Digitalisation in the public sector: Case study of a medicine robot and proposed guidelines

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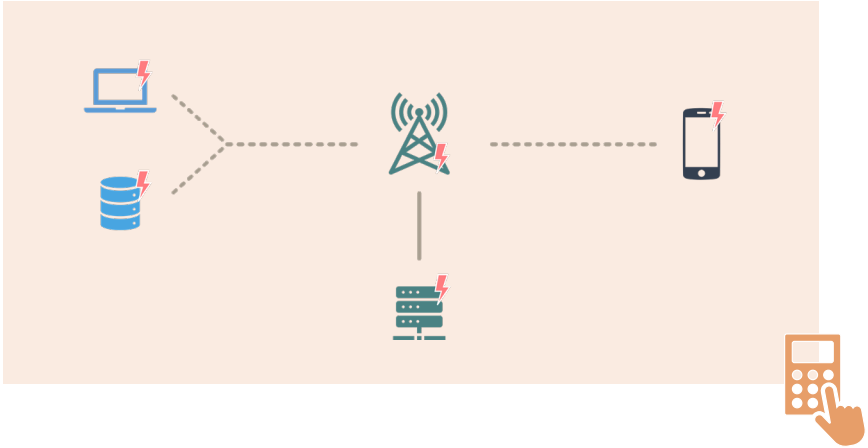
Finnish Environment Institute (Syke)
81st LCA Discussion Forum
Thursday, 15. September 2022

SYKE LUT University KPMG

Digital services and climate impacts

How to assess them?



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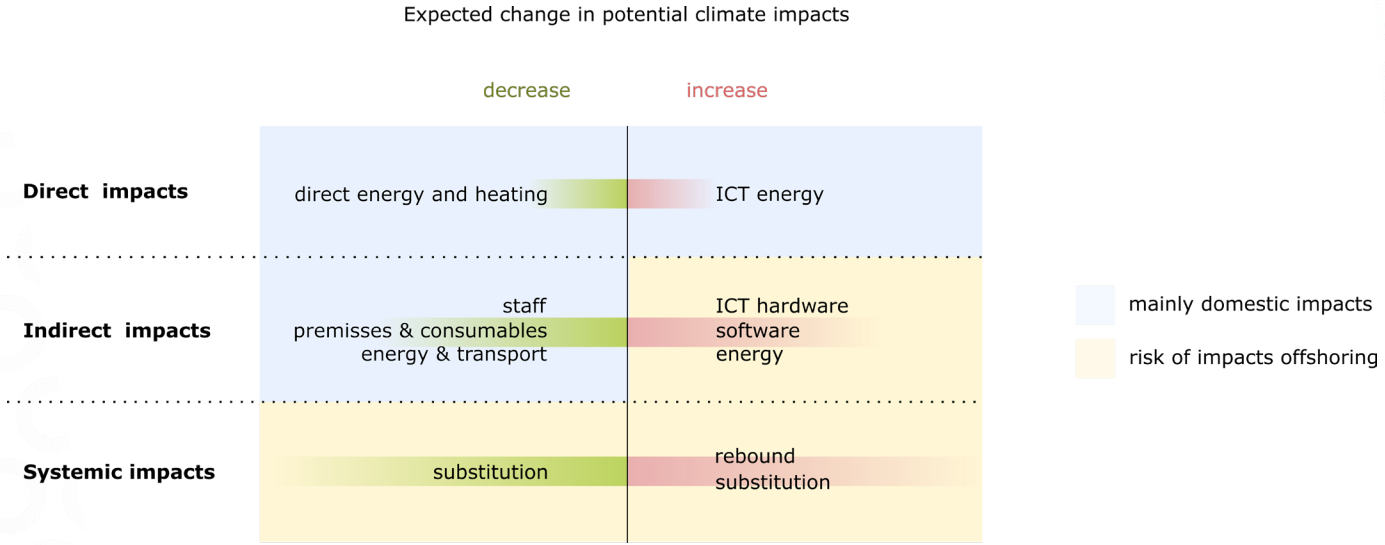
DISCUSSION FORUM ON LIFE CYCLE ASSESSMENT

Digital services and climate impacts



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Based on Pohl, J., L.M. Hilty, and M. Finkbeiner. 2019. How LCA contributes to the environmental assessment of higher order effects of ICT application: A review of different approaches. *Journal of Cleaner Production* 219: 698–712. https://doi.org/10.1016/j.jclepro.2019.02.018.

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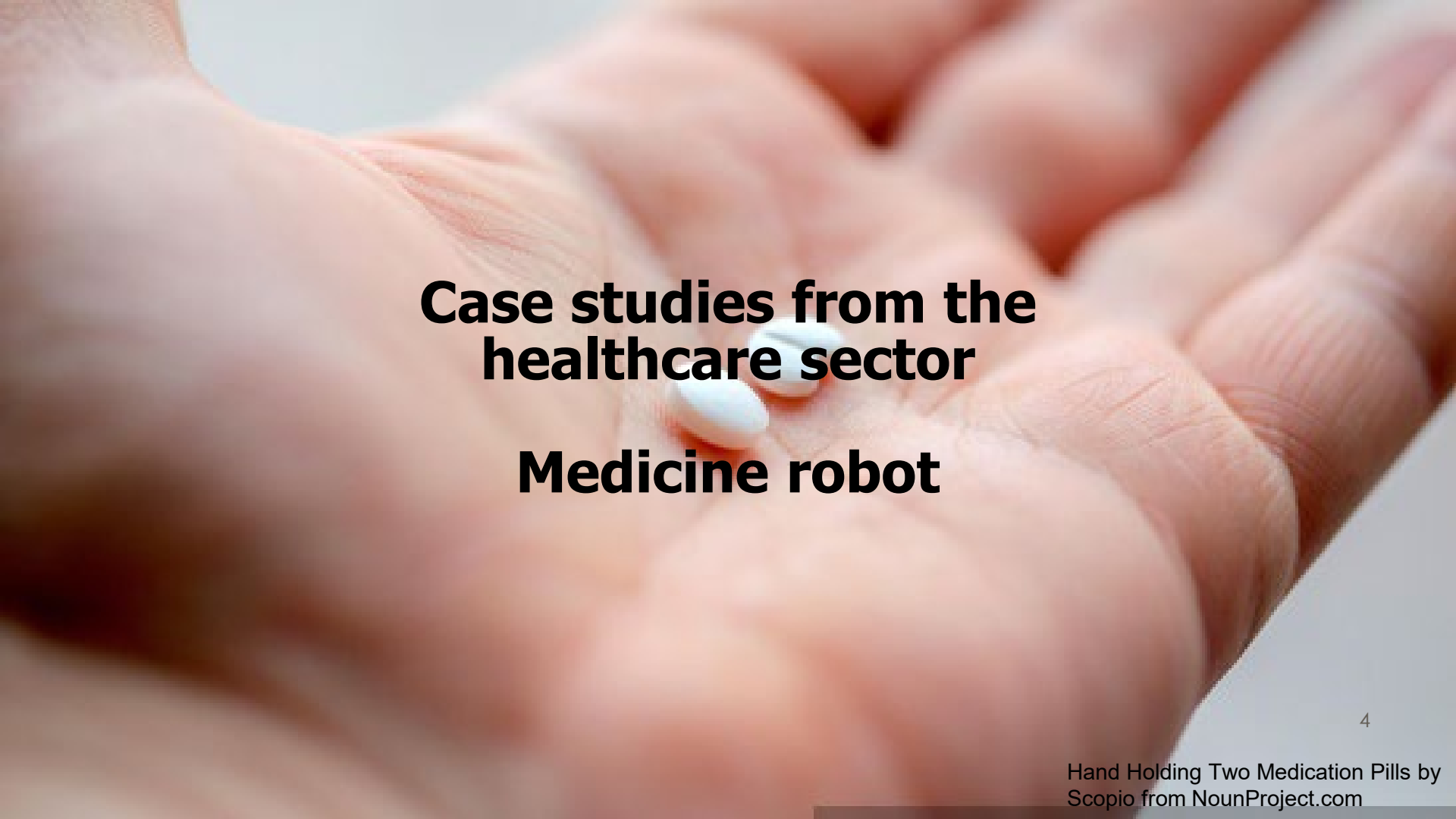
Case studies from the healthcare sector

Medicine robot

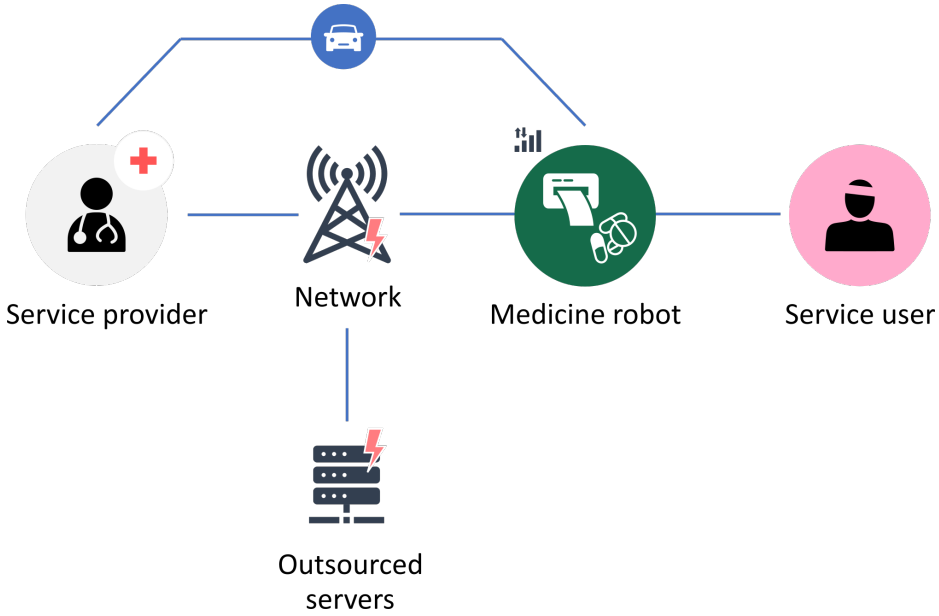


Hand Holding Two Medication Pills by Scopio from NounProject.com

Medicine robot

- A home care client is provided with a medicine robot – a device that gives the client a dose of medicine at a defined time without the need for a nurse to be present.
- Functional unit: Annual use of a medicine robot by a client that takes medication three times a day.
- Reference flow: 1095 portions of medication served

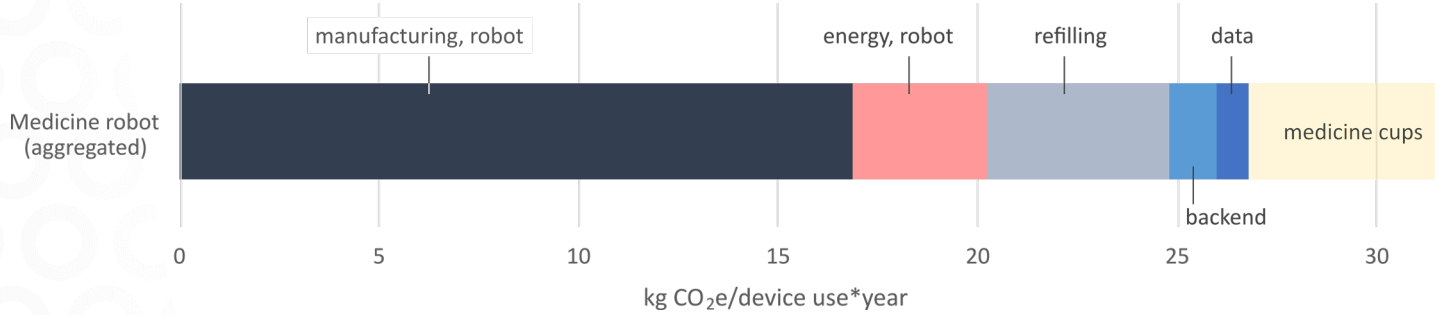
Medicine robot



Note: Medication is cut off from the system boundary.

Medicine robot - results

preliminary results



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± 30 kg CO_2e/a

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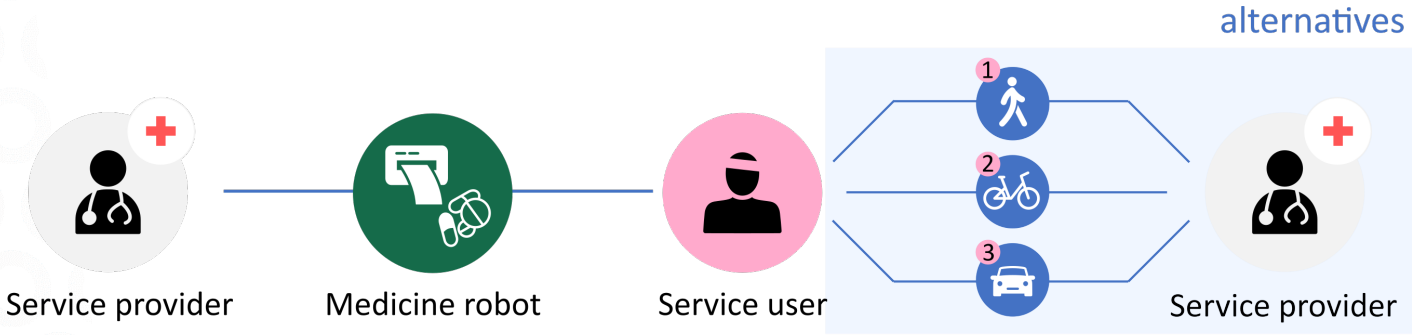
Medicine robot - alternatives



2 No big benefits. Riding distance can be up to 2 km, or 1.5 km on an e-bike.

3 Digital service makes sense pretty much always, even when the driving distance is very short.

Case studies from the healthcare sector

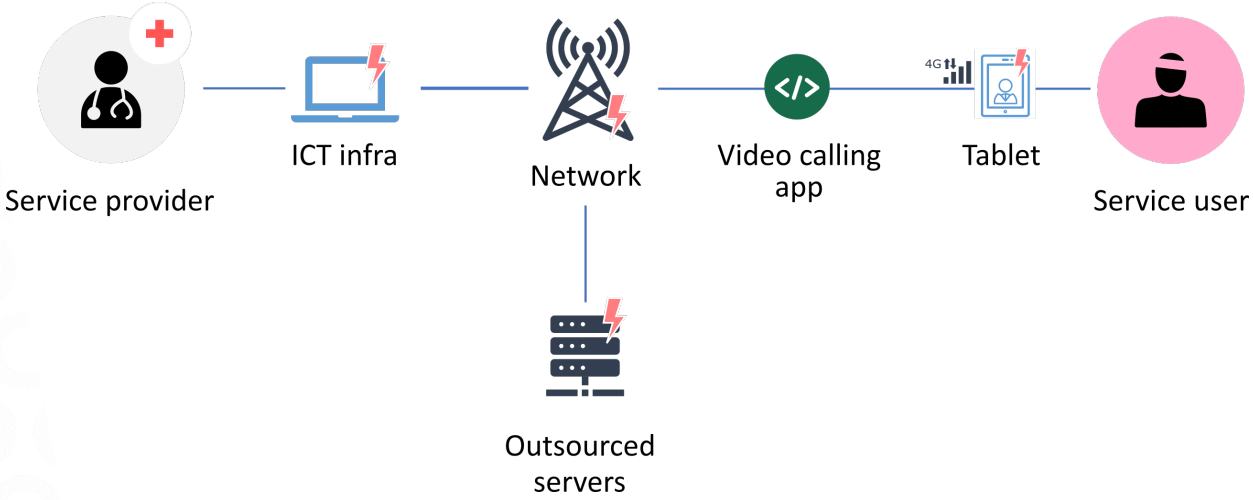
Telehealth

Portrait Of Happy Older Couple Sitting Together At Home And Using Digital Tablet by Jacob Lund Photography from NounProject.com

Telehealth

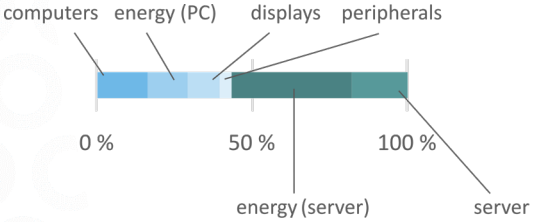
- A client living at home alone, who is in the need of home assistance, is served via video calls instead of in-person. The number of video calls per day in this case is two. The calls are carried out every calendar day (730 video calls annually). A video call takes 15 minutes on average.
- Functional unit: The annual use of the videophone by one client
- Reference flow: 182,5 hours of video calls

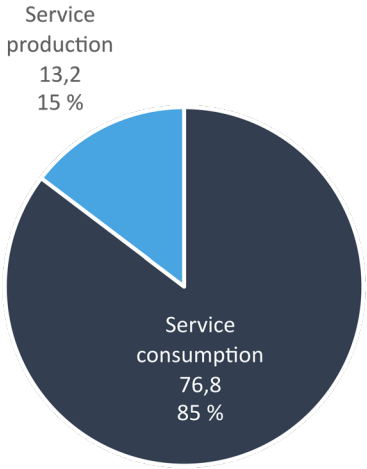
Telehealth

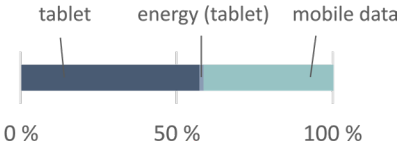

Service provider
ICT infra
Network
Video calling app
4G
Tablet
Service user
Outsourced servers

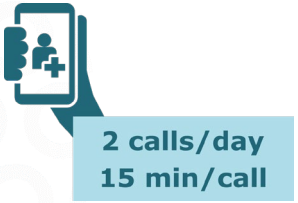
Telehealth - results

preliminary results









90 kg CO_2e

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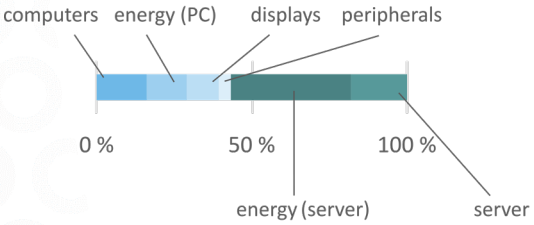
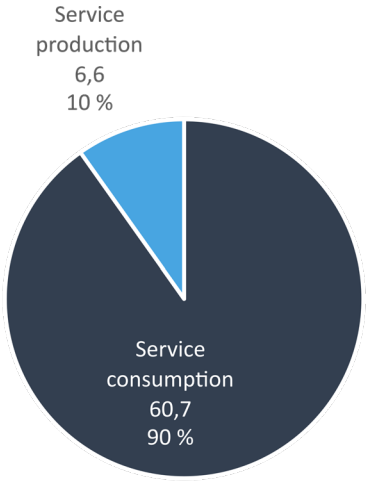
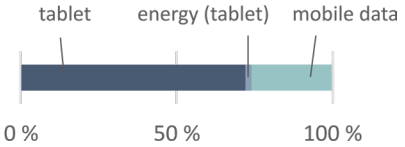
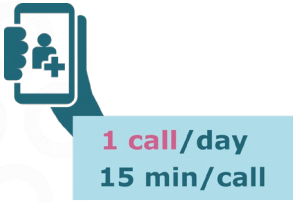
Telehealth - results

preliminary results









67 kg CO_2e

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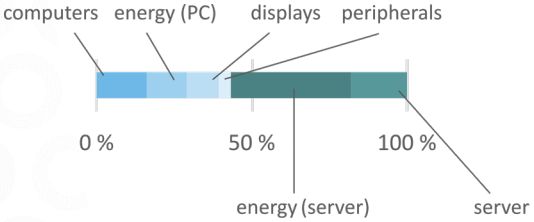

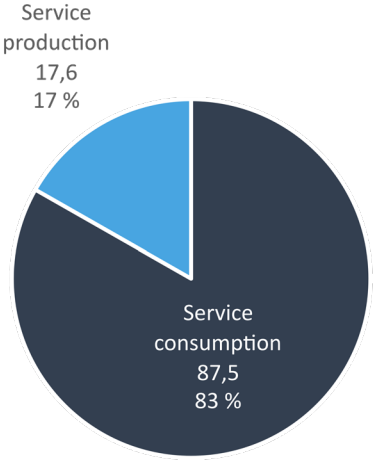

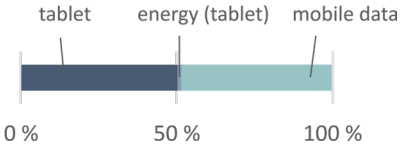

105 kg CO_2e

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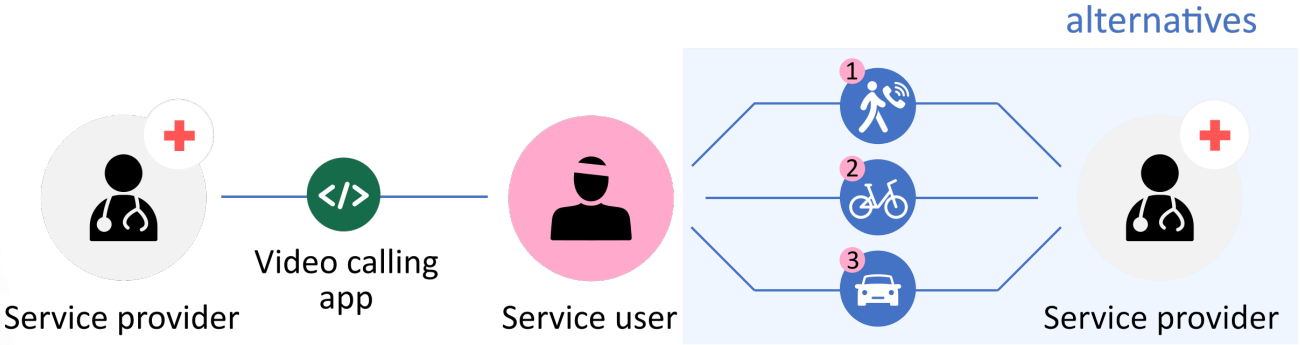

2 No big benefits. Riding distance can be up to 8 km, or 6 km on an e-bike.

3 Digital service makes sense if the driving distance is longer than 0.5 km, or 2 km for an EV.

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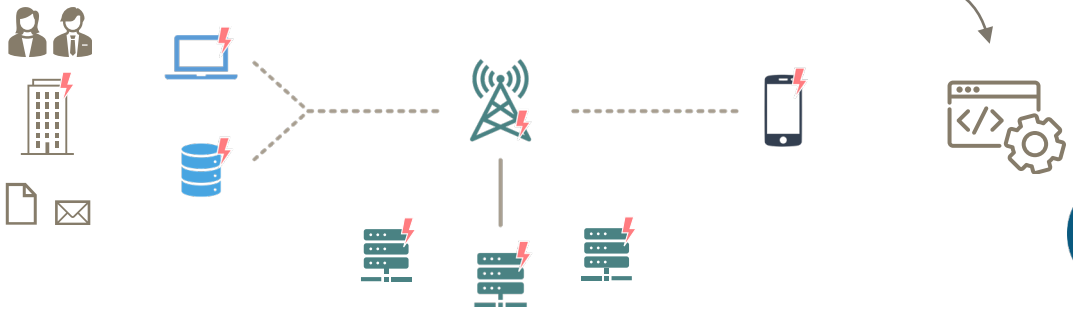
1) The biggest challenges concerning the analysis of the service were …

- Setting the **system boundary** and identifying all **relevant processes**
- The **amounts and flows of** digital (e.g., mobile) **data**
- **Allocation** of servers and end user devices (connected to multifunctionality, lifespans)

- The **comparison** to a physical service – what does a digital service replace? Or is it additional?

2) My main recommendations

- … regarding the choice of **functional unit**.
  - Define it based on the time the studied activity takes.
  - Or based on annual operation of a service.
- …for the choice of **system boundaries**:
  - Focus on the essentials: devices, network, servers
  - Software might be very important, too!



≠ 3) I see the following major differences between LCAs of services & common LCAs of products:

- Digital services are **seemingly immaterial**. The infrastructure is **hidden** and **complex**. It is **geographically dispersed** and **not transparent**.
- **Data (un)availability**. The dynamics and complexity of the information networks, and of services that run on them, make it very challenging to collect the inventory.
- Fast-paced development

Thank you for your attention!

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