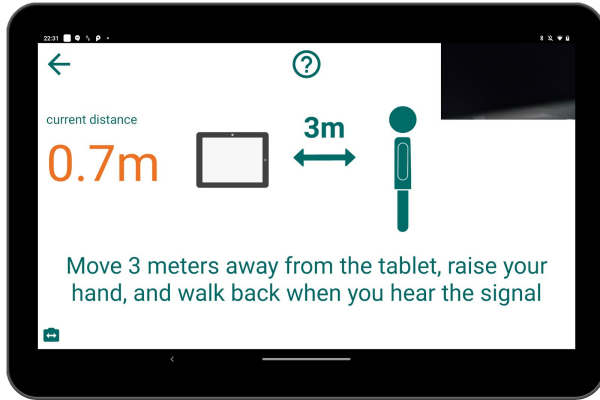
SPPB Chair test



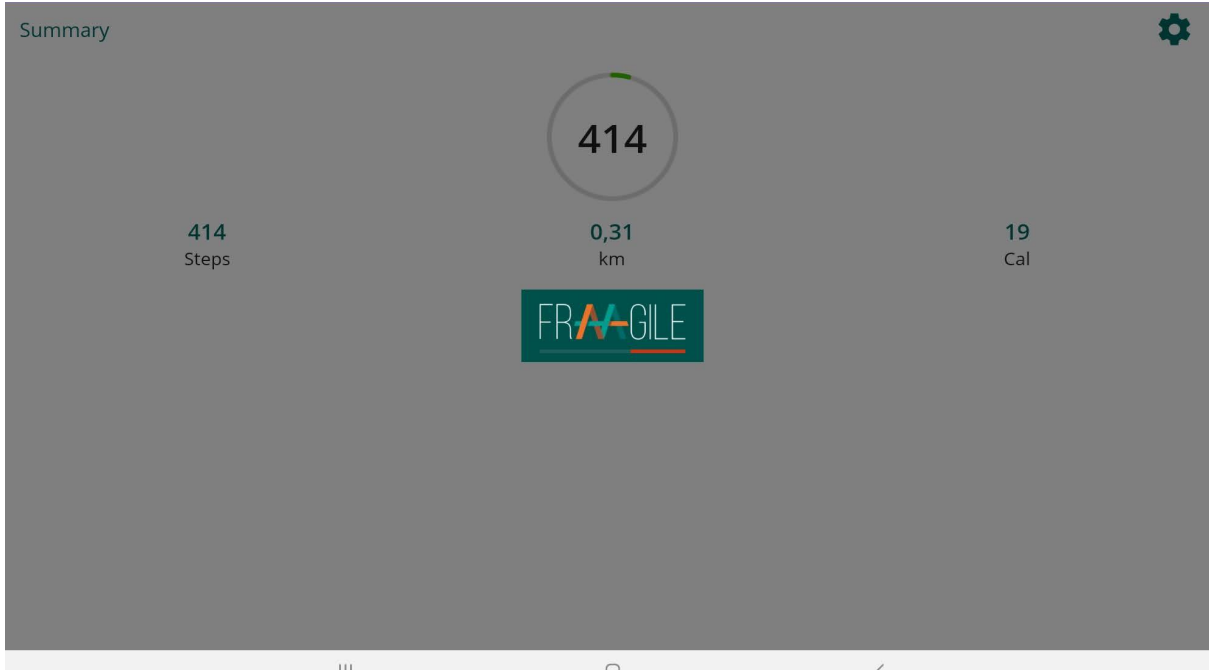
SPPB Balance test

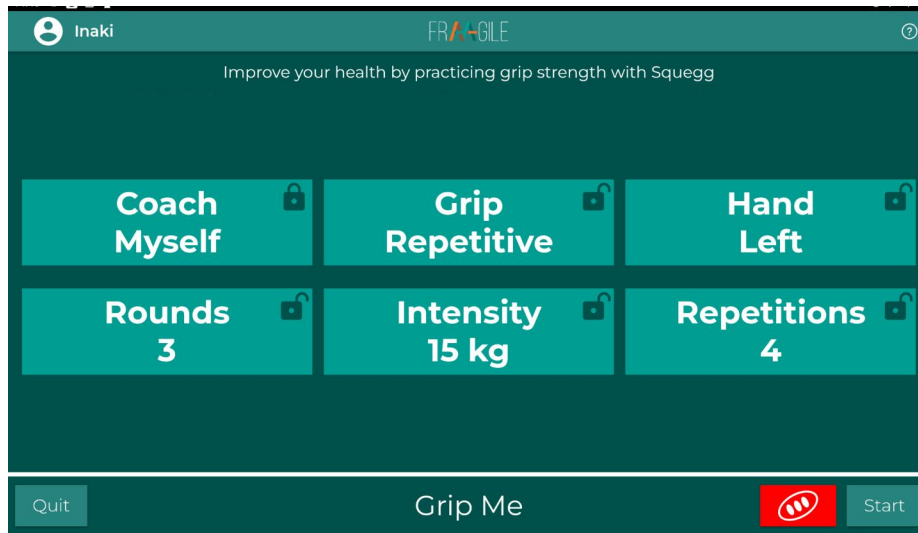


SPPB Speed test



Smartbands integration





Exercises at home

- MAT, ANA and TERZ have created, selected and adapted some videos to be performed at home or in daily centres by the patients: full body exercises or upper body exercises, with translations for the different languages and sites.
- The videos have been uploaded to our own YouTube channel.
- These videos are played directly in the tablet with subtitles to help patients and carers.



My health



Tests



Games



Exercises



Learn

Exercises - Full Body

[< Back](#)

**Full Chair
Workout - No
Equipment,
Seated | More
Life Health**



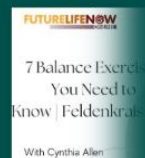
**Standing
Stretches For
Seniors | Full
Body 6
Stretches (8
Minutes)**



**Improve
Your
Leg Strength
in
5 Minutes
(Standing)**



**Full Workout
With Stretch
Band For
Seniors | 40
Minutes |
Intermediate**



**7 Balance
Exercises
You Need to
Know | Felde
nkrais**



Extra help

- Other general videos and games can be included using the Learn tab.
- There's also an extra feature to add new carers related to the patient using the tablet app itself.



My health



Evaluate



Play games



Exercises



Learn

Learn

Category

Learn (EN)

Frailty in Elderly Persons




Common Questions

Frailty is a distinct clinical syndrome wherein the individual

Play

YouTube




The Voices of Healthy

Produced by the Office of Disease Prevention and Health Promotion

Play

YouTube

COVID-19



How to protect

COVID-19 is an infectious disease caused by a new coronavirus introduced to humans for the first time.

Play

YouTube



WHO: How to

Hand hygiene, either with soap and water or with alcohol-based

Play

YouTube

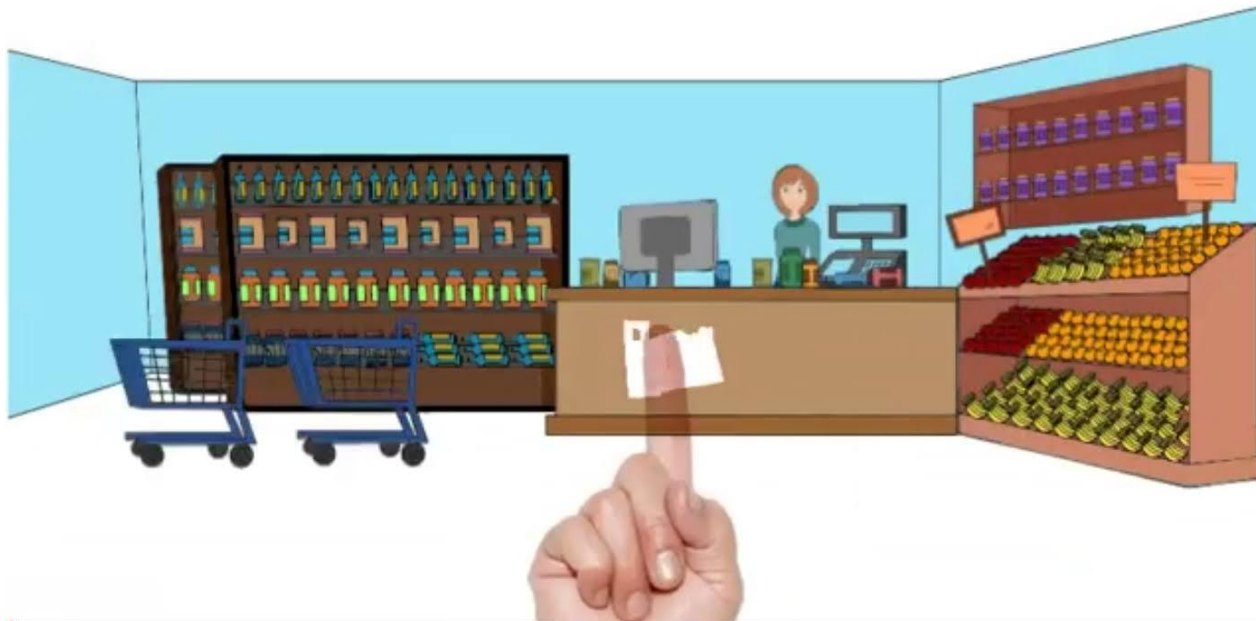


How to

A fabric mask as a barrier to the spread of

Play

YouTube



Common Questions About Frailty In Elderly

112 vues



0



0



Partager



Télécharger



Enregistrer

DR

DR VIC

56 abonnés

S'ABONNER

WITH ANIMATIONS & MNEMONICS



GLASGOW COMA SCALE

EYE
VERBAL
MOTOP

6:11

GLASGOW COMA SCALE (GCS) made easy
(with ANIMATIONS & MNEMONICS)!!

INTELLECT MEDICOS

950 k vues · il y a 3 ans



18:37

Master Shi Heng Yi – 5 hindrances to
self-mastery | Shi Heng Yi | TEDxVitosha

TEDx Talks

5,7 M vues · il y a 10 mois

