

POLIS

CITIES AND REGIONS FOR TRANSPORT INNOVATION

ANNUAL
CONFERENCE
2023

LEUVEN, BELGIUM • 29-30 NOVEMBER 2023



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Guardian Angel

On-demand lighting to support active travel in rural areas

Lei Chen (RISE Research Institutes of Sweden)

Anna-Sofia Alklind Taylor (University of Skövde)





Active travel



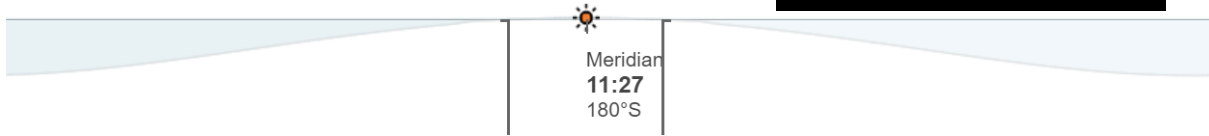
Challenges - darkness

2023 Nov	Sunrise/Sunset		Daylength		Astronomical Twilight		Nautical Twilight		Civil Twilight	
	Sunrise	Sunset	Length	Diff.	Start	End	Start	End	Start	End
29 ^	09:57 ↘ (159°)	12:56 ↙ (201°)	2:59:00	-9:58	05:46	17:07	06:54	15:59	08:14	14:39

Rise
09:57
159°SSE

Set
12:56
201°SSW

Ca 21 hours



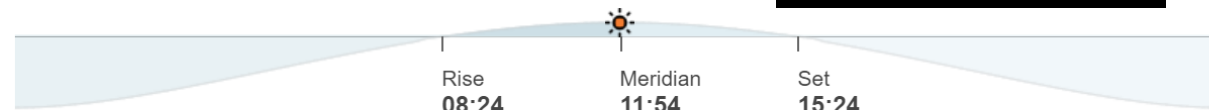
2023 Nov	Sunrise/Sunset		Daylength		Astronomical Twilight		Nautical Twilight		Civil Twilight	
	Sunrise	Sunset	Length	Diff.	Start	End	Start	End	Start	End
29 ^	08:24 ↘ (132°)	15:24 ↙ (228°)	6:59:54	-3:14	05:55	17:52	06:43	17:05	07:34	16:13

Rise
08:24
132°SE

Meridian
11:54
180°S

Set
15:24
228°SW

Ca 17 hours





Rural areas – challenging infrastructure





Perceived safety and security

Nytt initiativ ska få kvinnor att motionera i mörkret

Mörkare kvällar skapar en känsla av fler otrygga miljöer för många kvinnor. Nu anordnas det en powerwalk för tjejer som känner rädsla för att promenera ensamma.

Borås • Publicerad 4 oktober 2021



LTU-studenterna Hanna Edberg, Klara Vesterberg och Vendela Sandström jobbar med en app för tjejer som känner sig otrygga. Foto: Linnea Luttu

TRYGGHET I MOBILEN

Utvecklar app för andra tjejer: "Många undviker att gå ut"

Belysning viktigast för känslan av trygghet ute – Tre praktiska tips för kommuner

7.12.2021 07:30:00 CET | [Belysningsbranschen](#)

Dela

Mer än hälften av alla kvinnor känner olust till att vistas utomhus under kvällstid. En färsk undersökning visar att belysning är den enskilt viktigaste åtgärden för att öka känslan av trygghet, till och med viktigare än fler poliser och vakter. Kommuner har en avgörande roll för att komma till rätta med problemet.



UK company bids to protect women from street assaults with drones

Bruce Crumley • Jan, 3rd 2022 2:10 am PT @BDroneD

AERO GUARD

BY DRONEDEFENCE

Comments

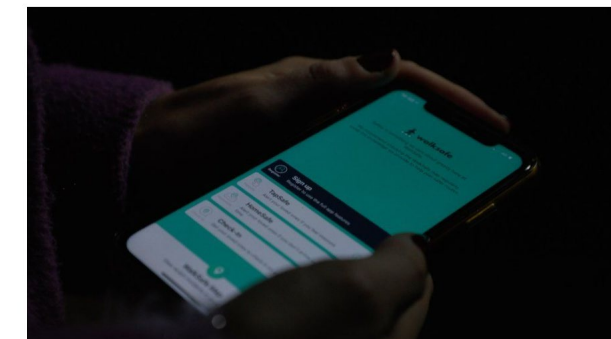
A UK company that had been specializing in counter-drone systems is now proposing to deploy UAVs to protect women from street assaults, using an emergency app leading craft to where calls for help were made, according to British media reports.

The technology helping keep women safe on the streets

By Shiona McCallum
Technology reporter

© 12 December 2021

Sarah Everard murder



Half of all women have felt unsafe at some point walking alone in the dark, according to recent figures from the Office for National Statistics.



Drones to rescue

- Drones equipped with lighting infrastructure
- On-demand and bookable
- Follow the cyclist to provide lighting
- Lighting strength and range can be adapted
- Digital services could be included





Guardian Angel

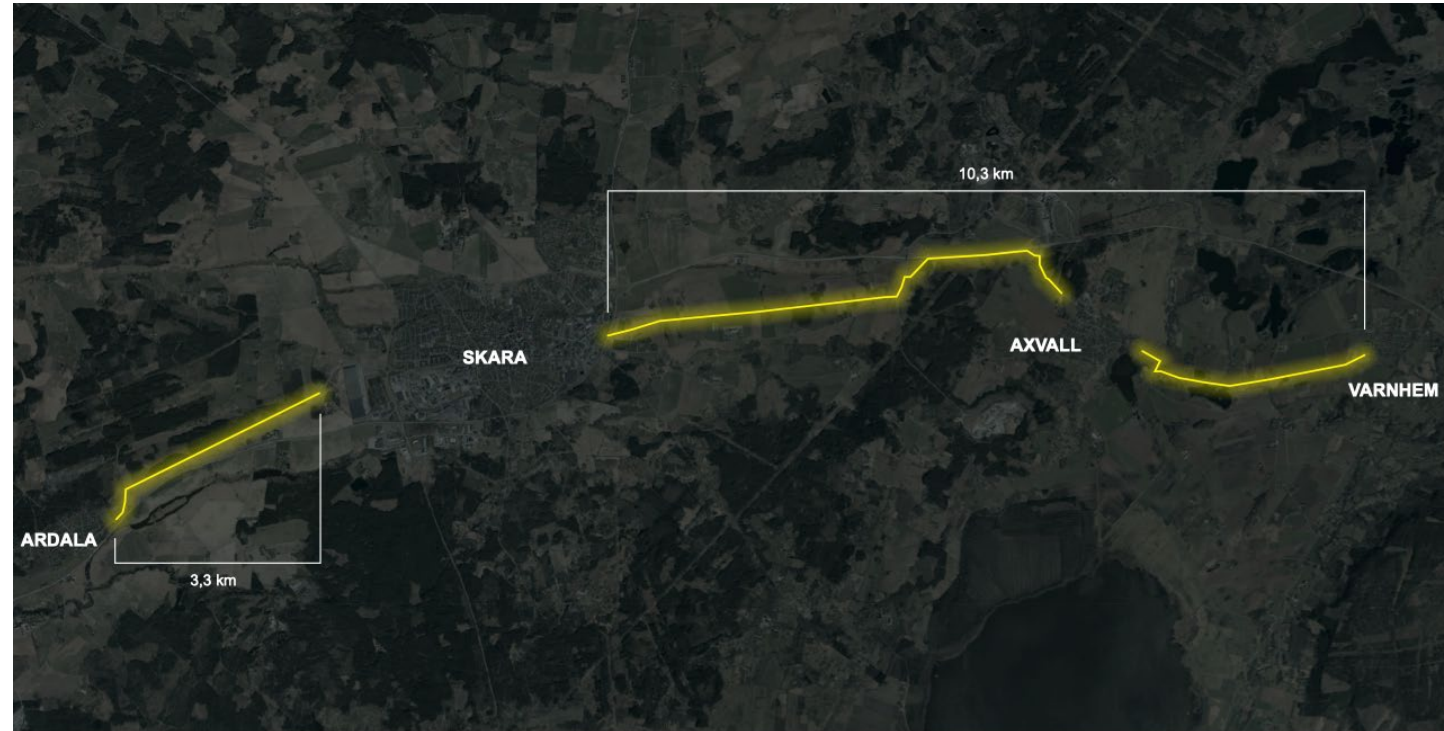
- Encourage more active mobility even in after-dark,
- Support improved feeling of security
- Support the travel habit changing
- Support improved traffic safety and contribute to Vision Zero





The project

- 2021 – 2023
- Innovation and pilot project
- Drone-based on-demand lighting solutions
- Chosen bicycle route in Skara
- Focus on user perception and acceptance
 - UX
 - Trust
 - Safety
 - Societal impact



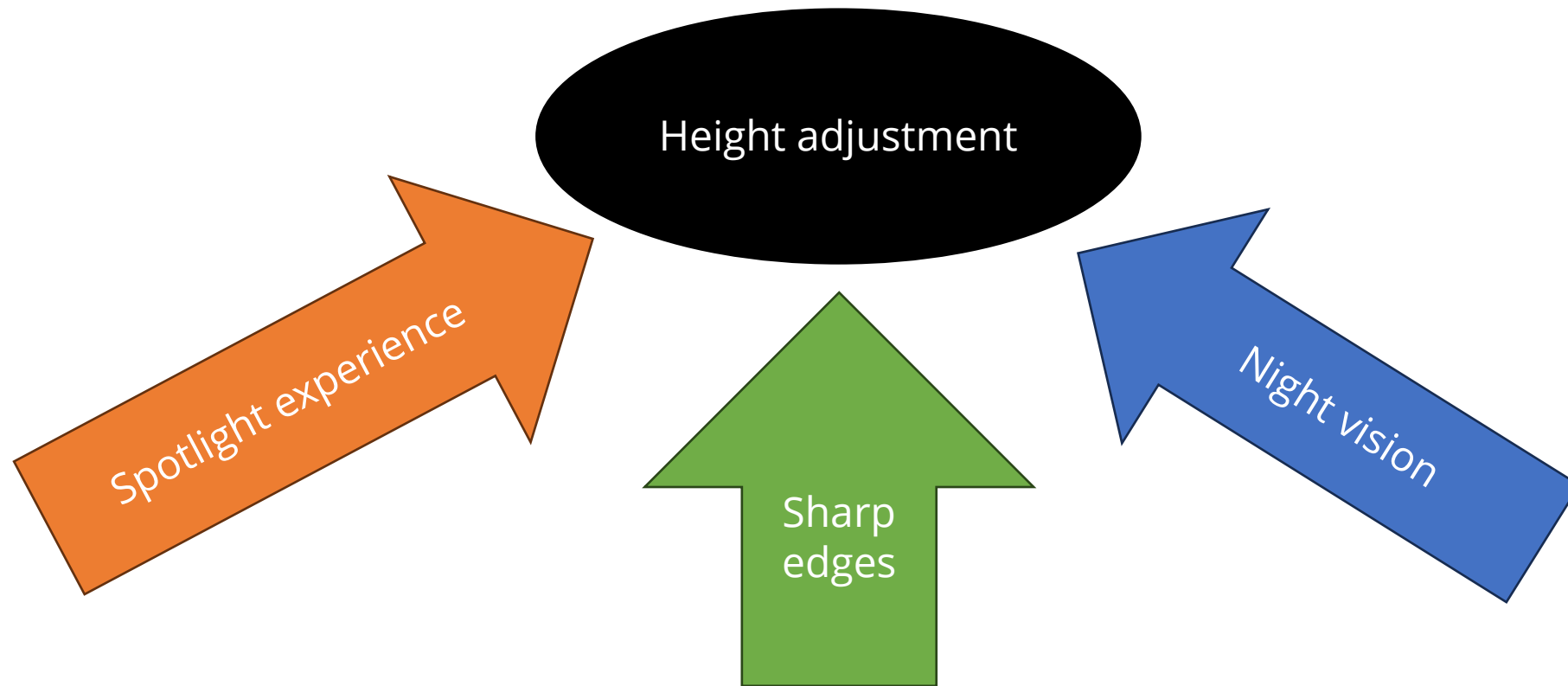


Initial solution test





Changes from initial solution test





Focus group study





Changes from focus groups



2 drones



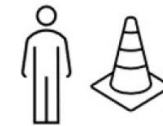
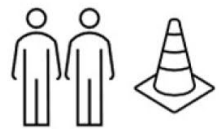
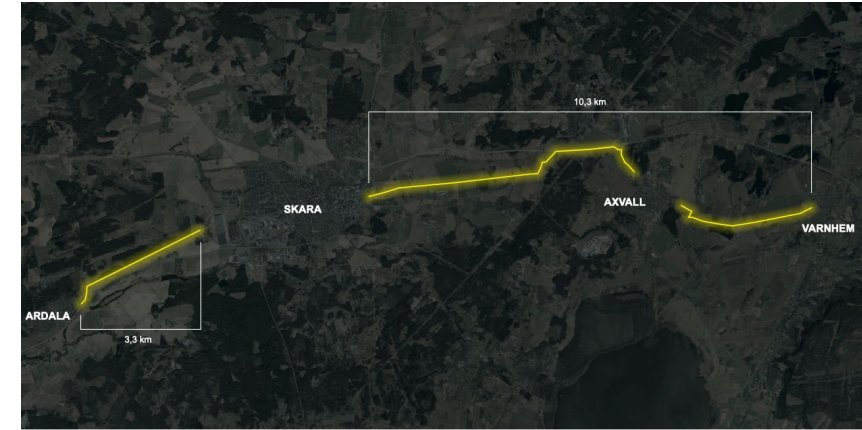
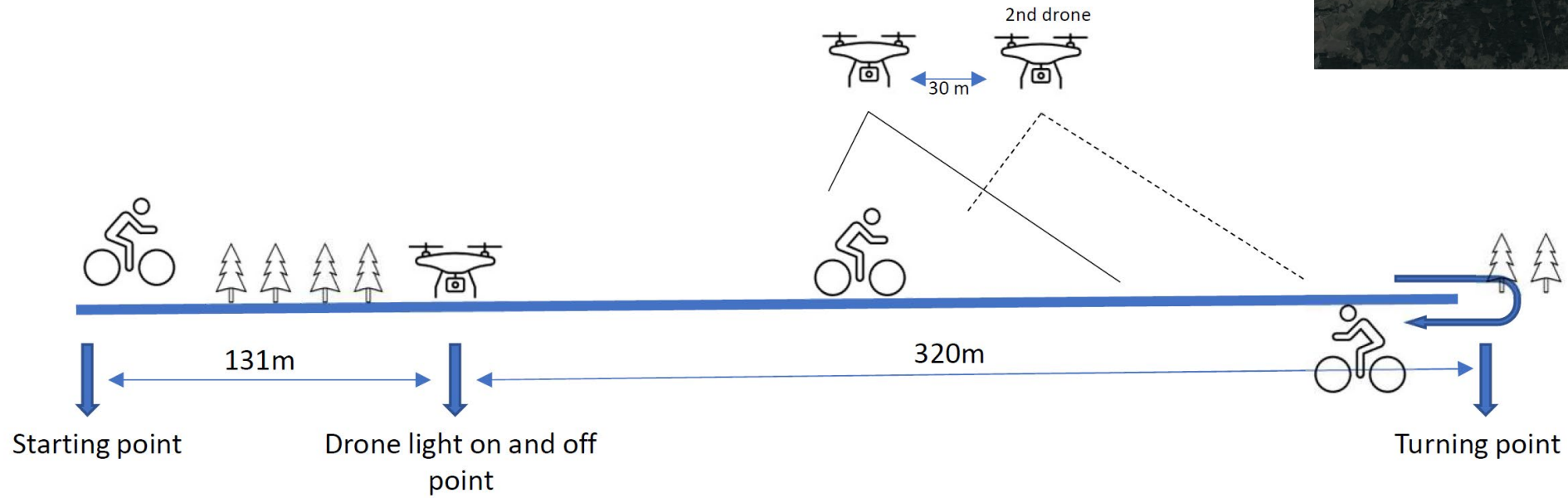
Visibility far ahead



Visibility to the sides



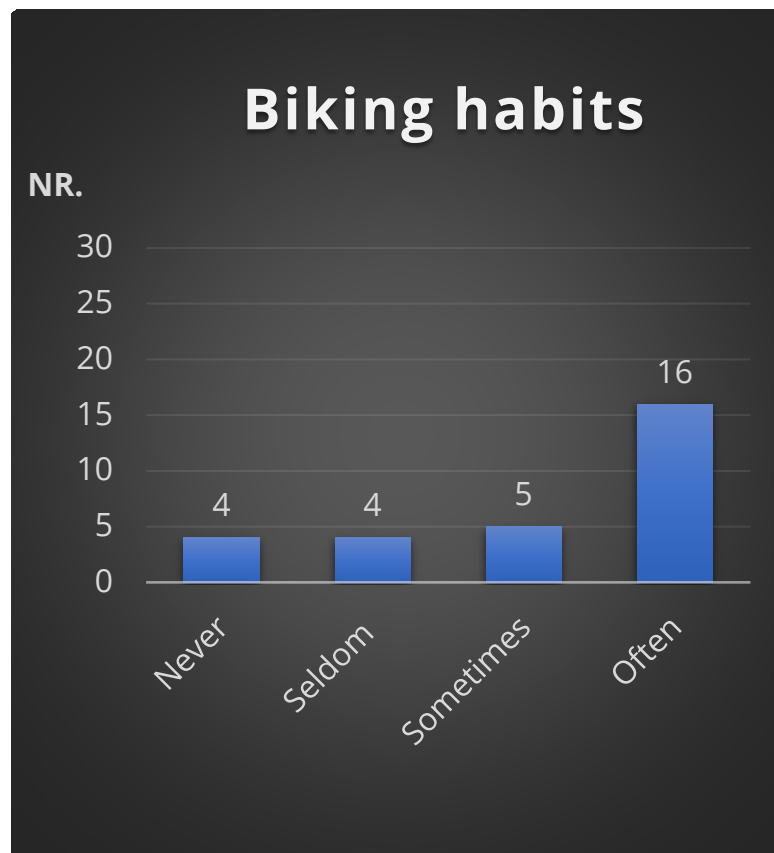
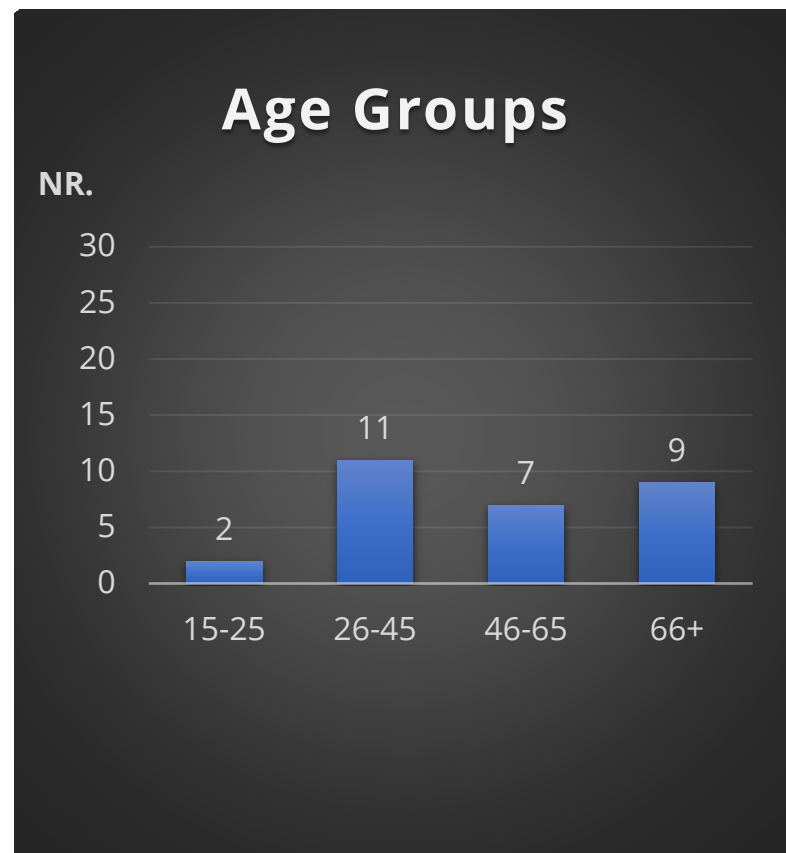
Pilot study



cykla med drönljus



Pre-test questionnaire (n = 29)



Gender

• Men	(20)
• Women	(9)

When using bicycle?

• Errands	(24)
• Social activities	(21)
• Commuting	(19)
• Physical training	(14)
• With others	(9)



Unanimous positive response

- UX
 - Enough broad and strong lighting
 - Negligible noise
- TRUST
 - Positive attitude towards drones
 - Positive perceived visibility
 - Positive reliability though improved drone-cyclist synchronization wanted

*“Like cycling under a **full moon!**”*

*“The drone is like a **guardian angel!**”*





Potential impacts

- SAFETY
 - Excellent likelihood to see and react to unexpected things
 - Fewer shadows and dark spots, increasing visibility and predictability
- SOCIAL IMPACTS
 - Willingness and motivation to cycle when dark
 - Potential travel habits changing

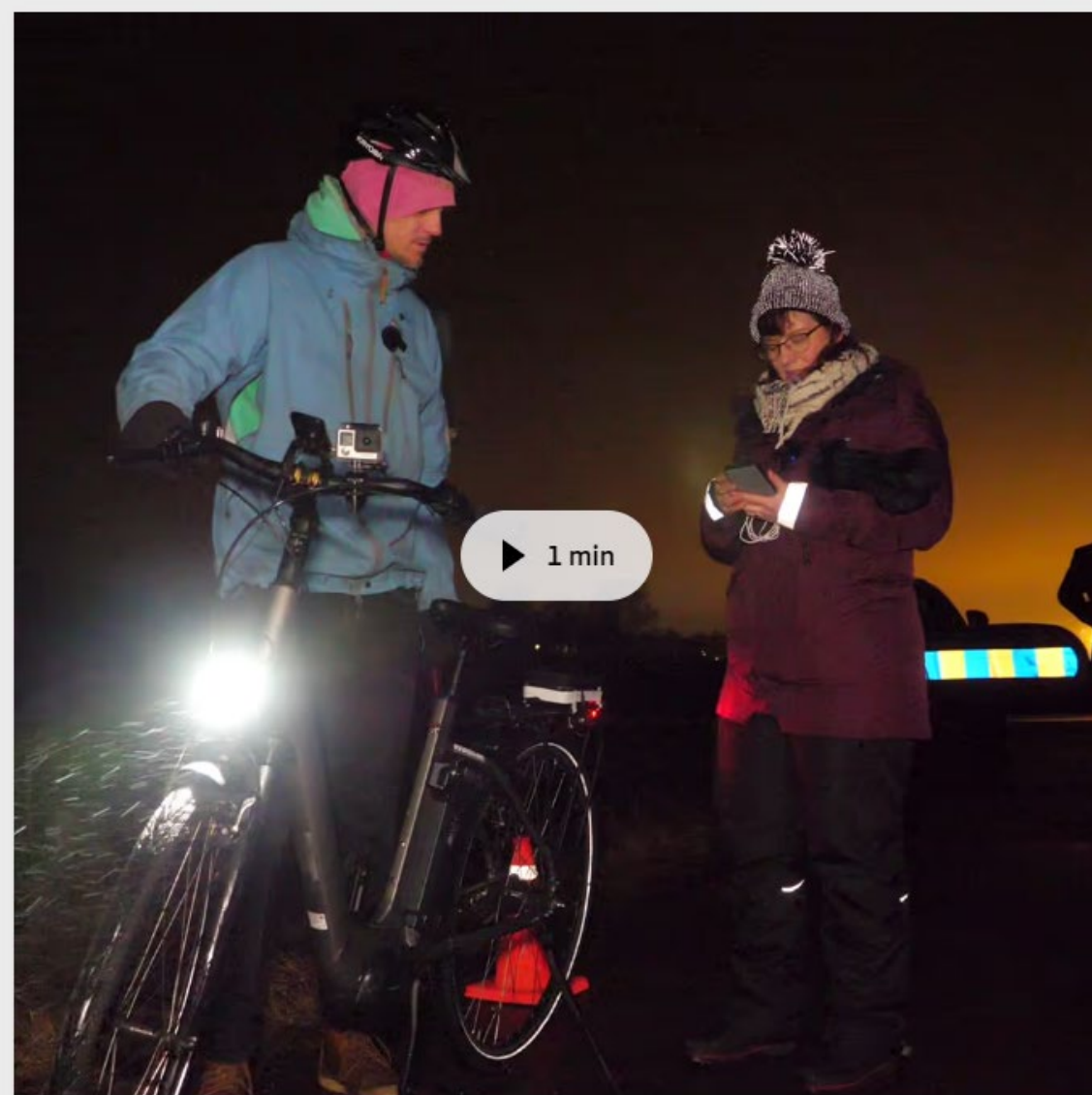




Challenges and opportunities

- Challenges
 - Regulations are under development
 - Business modelling
 - Privacy and integrity
 - Multiple drones simultaneously
 - ...
- Opportunities
 - Already many applications
 - Harmonized EU space regulation
 - U-Space services are on-going
 - Significant economic and social potential





Nytt projekt: Här lyser drönare upp vägen åt cyklister i Skara Foto: Bosse Carlqvist/SVT

Visa alla (3)

Nytt projekt: Här lyser drönare upp vägen åt cyklister i Skara

UPPDATERAD 29 MARS 2023 PUBLICERAD 29 MARS 2023



Whenever you want to travel by bike, you should feel safe and secure doing so. Darkness shouldn't be the reason that stops you from active travel.

Let the drones light up the road for you.

--- Skyddsängel / Skara Guardian Angel





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THANK YOU 😊

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