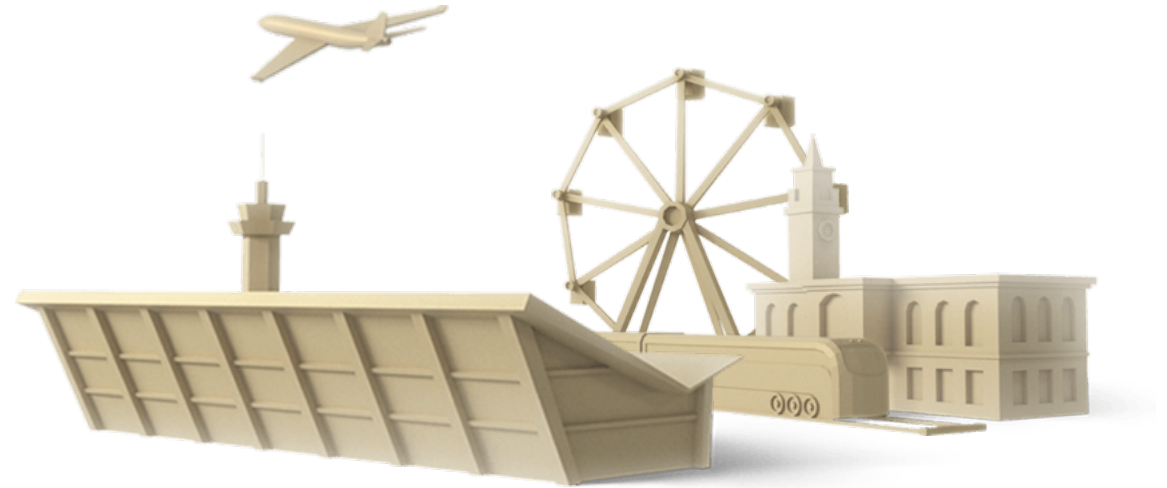


KÄRSA



Screening of large volumes of cargo for
contraband using ultra- sensitive atmospheric
pressure chemical ionization high-resolution
mass spectrometry

www.karsa.fi © Karsa Ltd

Dr. Richard Lareau, Technical Consultant

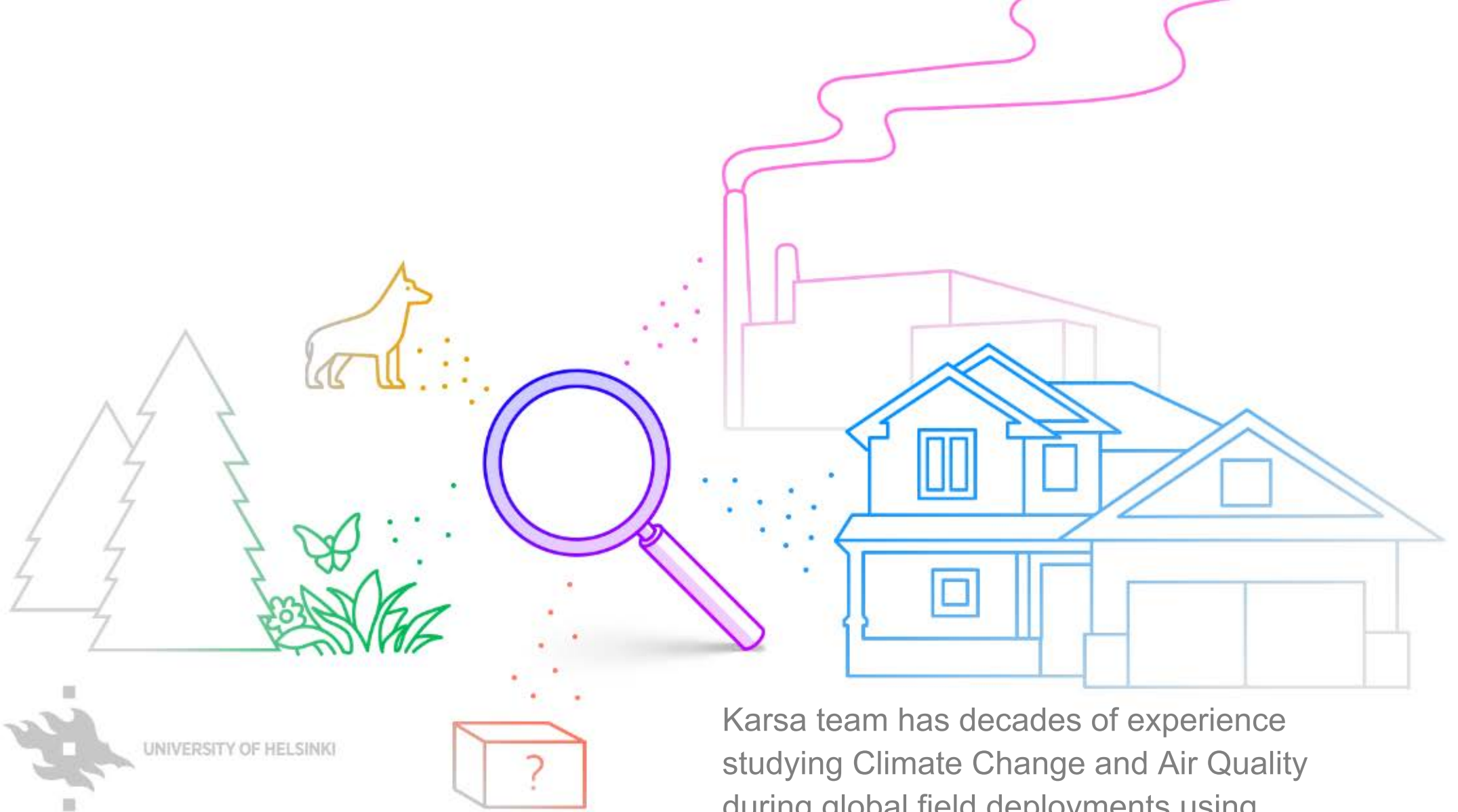
Dr. H.J. Jost, CEO, hj.jost@karsa.fi

ADEPT02/July 18, 2019

So what? Who cares?

- Space: Detection of contraband such as illicit drugs and explosives in mail and cargo
- Problem: Screen at speed of commerce with high PD rate and low PFA
- Solution: Clear mail bags, pallets or even trucks/containers
- Results: Detected weapons hidden in cars, explosives in cargo, and initial work with drugs using ScentHound explosives vapor detection prototype
- Limitations: availability of vapor
- TRL: 6
- Contact: Dr. Richard Lareau, Technical Consultant (presenter), Dr. H.J. Jost, CEO, hj.jost@karsa.fi





Karsa team has decades of experience studying Climate Change and Air Quality during global field deployments using ultrasensitive Atmospheric Pressure Chemical Ionization (APCI) technology

World leading sampling and detection experts



MIKKO SIPILÄ
Science Fellow



H. J. JOST
Chief Executive Officer



ALEKSEI SHCHERBININ
Chief Product Officer
Chief Financial Officer



JANI HAKALA
Senior Scientist



OSKARI KAUSIALA
Software Architect



NINA SARNELA
R&D Scientist



VERNER HEMMILÄ
Product Development Engineer



JYRI MIKKILÄ
Director of Engineering



TOFWERK
Time-of-Flight MS



Aerodyne Research



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

ŠCENTHOUND

First and most advanced product of Karsa

Current focus on cargo screening

Goal to be first certified product for upcoming ECAC explosives vapor detection standard

Operation: draw air from gaps in cargo containing threat vapors onto filter and analyze in Scenthound

Use multiple samplers with one analyzer



Chemical Ionization -inlet

- Atmospheric pressure chemical ionization
- Multiple reagent options
- Soft x-ray ion source
 - Bipolar
 - Easy on/off
 - Not radioactive
- Reliable
- Low maintenance
- Designed to prevent contamination
 - Never had a clogged pinhole



Filter cassette

- Multiple filter options
- Fixed or interchangeable filter
- Reusable



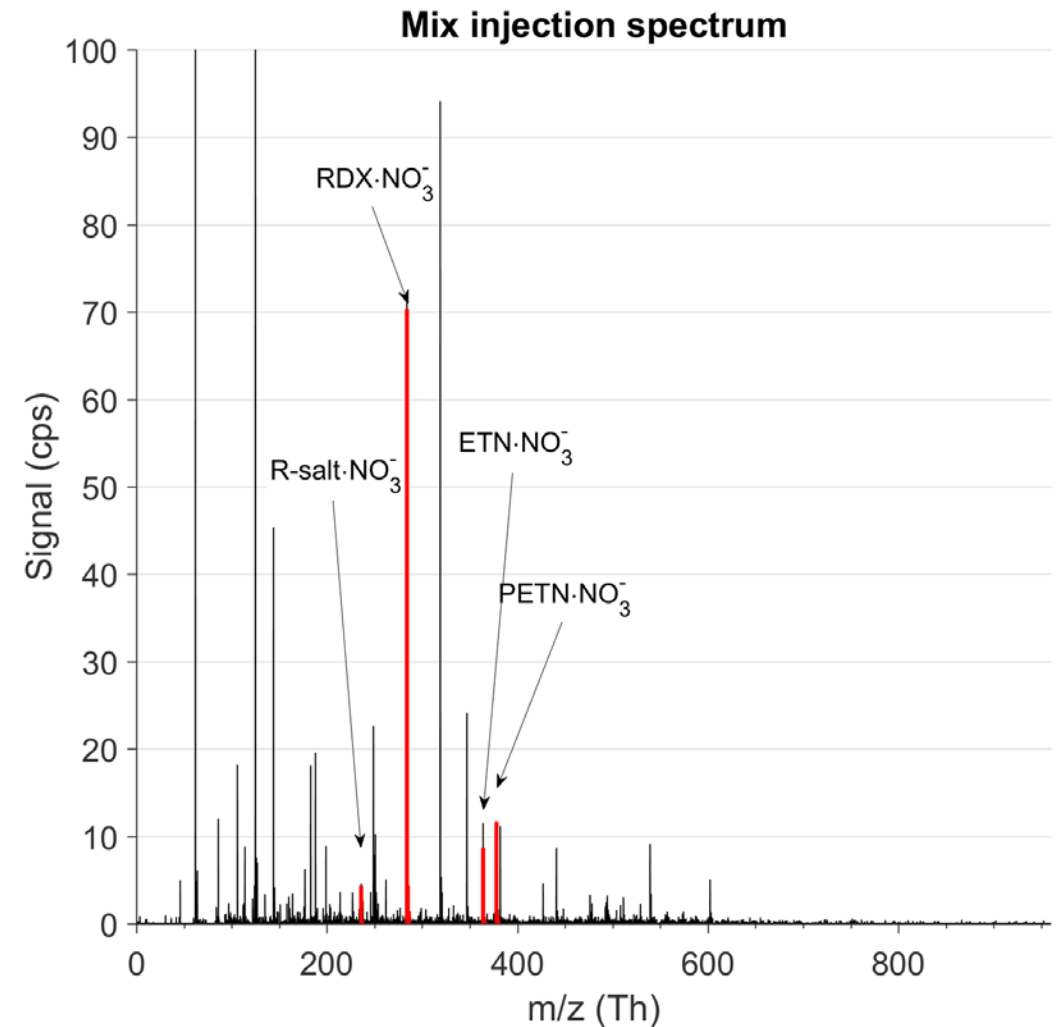
High volume sampler

- Portable and lightweight
- Battery operated
- Programmable
- Low cost
- Multiple samplers can be operated at once and analyzed with one ScentHound



Tarkka ToF-MS Backend in Scenthound

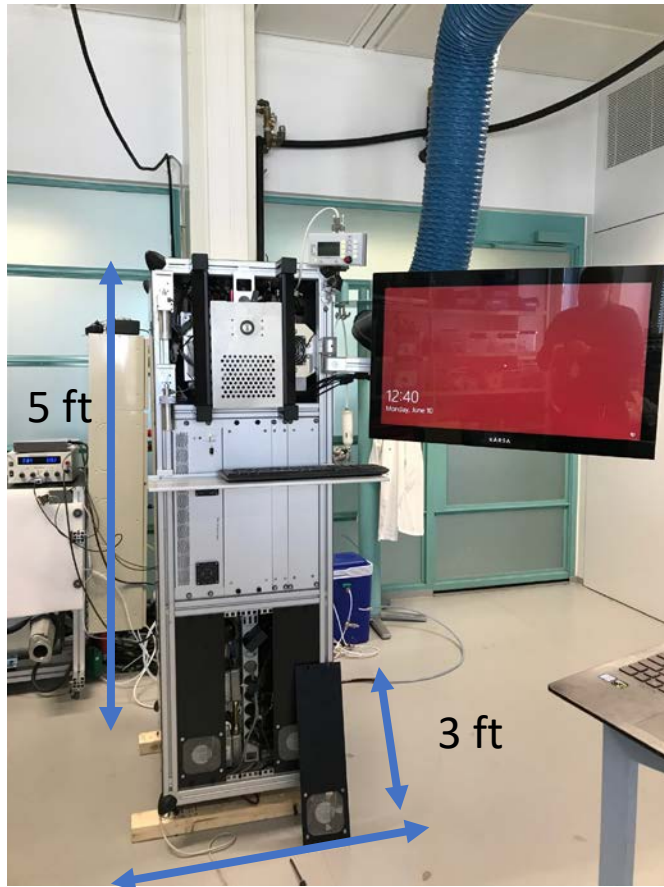
- High sensitivity
- High resolution
- All the masses all the time
- Reliable, low maintenance
- Footprint required: approx. 3ft x 3 ft x 5 ft (h)
- Rugged
 - Turbo pump changed after 10 years of use
 - Successfully deployed globally
 - Himalayas, Antarctica, Svalbard, Greenland
La Reunion...



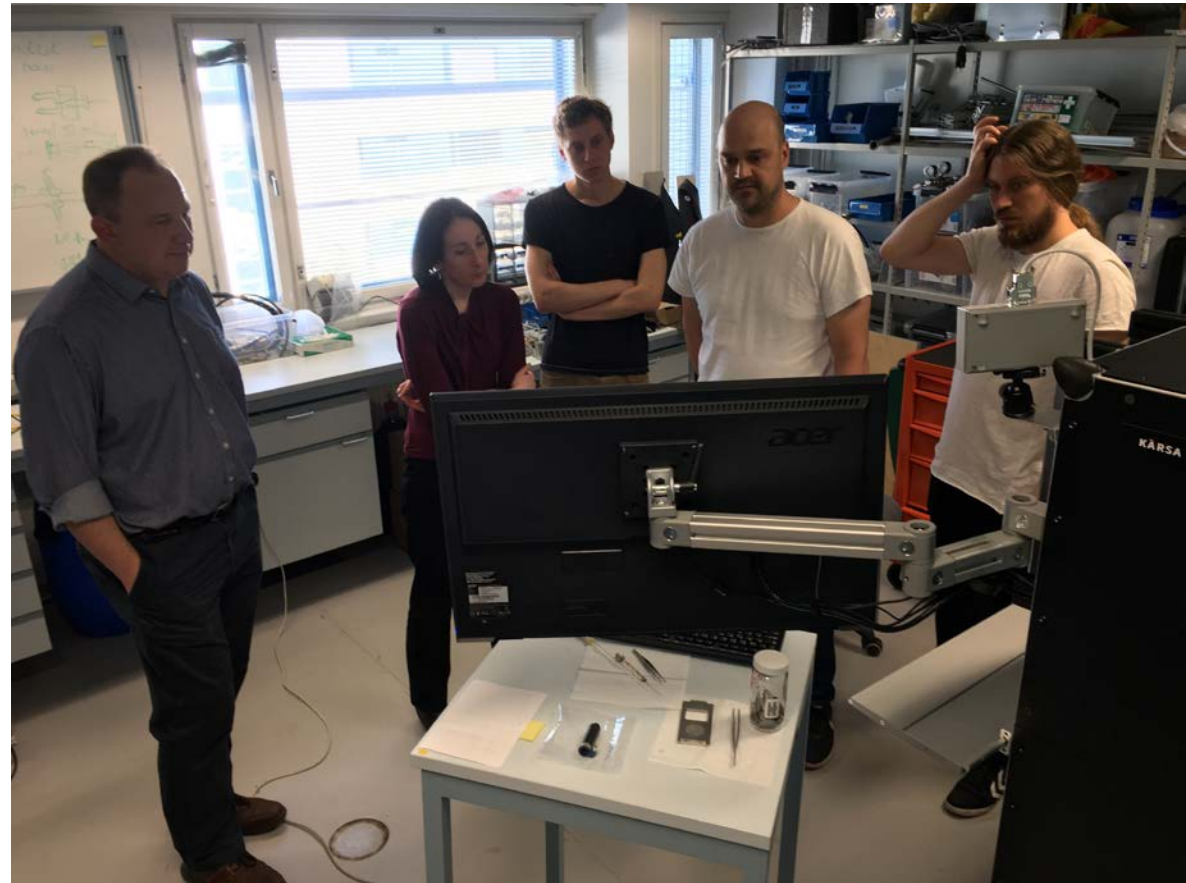
Sampling from car with a weapon in bag



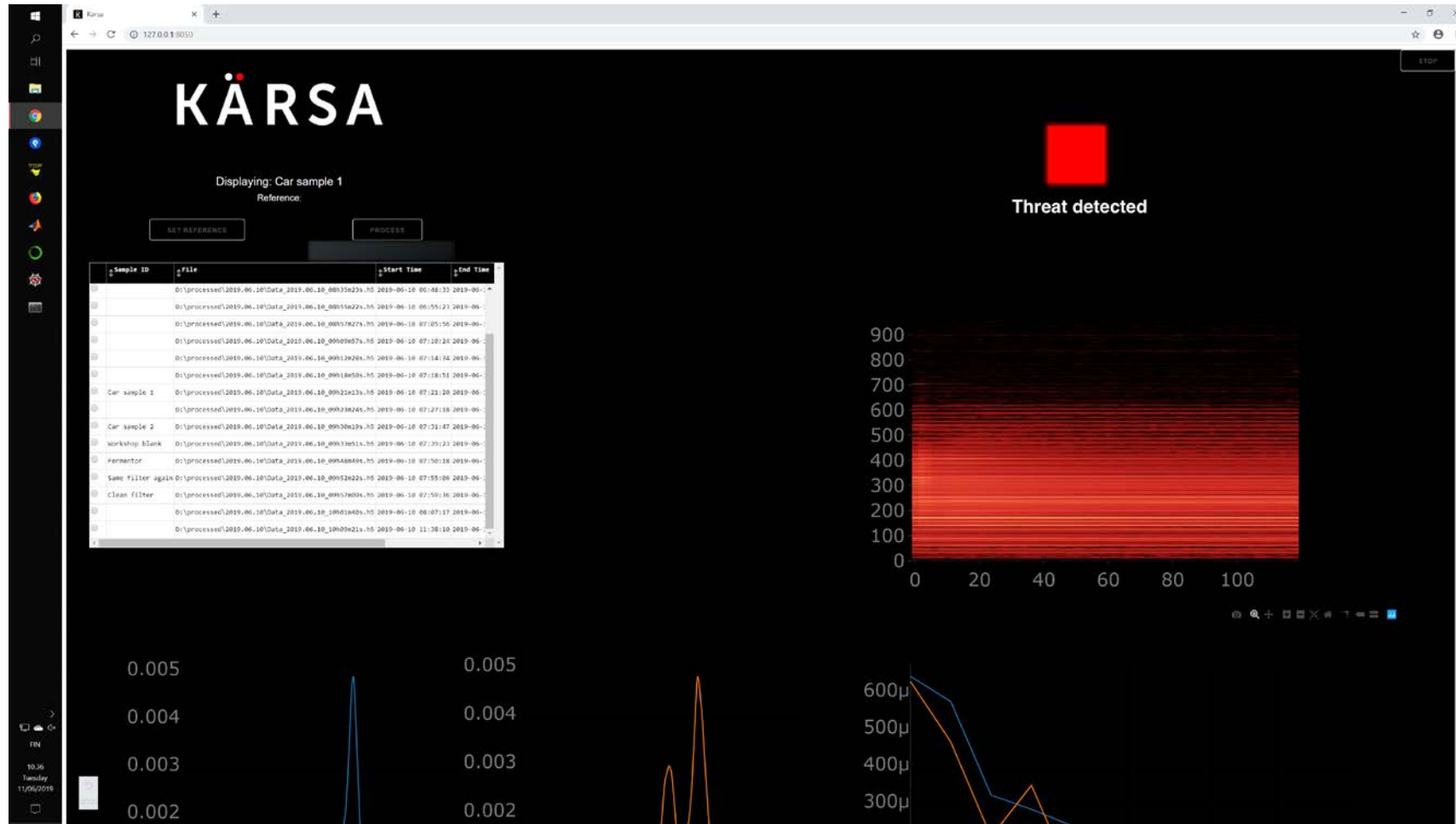
Analysis of filter in < 2 minutes



3 ft



Weapon detected



Competitive advantage

- High resolution, high sensitivity MS as opposed to industry trend to small, cheap MS: low FA and high PD
- Tight, low level integration of MS due to collaboration with MS manufacturer.
- Software enabling a simple to use High Resolution MS system
- Small footprint, robust, field proven platform.
- Potential to screen at mail bag, ULD, pallet or truck level in about 2-10 minutes depending on the sample volume.

Karsa and CPB

- Focused team of experts to solve sampling problems utilizing ultra sensitive, robust detection system
- Proven detection of explosives particles and vapors, and weapons in cars by gunpowder residue
- ScentHound has potential to detect illicit drugs, weapons, CWA (including TICs and TIMs) in cargo, vehicles or mail
- Looking for funding to increase TRL and adapt to CPB requirements



KÄRSA

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