Parkkihaukka (”Park Hawk”)

Nudging towards sustainable mobility behavior in nature destinations

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VTT
Looking for peace of mind in nature?

The reality

Nuuksio: Metropolitan wilderness

Size: 53 km^2

- National park surrounded by 1,5 million inhabitants
- Less than 30 kms from Helsinki
- 350,000 yearly visitors – 2nd most popular national park in Finland
- Aiming at serving more people rather than restricting the visits
- Increasing tourist interest

Encountered problems

- Vast majority of visits made by **private cars**
  → unsustainable impact to nature
- **Parking lot space insufficient** in peak visit times
  → illegal parking, excessive back and forth driving, harm to local inhabitants and services, bad nature experience
- **Popular hot spots** in dead-ends behind long **narrow roads**
  → dangerous situations on the roads, not suitable for heavy public transportation
- Partly unpredictable **low and high visiting peaks**
  → profitable regular public transportation difficult to arrange

Typical ways to decrease transport load

Sticks

- Vehicle restrictions
- Vehicle exclusion
- Parking fees
- Entrance fees
- Traffic calming with road alteration and road furniture

Carrots

- Better public transportation
- Park & Ride
- Shuttle and on-demand transportation
- Bicycle renting
- Cycle and walking routes
- Marketing / education

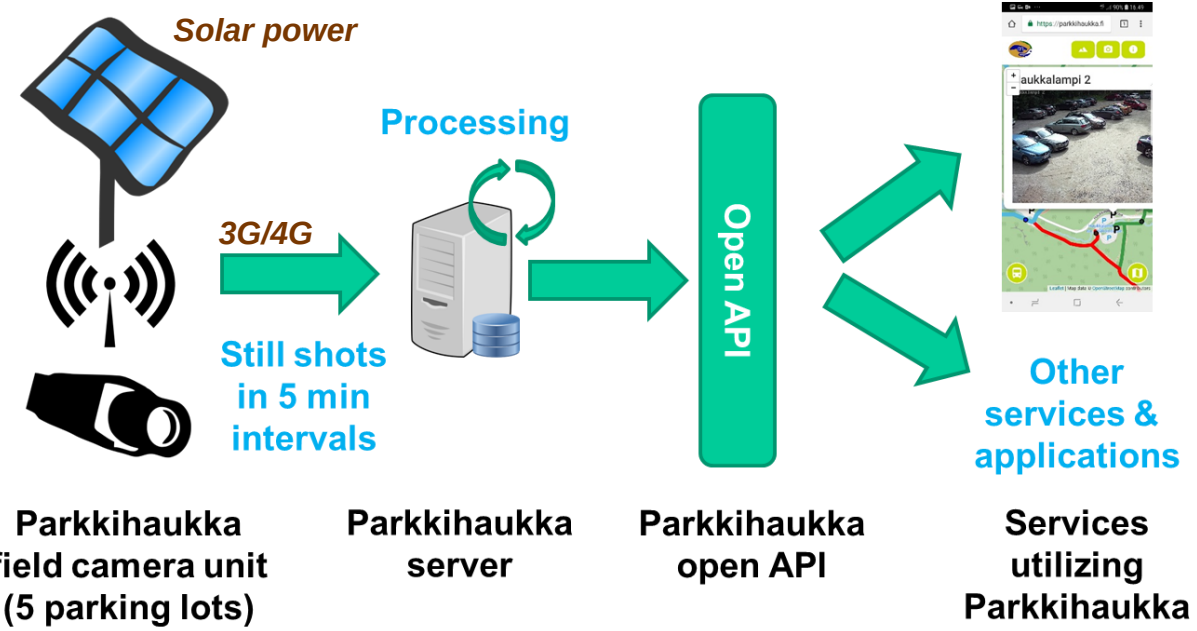
If you had known that parking lot is full…

…would you have chosen another parking lot?

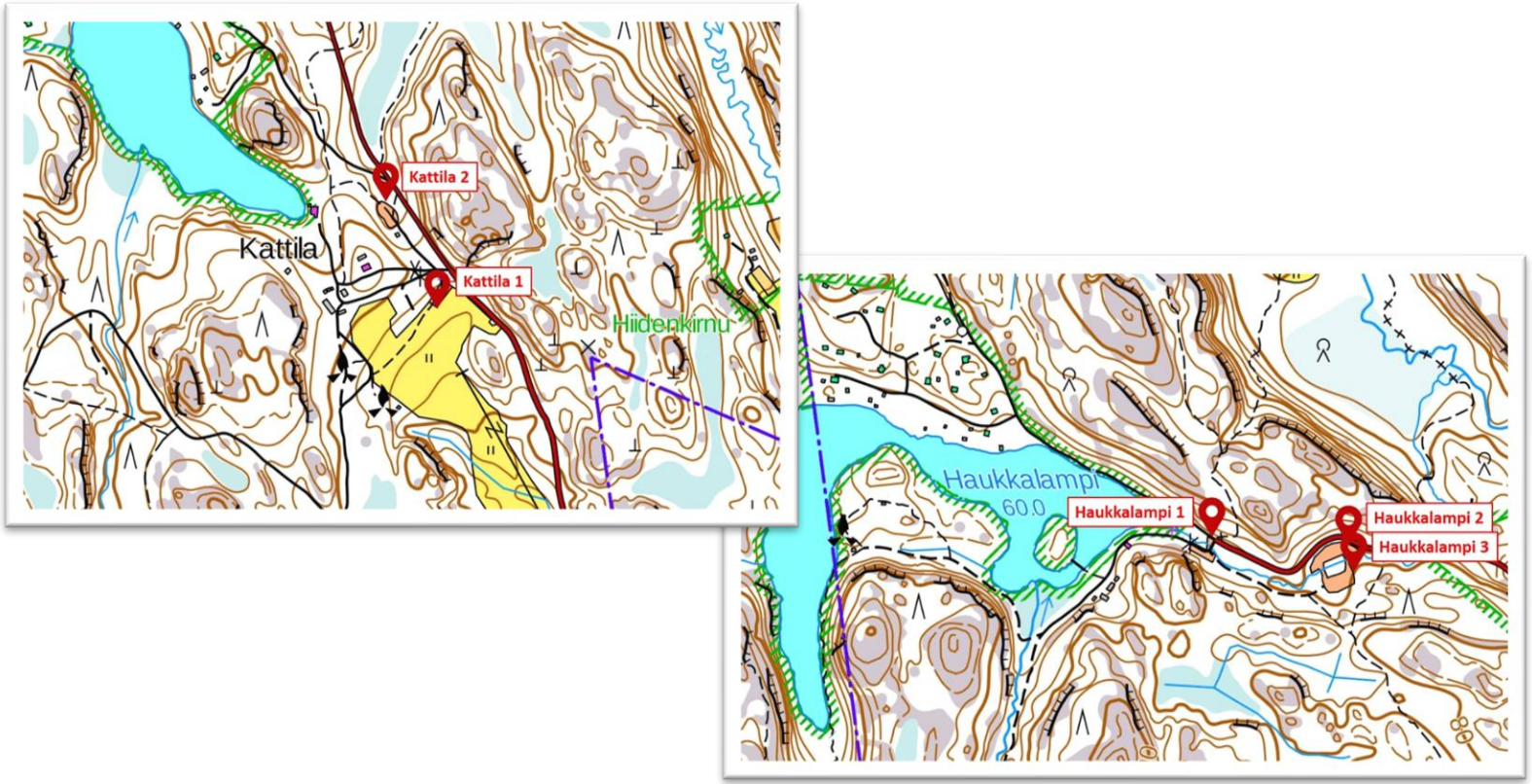
…or some other transportation means?

Would real-time parking lot info nudge people to sensible decisions?

Parking lot information from real-time cameras



Cameras covered 5 parking lots

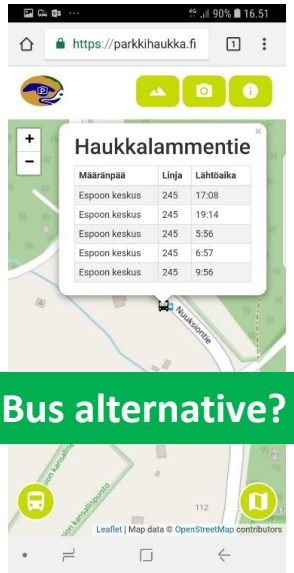


Nudge towards more sensible alternatives

Parking lot occupancy

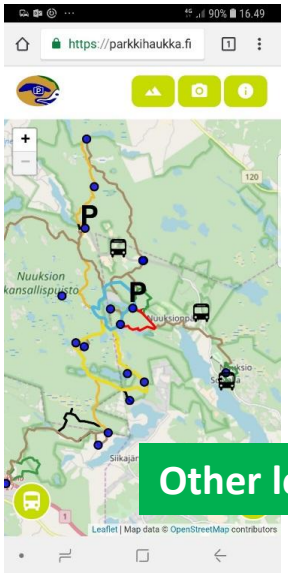
Parking lot full?

Public transportation

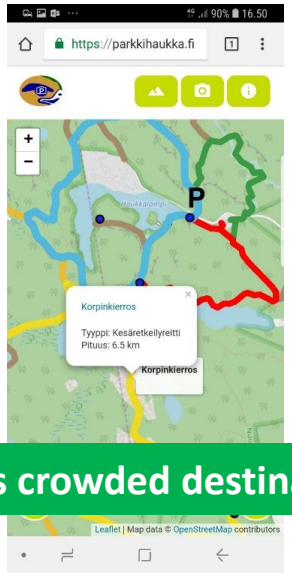


Bus alternative?

Nuuksio service map



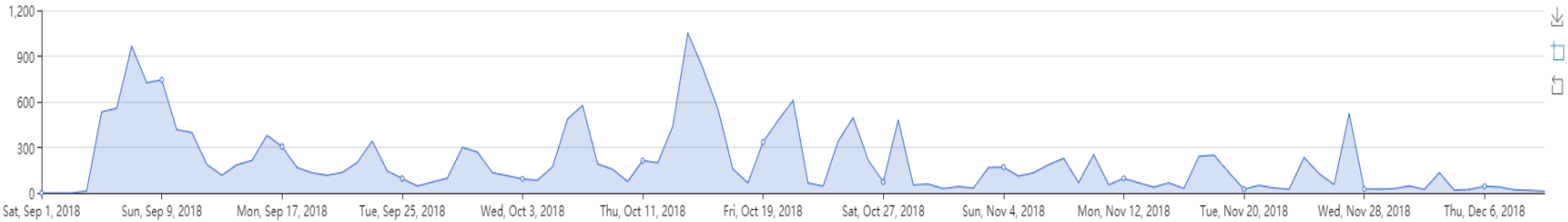
Hiking routes



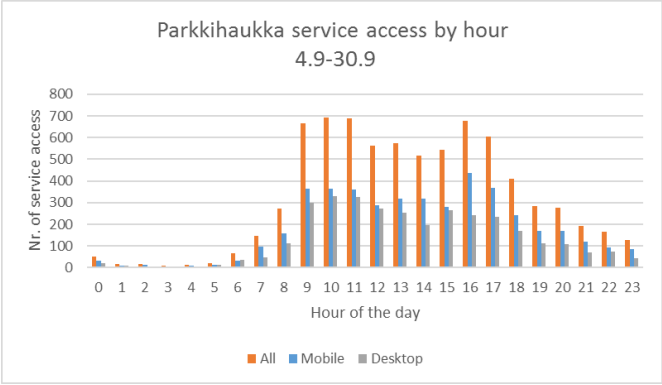
Other less crowded destination alternatives?

Further information

Use of the service in the first autumn 2018



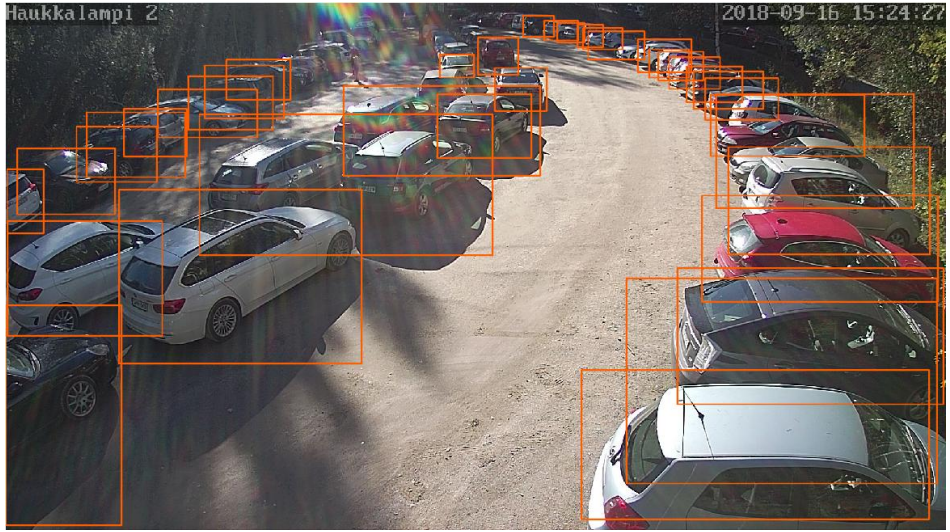
- 20k visits during the autumn
- Visibility campaigns, weekends and holidays produce peak usage
- Peak Parkkihaukka use on peak parking hours
- Parkkihaukka gained regular user base
- 57% mobile users

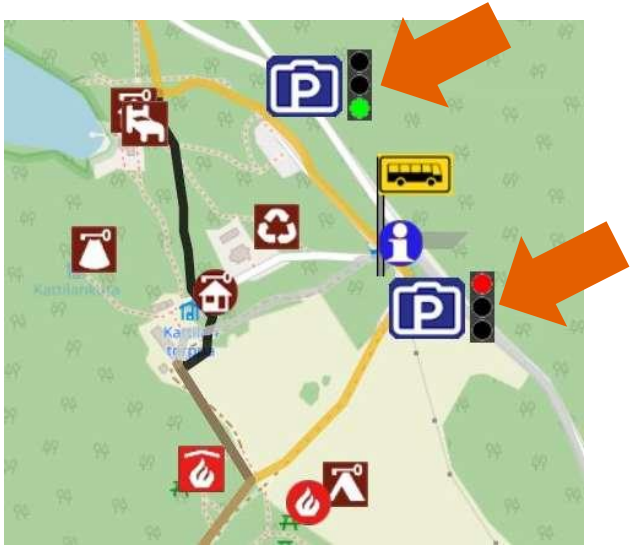


Machine vision upgrade in 2019

Machine vision enabled upgrade…

… to automatically detect parking lot occupancy



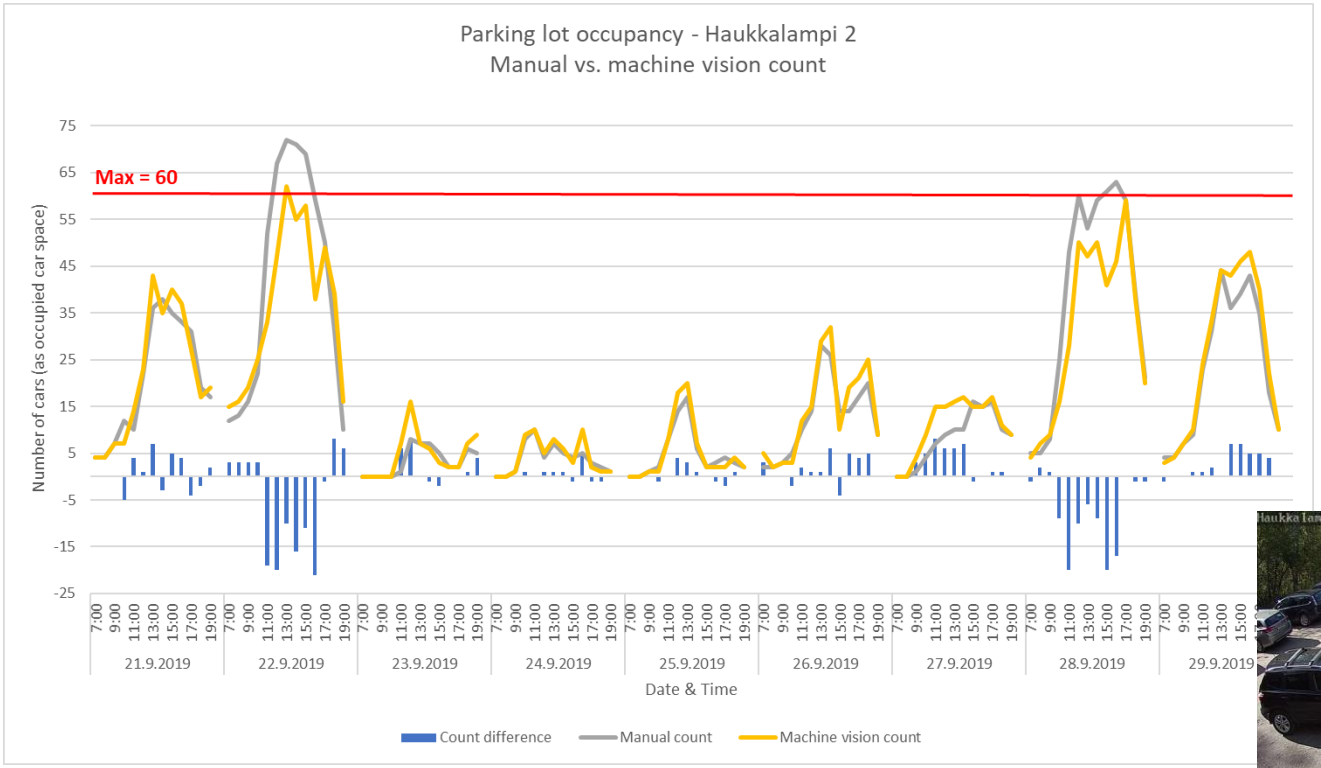


Parking lot occupancy:

0-25% **26-75%** **> 75%**

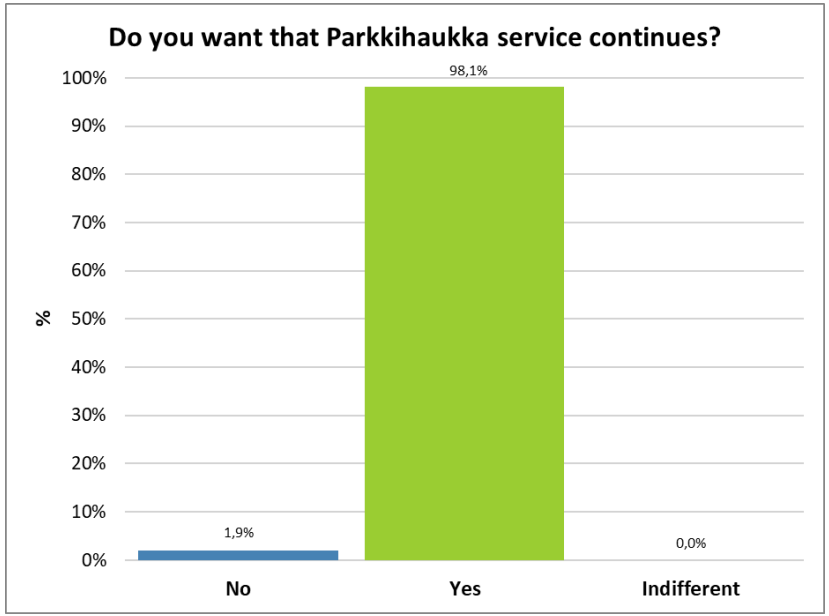
Realized in: *Improved Sustainability in Urban National Parks* project (http://www.metsa.fi/web/en/sust-urb)

Machine vision for parking lot occupancy detection

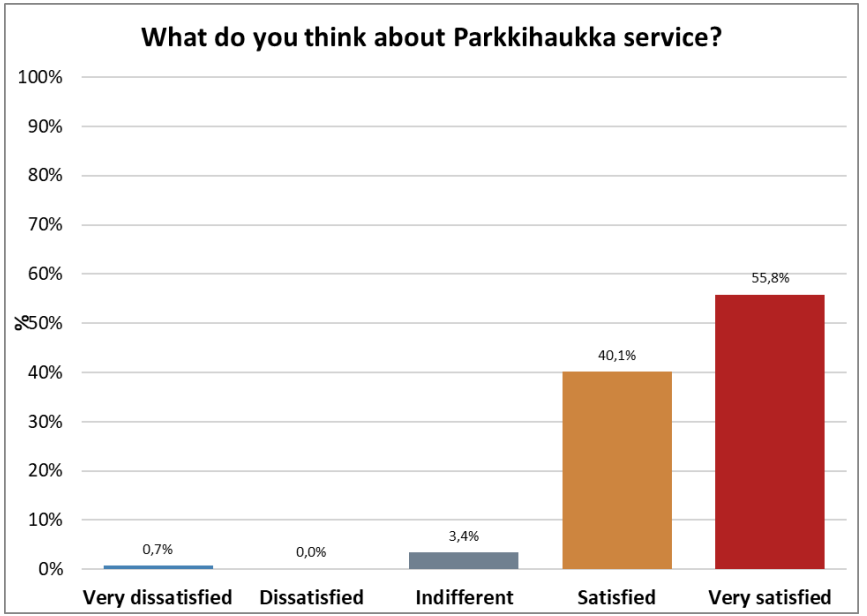


Short questionnaire in the application 2019

Current Parkkihaukka users are satisfied



n = 157



n = 147

Answers from online questionnaire in Parkkihaukka application: 4.10-15.11.2019

Summary of free text responses from users

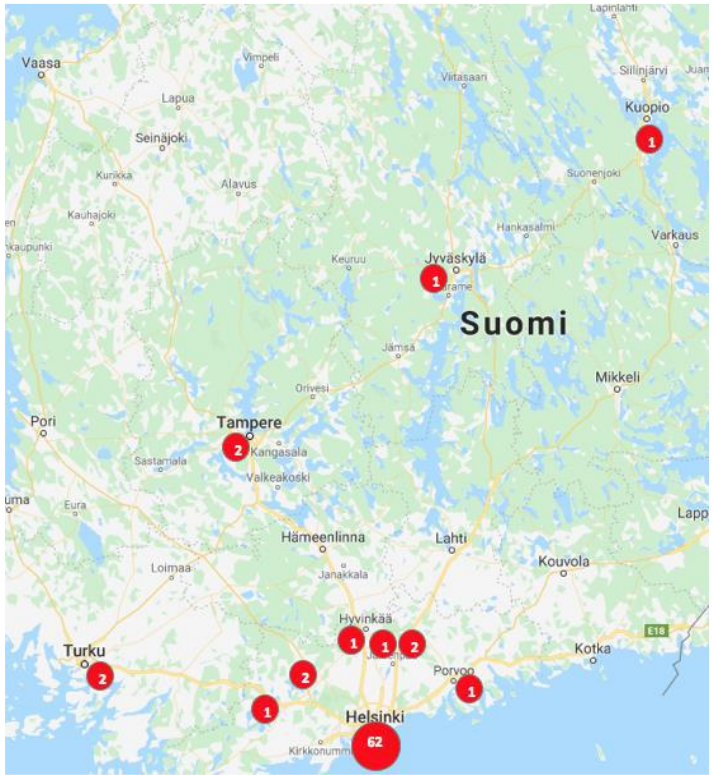
- The service has been highly appreciated by users, with many finding it **extremely useful for checking parking availability before heading to Nuuksio**.
- There are **suggestions to expand the service to other popular parking areas**
- Users have **suggested increasing the marketing efforts** to raise awareness about the service.
- There have been some **issues with the cameras**, such as them being offline or malfunctioning.
- There is a **need for better infrastructure, such as reliable electricity and improved camera coverage**, to ensure seamless operation.
- Couple of users were **concerned about privacy** or “big brother” surveillance

Answers from online questionnaire in Parkkihaukka application: 4.10-15.11.2019

Interviews at selected parking lots featuring Parkkihaukka in Autumn 2019

Respondents of the interview

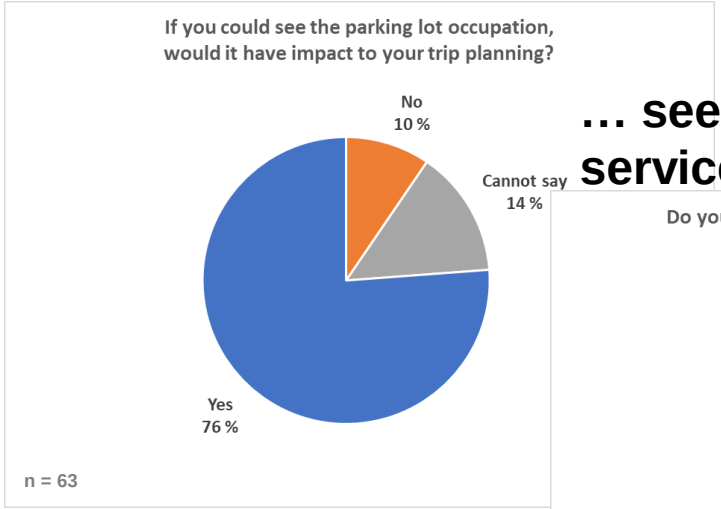
- Interviews made by *Metropolia University of Applied Sciences*
- Number of interviewees = 79
- Most of them coming from Helsinki
- Used Parkkihaukka = 5
- Aware of Parkkihaukka = 12
- Not used Parkkihaukka = 74
- 91 % arrived as a group
- Most visitors come to Nuuksio only once in a year or even less often
- One parking lot (Haukkalampi) clearly most popular destination



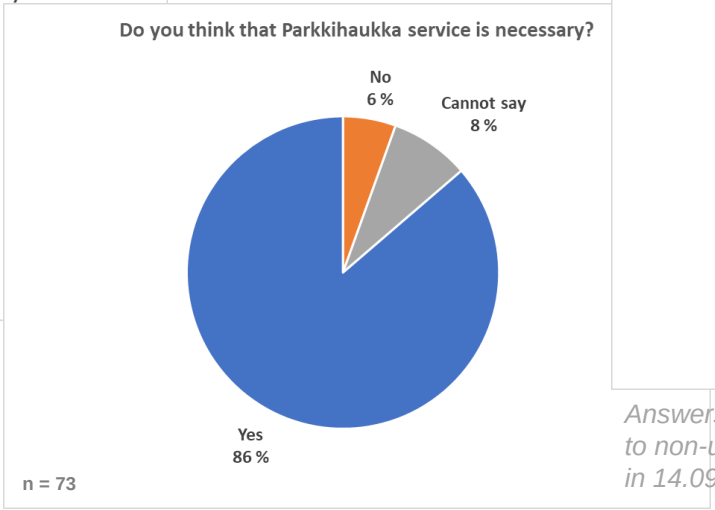
N=79

Those who are just introduced to Parkkihaukka…

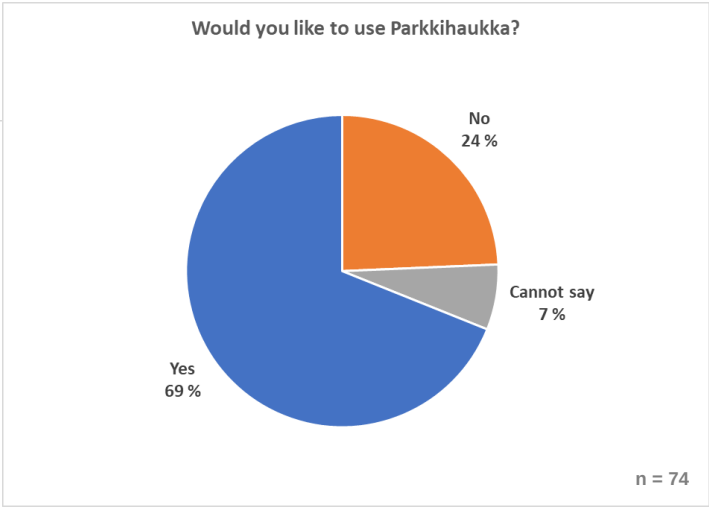
… see that use of it would impact on their plans. (From 5 users 3 said that information provided by Parkkihaukka actually changed their plans)



… see it as a necessary service



… would like to start using it



Answers from the on-site Parkkihaukka questionnaire to non-users by Metropolia University of Applied Science in 14.09, 15.10 & 18.10.2019

Conclusions

Parkkihaukka service

- Pilot experiment tested in 2018 & 2019
- Automatic AI-based parking lot occupancy detection added in 2019
- Service continued as a paid service with same setup in 2020 & 2021 for Metsähallitus
- Service discontinued because of renewal needs and resource challenges
  - Camera, power and connectivity solutions needed upgrade
  - Research centre as a service provider was not optimal
- Parking problems have been continued in Nuuksio and many other popular nature destinations

There is still a need for service like Parkkihaukka (“Park Hawk)

Lessons learned (1)

- **Wilderness without any infrastructure is challenging environment for standalone camera-based information source**
  - Solar power in short days and long cloudy periods
  - Cameras without optimized power consumption
  - Poor mobile data connectivity in certain places
  - Need for weather and vandalism proof solution
- **GDPR challenges with camera-based detection solutions**
  - No 3rd party IP camera data hosting
  - → AI-based pattern recognition instead of photos (own set of challenges!)
  - → edge computing for pattern recognition (note power challenges!)
- **Minimize down times and faults to gain users' trust**
  - Service maintenance throughout the service period with swift reaction times
  - Automatic fault detection to minimize reaction times

Lessons learned (2)

- **Partial coverage of the alternatives leaves people in uncertainty in their actions**
  - Cover all possible parking places of the destination and alternatives for the private car emphasizing the benefits in the service
- **Reaching user base difficult when most visitors are only occasional**
  - Add marketing channels and increase frequency of marketing campaigns
  - Add digital signages in the strategic places along the roads coming to national parks with real-time parking information and service adds

Conclusion:

- **Real-time information with alternative options is an effective way to nudge visitors towards more sustainable mobility behavior**
- **The impact depends on the proportion of the visitors getting the message!**

Thank You!

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