

Veifinningsteknologi

Wayfinding technology

Henger vi med?

Are we keeping up?





Du må endre praksis!

You need to change your practice!

- Teknologi vil endre fagområdet, og mobilitetslæreren må omstille seg?
 - Hva med den hvite stokken da?
 - Hvordan vet vi at det blir en endring?
-
- ✓ Technology will change the profession, and the O&M specialist will have to adapt?
 - ✓ What about the white cane then?
 - ✓ How do we know that there will be a change?

Assistive technology

Assistive technology is an umbrella term for assistive products and their related systems and services. Assistive technology enables and promotes the inclusion, participation and engagement of persons with disabilities, ageing populations and people living with chronic conditions in the family, community and all areas of society, including the political, economic and social spheres.

Assistive products can enhance performance in all key functional domains such as cognition, communication, hearing, **mobility**, self-care and vision.

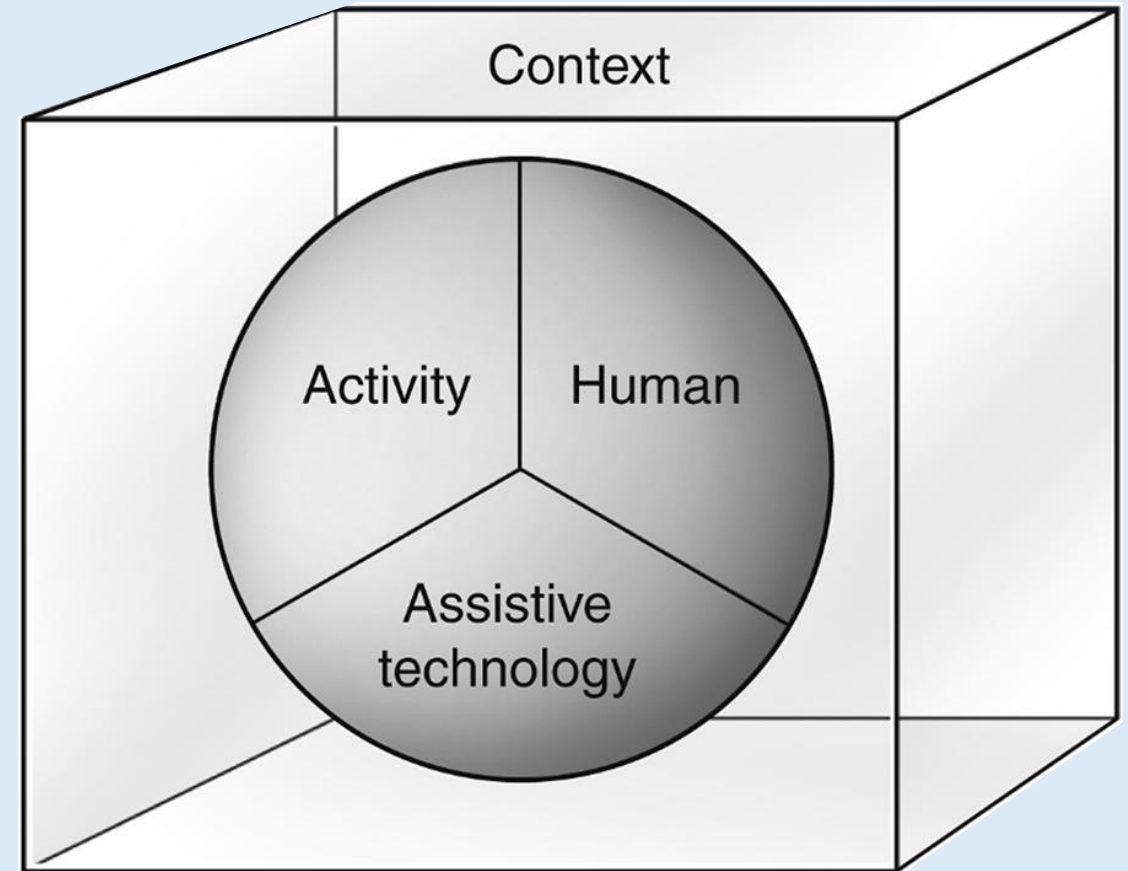
(WHO)



Human Activity Assistive Technology Modell

(Cook & Hussey, 1995)

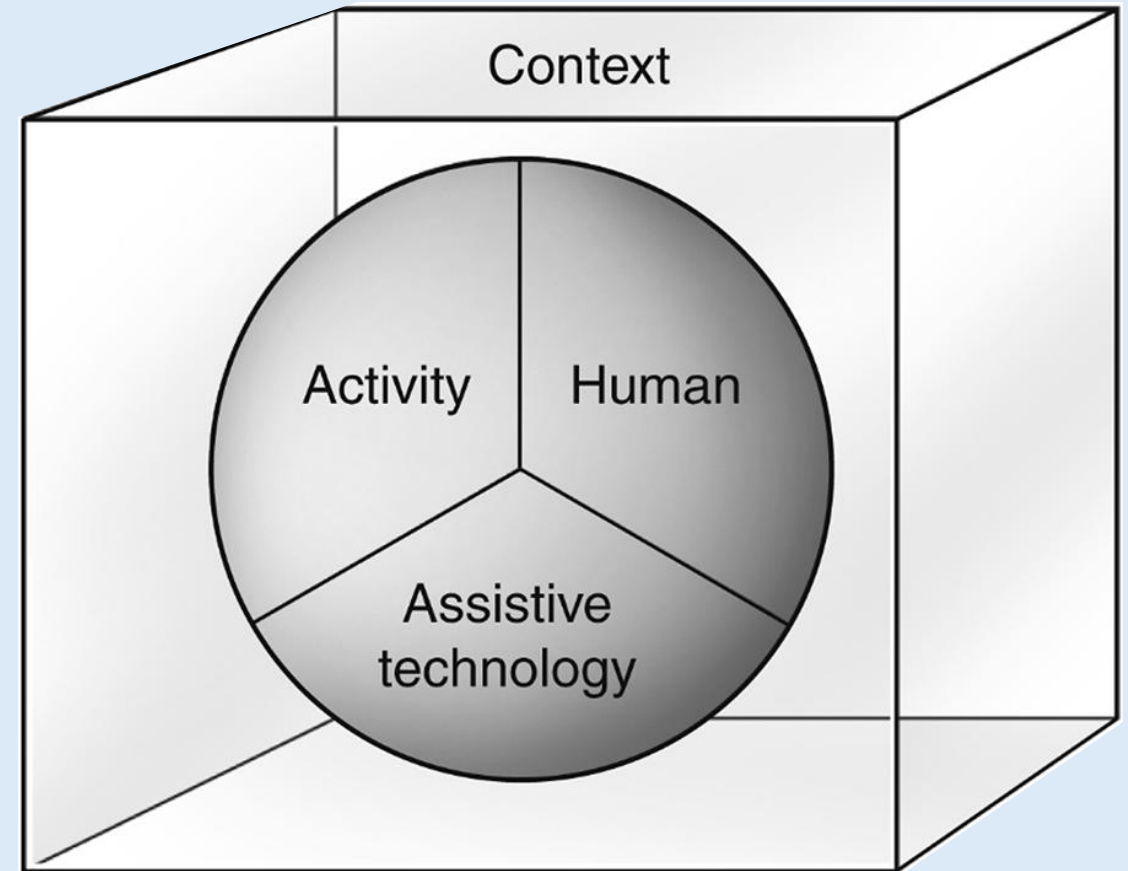
- **Activity:** doing & participation (time, space & location)
- **Human:** Motor-, Sensory-, Cognitive- and emotional – abilities. Roles (identity), experience, motivation & life span perspective.
- **Context:**
 - Physical
 - Social
 - Institutional
 - Cultural



Human Activity Assistive Technology Modell

(Cook & Hussey, 1995)

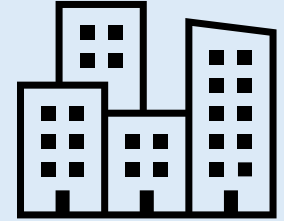
- **Assistive technology**
 - An enabler for a human doing an activity in context.
- Application of the model
 - Clinical assessment
 - Outcome Evaluation
 - Product Research and Development
 - Usability



Western culture places a high value on independence, which might reinforce use of technology or restrict it (Polgar et.al. 2025 p. 26)

Hva bruker vi i miljøet

What do we use in the environment?



Fysisk

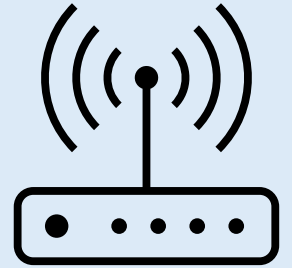
- Universell utforming- visuell og taktil
- Høytalere i f.eks. lysregulert gangfelt
- Kunstige ledelinjer
- Stokken
- Folk (kultur for å gi hjelp)

Physical

- Universal design - visual and tactile
- Speakers in e.g. light-controlled pedestrian crossings
- Artificial shorelines
- The white cane
- People (environment- culture to provide help)

Hva bruker vi i miljøet

What do we use in the environment?



Signaler vi kan bruke

- Lyd
- Satellitter
- Blåtann
- Wifi signaler
- Radiosignaler
- 5G

Signals we can use

- Sound waves
- Satellites
- Bluetooth
- Wifi signals
- Radio signals
- 5G

What is 'wayfinding technology'.



“As technology has developed, the use of GPS for the visually impaired has become part of a larger area called 'wayfinding technology'. Wayfinding technology can be simple things like a sound beacon that helps you find the entrance to a building, or a compass that shows you which direction you are going.... But the term also covers more advanced technology such as obstacle detectors and Bluetooth technology”.

(Tor Ulland, 2021)

Note: Back in 2021 artificial intelligence wasn't something to consider

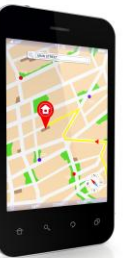
What information do you need?

Obstacles
and hazards

Sensors on the body or cane
Transmitters located in the
surroundings

Directions
"orientation"
-Where am I?

GPS
Base Map
Compass



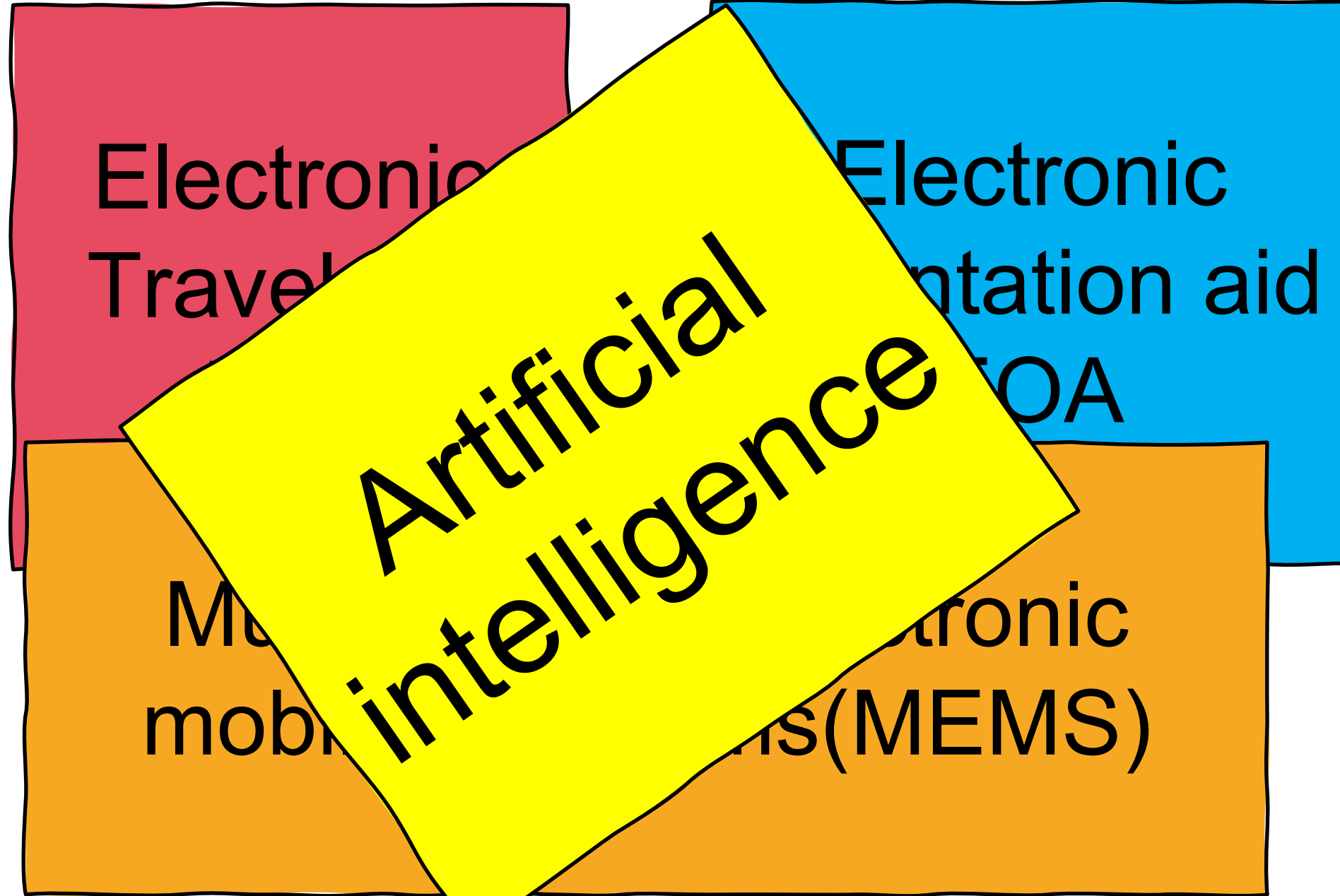
New classification of technological aids

Electronic
Travel Aid
ETA

Electronic
Orientation aid
EOA

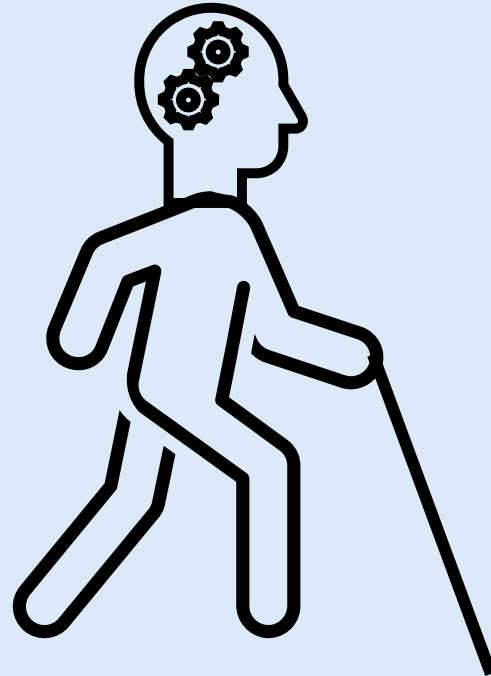
Multi-element Electronic
mobility Systems(MEMS)

New classification of technological aids



What must be processed and carried out, without Wayfinding technology?

- ✓ Tactile-haptic feedback from the cane
- ✓ Sounds from surroundings
- ✓ Tactile-haptic from the ground (with feet).
- ✓ *Walk*
- ✓ *Cane technique*
- ✓ *Memorize route*
- ✓ *Active listening*



What must be done in addition with Wayfinding technology?

- Route instructions and other auditory information from the app
- Operate the smartphone/device
- Interpret vibration (tactile) from device
- Interpret and understand the information provided by the technology

En haug med sensorer i lomma !

A pile of sensors in your pocket!

- Akselerometer
- Gyroskop
- TrueDept camera
- Biometrisk identifikasjon
- Lidar- skanner (3d radar)
- Lys sensorer,
- IR-teknologi (proximity sensors)
- Barometer,
- Posisjons mottakere (**GPS**, GLONASS, Galileo, QZSS, and BeiDou)
- iBeacon microlocation (Bluetooth Low Energy (BLE))
- Magnometer(kompass)

- Accelerometer
- Gyroscope
- TrueDept camera
- Biometric identification
- Lidar scanner (3D radar)
- Light sensors,
- IR technology (proximity sensors)
- Barometer,
- Positioning receivers (GPS, GLONASS, Galileo, QZSS, and BeiDou)
- iBeacon microlocation (Bluetooth Low Energy (BLE))
- Magnometer (compass)



What characterizes the development?





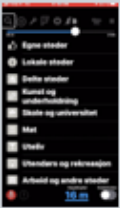

Various technologies are put together using the smartphone as the "brain"- "Multi- element"

- Screen reader (voiceover / talkback)
- Voice assistants is getting better, and with AI (Siri & goggle assistanst)
- Sharing routes in online networks
- Live Public transport information from apps (online)
- Sensors on the body or cane (Acquisition and feedback)
- Transmitters located in the surroundings (Beacon) ?
- Camera in the phone (and other sensors)
- Artificial intelligence that interprets the environment

Hva kjennetegner testingen av ny teknologi.

What characterizes the testing of new technology.

- Liten gruppe som tester (hvordan rekrutteres de?)
- Utvalg basert på frivillighet
- Ofte forblir nasjonale løsninger nasjonale?
- Utvikling/vedlikehold stopper ofte opp etter utprøvningsperiode
- Tar ofte ikke tilstrekkelig høyde for variasjonen i brukergruppa?
- Inkluderer sjelden opplæringsfunksjoner?
- Barn er ofte utelatt og personer med flere funksjonsvansker
- Small group testing (how are they recruited?)
- Selection based on volunteering
- Often national solutions often remain national?
- Development/maintenance often stops after the trial period
- Does not often take sufficient account of the variation in the user group?
- Rarely includes tutorial features?
- Children are often left out and people with multiple disabilities
- The testers are basically experts, both in mobility and technology
- Why are children left out?

Navn	Komponenter/ applikasjon	Enhet/ funksjoner	Foto	Unike funksjoner	Nettsted */ Pris/ Brukere/ Status i utvikling
<u>Ashirase</u>	Enheter til å feste i sko og app	GPS, Veibeskrivelse		Veifinring med vibrasjon i skoene	https://global.honda/en/newsroom/news/2021/c210611beng.html Start up i Honda familien. Leverer ikke til Europa ennå.
<u>Wewalk smart cane 2.</u>	Stokk og app	Stokk med sensorer og AI- assistent		Hinder detektor, GPS, kollektivtrafikk-info. Ai-assistent, lykt, 360 tupp og Remote update Tale, vibrasjon, tilbakemeldinger fra stokk	https://wewalk.io/en/product/ https://ifdesign.com/en/winner-ranking/project/wewalk-smart-cane-2/676885 Ca 8500 NOK +abonnement (1.utg)
<u>Blindsquare</u>	App	GPS - Veibeskrivelse		Tale, vibrasjon	https://www.blindsquare.com/ 500 NOK Selskapet har ikke publisert noe siden 2023?
<u>Lazarillo</u>	App	GPS- Veibeskrivelse		Tale, vibrasjon	https://lazarillo.app/ Gratis, strever med å både bruke engelsk og norsk tale.

Hva med stokken da?

What about the cane then?



Long canes (54%) are currently the most used primary mobility aid

51% of the respondents reported that they do use ETAs as a secondary mobility aid or have tried ETAs

Crowded and unfamiliar places were of significant concern.

Audio feedback is better than tactile.

Respondents ranked 'easy to use' and 'quality of training' as the two most desired features of mobility aids.

(Jin et. al. 2025)

Kritiske stemmer til utviklingsprosessen

Critical voices to the development process

Recent trends have seen some technology move quickly from an idea to production, big splash marketing, and then dropping off the market and out of business within a year or two. (Smith D.L. et.al. 2024)

Products that are designed without a function that meets a human need tend to be underused og discarded.

Designs that results in expensive technology with limited opportunity for fundings support to the end user may never make it out of the design laboratory (Polgar M.J, et al. 2025).

However, there exists a substantive gap between a research prototype and a commercially viable mobility aid. The life cycle of such research prototypes tends to be short, and many are never commercialized, hence little is known about the end-users' attitudes towards such prototypes (Jin et. al. 2025).



Status i dag

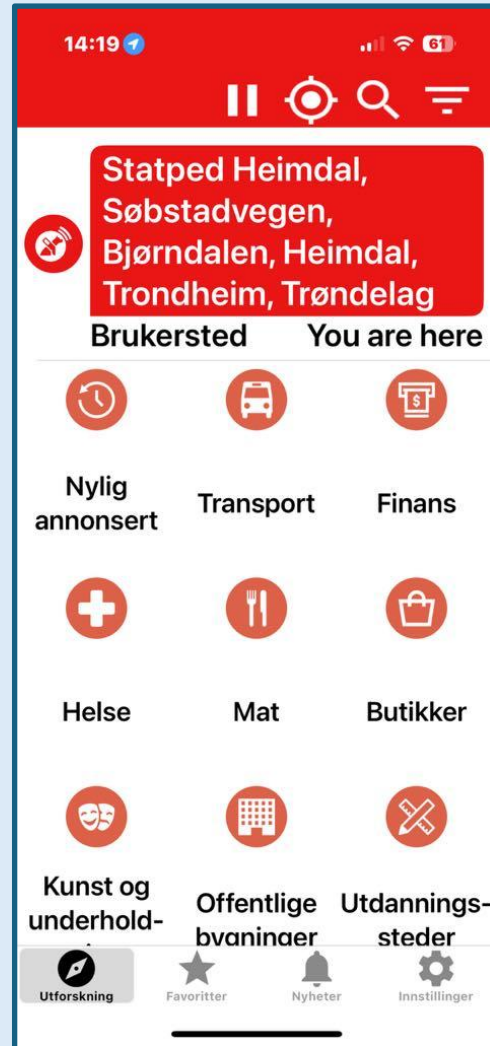
The challenge to developers:

- ✓ *Provide the right amount of information at the right time*
 - ✓ *The technology must be flexible based on individual needs and preferences.*
-
- Today, users of wayfinding technology should master basic VoiceOver/or Talkback.
 - 6G wireless mobile technology 2030

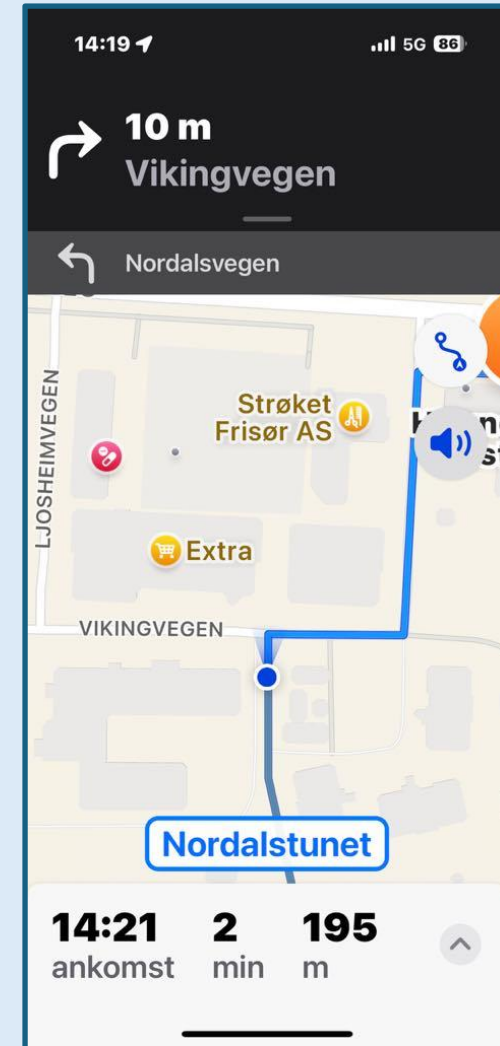


Oppgave

Lazarillo



Apple kart



“Technology is nothing. What's important is that you have a faith in people, that they're basically good and smart, and if you give them tools, they'll do wonderful things with them”

- Steve Jobs

Referanser:

Jin, R., Petoe, M.A., McGinley, J.L, & Ayton, L.N. (2025) Perspectives on traditional and emerging mobility aids amongst Australians with inherited retinal disease. *British Journal of Visual Impairment Vol 43(2) 527-539.*

Messaoudi, M. D., Menelas, B. J. & Mcheick, H. (2022) Review of Navigation Assistive Tools and Technologies for the Visually Impaired. *Sensors MDPI*

Polgar, J., Encarnação, P., Smith, E.M. & Cook, A.M. (2025). *Assistive Technologies: Principles and Practice 6th Edition.* Elsevier

Smith, D.L, Penrod. W.M, & Tikkun, S. (2024). Adaptive Technology for Orientation and Mobility, I B. B. Blasch, R. S. Wall Emerson, & W. R. Wiener, (Red.) *Foundations of Orientation and Mobility. History and Theory Volume 1.* (4th Ed., p. 290-329). APH Press, American Foundations for the Blind.

Forelesning IMC 17. 2021 mai. *WeWalk, How much is to much?* Feghali, J.M. Mericlier, G. Brostek Lee, D. Kaiser, J. & Penrod, W.