AI in Hearing Healthcare – Disruptions Ahead

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What is a Hearing Instrument ?

- Hearing Loss Compensation: Better, smaller, longer battery life, …
- Streaming: TV, Church, Smartphone
- Fitting by Audiologist required
- Connectivity: BLE via Smartphone

Future hearing Care – Disruptions Ahead

- Personalisation of HIs:
  - "Automatically adapting to you" (self fitting), your live, environment, your intent…
  - Bio feed-back: mind controlled, "do what I want".
  - Super Hearing
- Hearing Instruments become IoT devices and part of a "Body Area Network".
  - HIs become multi sensor platforms for multiple purposes:
    - EEG, EOG, ECG, …
    - PPG: Pulse, Blood pressure.
    - IMU (Inertial Measurement Unit)
    - fNIRS
    - GPS
    - Microphone, e.g. voice sentiment analysis.
  - Always on: connected healthcare 7*24, eHealth "cloud clinic" services around the clock.
  - Open APP shop for third party applications: HI becomes the "Swiss Army Knife" of remote healthcare services
- Holistic Healthcare:
  - Value proposition: prevention, "we keep you healthy"…
  - Holistic view on comorbidities.
  - De-stigmatizing: "you do not need to be sick (hard of hearing) for using an HI"
  - Integration into digital healthcare platforms, both public and private.
- HI becomes a "life style gadget":
  - Bable fish: instant, real time translation.
  - Voice over internet: voice controlled Internet services
  - Personal butler, "Alexa to go"
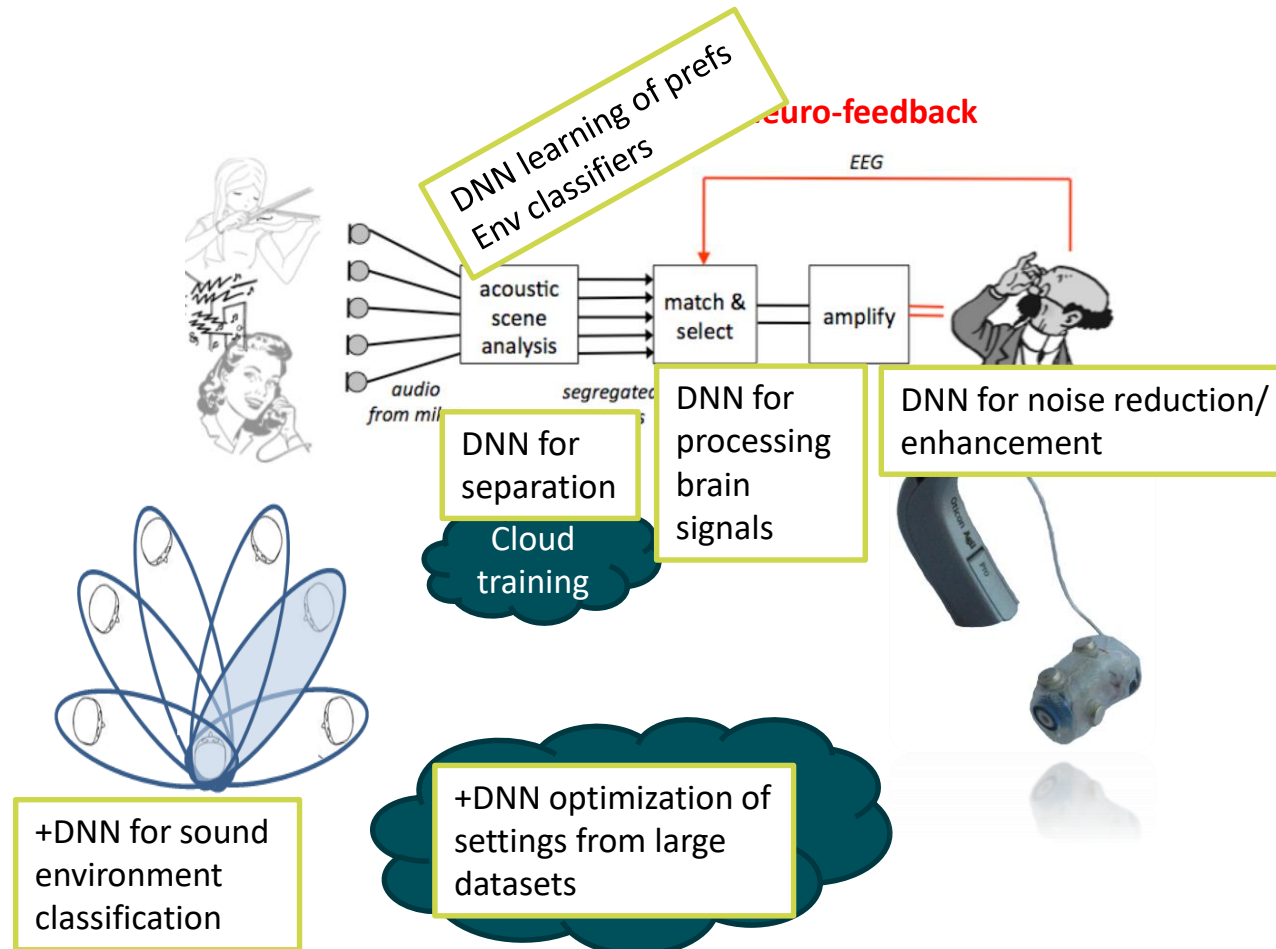 - Augmented reality
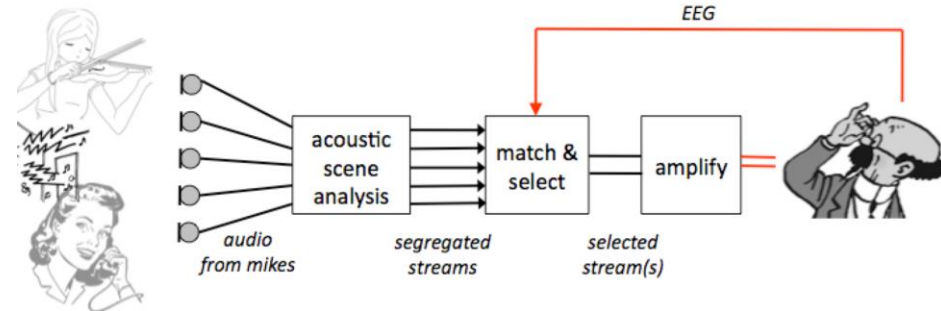
The enabling Technologies

"Bill Gates put a computer on every bodies desk, Steve Jobs into everybody's hands, we put it into everybody's ears"
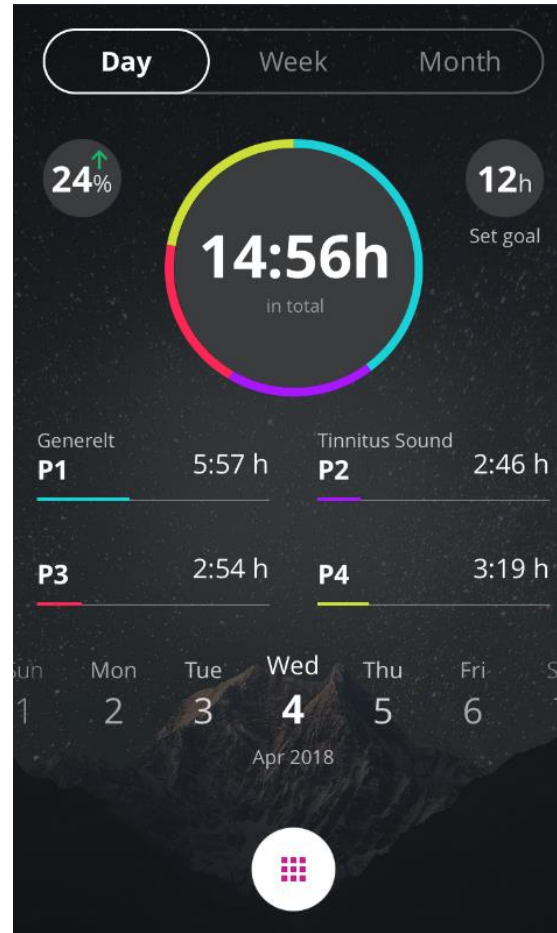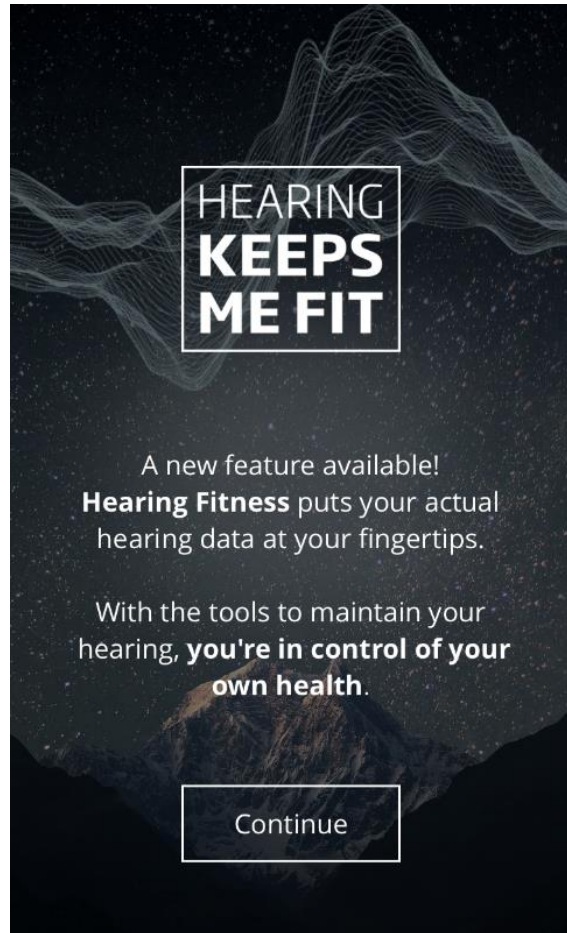
- AI as prediction machine: (*McKinsey: "the cost for prediction is falling to almost Zero"*)
  - Predicting intent, user behaviours, environment: "*other people with your profile preferred this setting/fitting in this place, would you like to try*?"
  - Predicting health conditions, enabling prevention.
  - Enabling augmented reality
- Connectivity: always on, multiple radio standards, 5 G >>> enabling continuous connectivity
- Power supply: Power consumption decreases, (rechargeable) battery capacity increases, wireless recharging >>> enabling always on.
- Computing Power and AI:
  - from DSP to Spiking network (e.g. IBMs True North chip)
  - Microelectronics: Moores law,
  - Sensor Integration and Sensor Fusion.

Ai all over: Deep Neural Networks use in Hearing Devices

DNN learning of prefs Env classifiers

Neuro-feedback

EEG

acoustic scene analysis

match & select

amplify

audio from mic

segregated

DNN for separation

Cloud training

DNN for processing brain signals

DNN for noise reduction/ enhancement

+DNN for sound environment classification

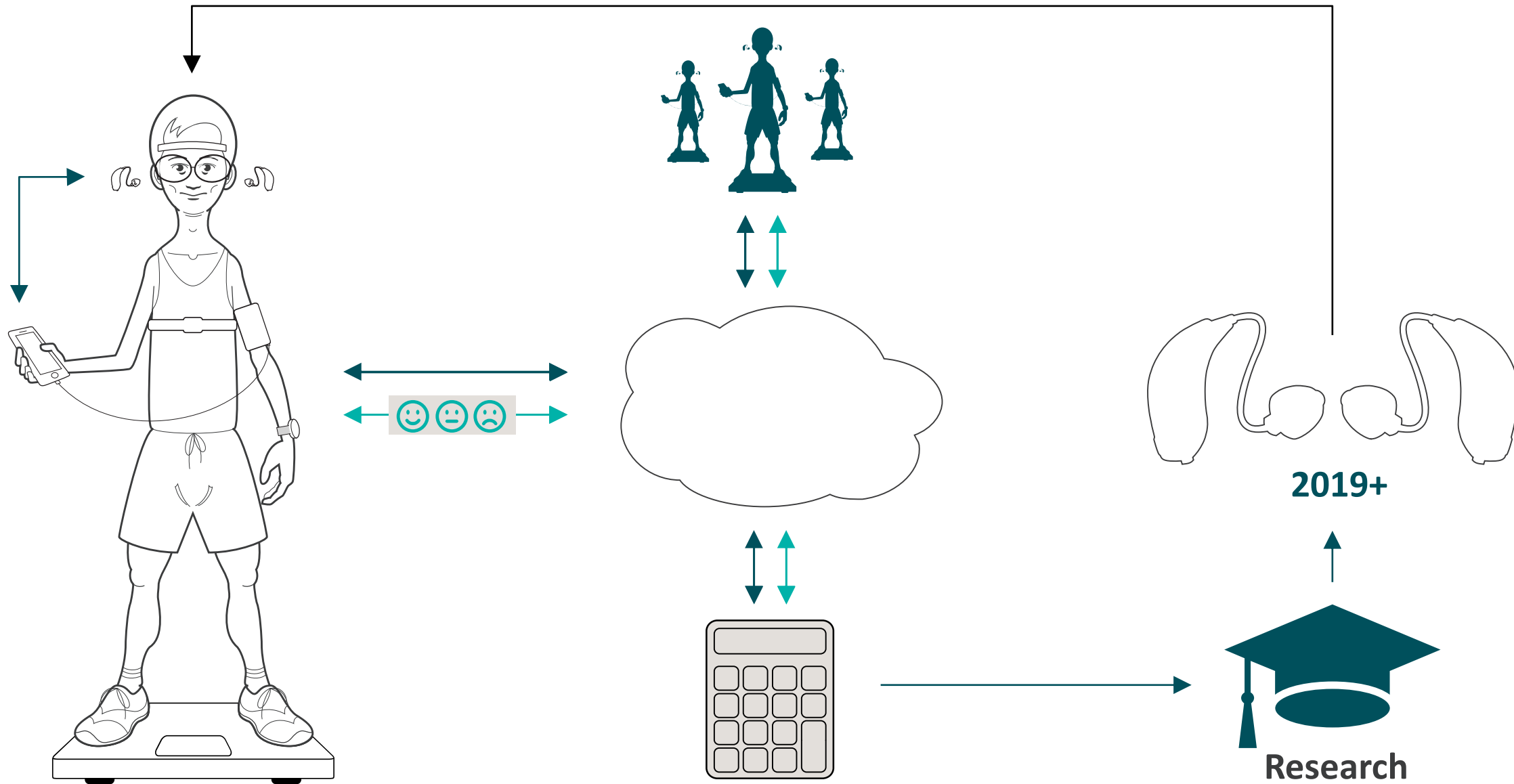+DNN optimization of settings from large datasets

The first Step is done: ON App with HearingFitness

Examples

Oticon HearingFitness will evolve continuously. Please find the current version and available functionalities on the App Store or Google Play
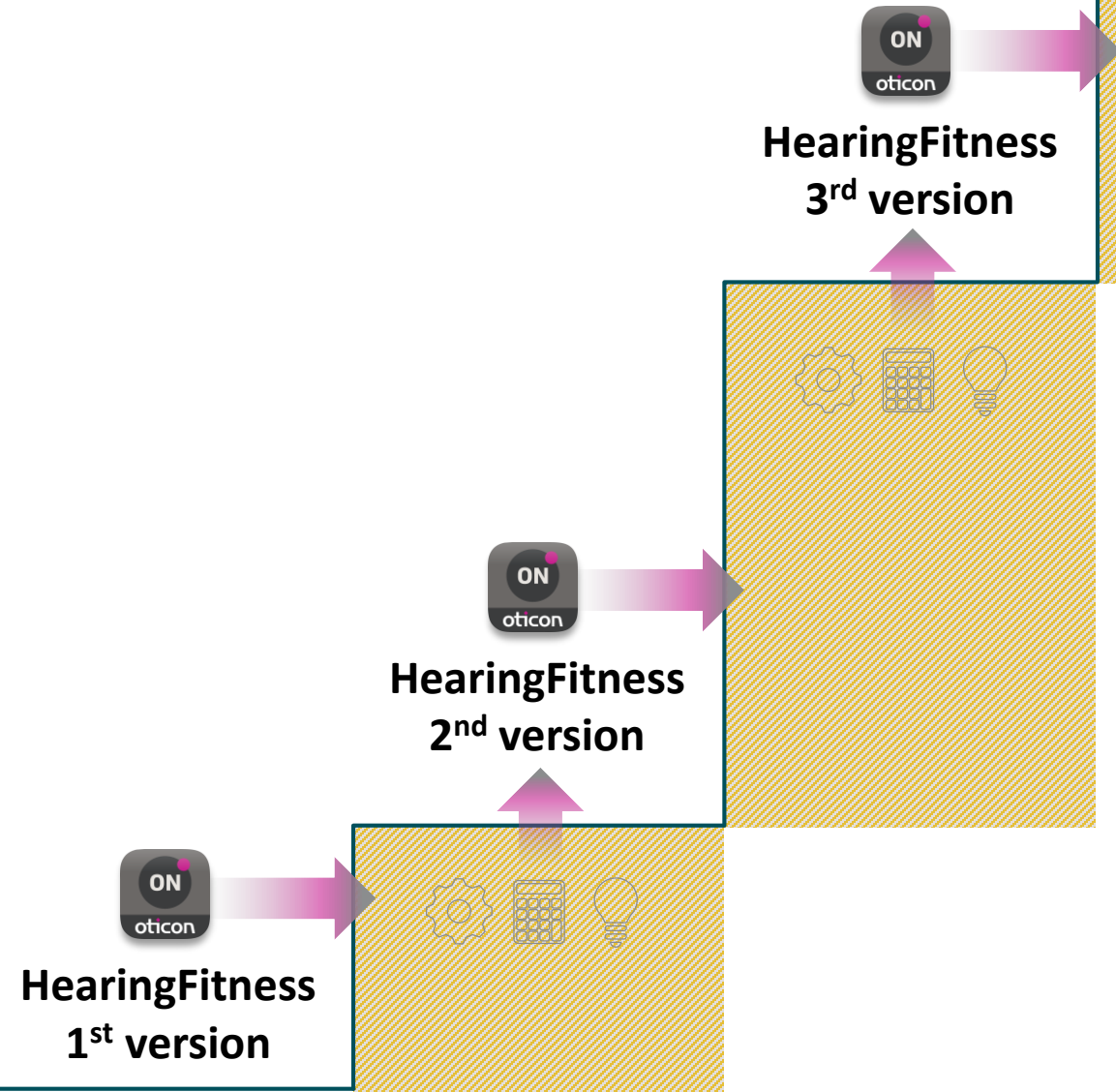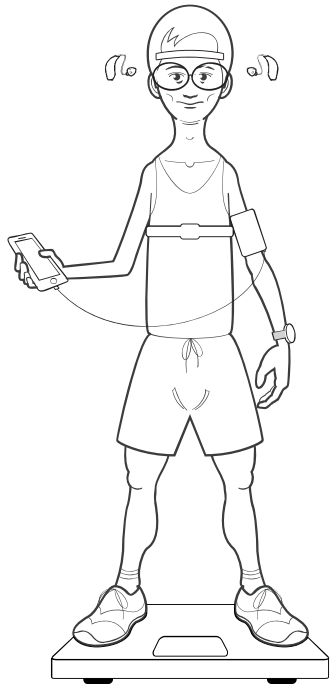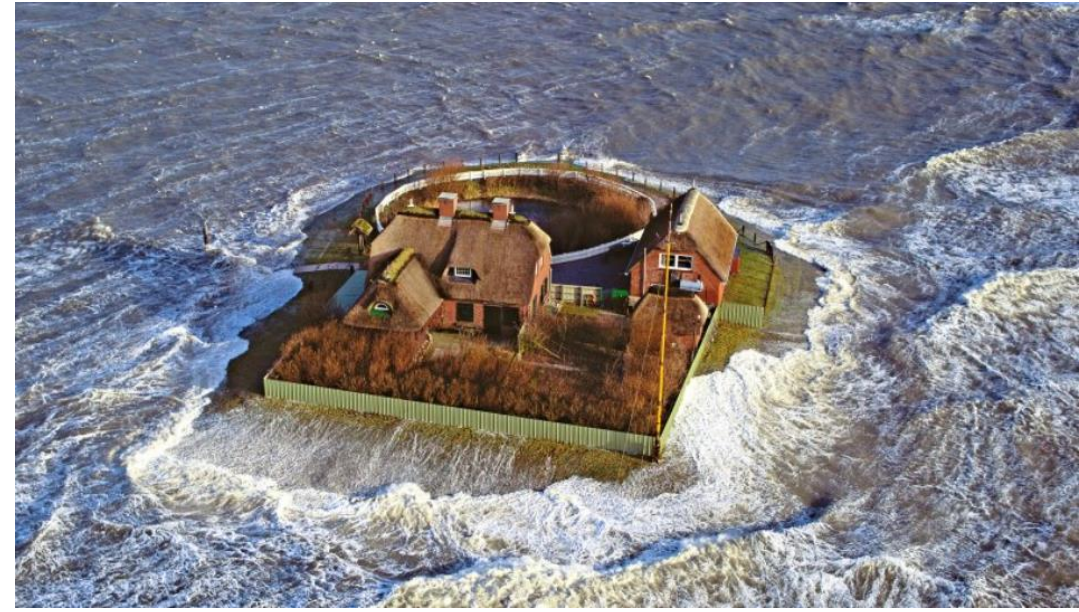
2019+

Research

Imagine…

What health aspects could correlate with hearing?

We are only just starting to understand

So what might tomorrows user look like?

The first step in a journey

HearingFitness
3rd version

HearingFitness
2nd version

HearingFitness
1st version

Are we Ready for the Future?

- Ignition is where Technology meets Demand and Science meets Business:
    - Henry Ford: "*If I would ask people what they want, they would answer 'faster horses'*"
    - Technology is almost exploding, everything seems feasible and in reach. Where to start? – What comes first? Which enabling technologies to focus on first?
    - What are the compelling use cases? – What are the pains we want to solve? – Where do we start?
    - Cost functions: how to get through the "Bermuda Triangle" of Cost/Time/Content
    - Where to find key know how? – Partnering?

Thank you for your Attention

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