

Microplastics in urban stormwaters

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S Y K E
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Microplastics

- Majority (in quantity) of marine plastic litter composed of particles under 5 mm of size called microplastics

Primary microplastics



Photo: Ecowatch.com

Secondary microplastics



Photo: plasticchange.com

Microplastics – why do we care?

- Microplastics are of particular concern
 - Small size → bioavailability
 - Mechanical stress/entanglement
 - Potential to be transferred within food webs
 - Expose animals to hazardous substances
 - Lightweight & durable
→ artificial “microbial reefs”
- Also non-synthetic microlitter has been proposed to have potential to transport chemical pollutants
- Majority of studies in biological impacts have been in the lab with concentrations many times higher than what is environmentally realistic

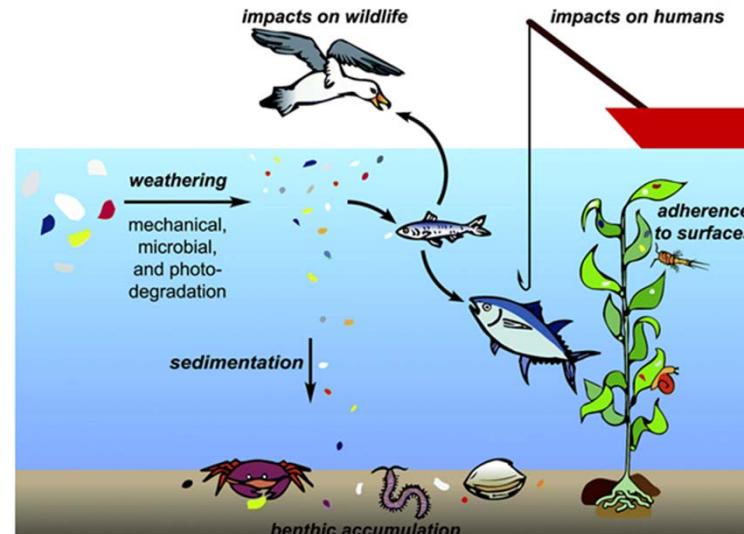


Photo: Lin 2016

Sources and pathways of microplastics to the aquatic environment

Land-based sources

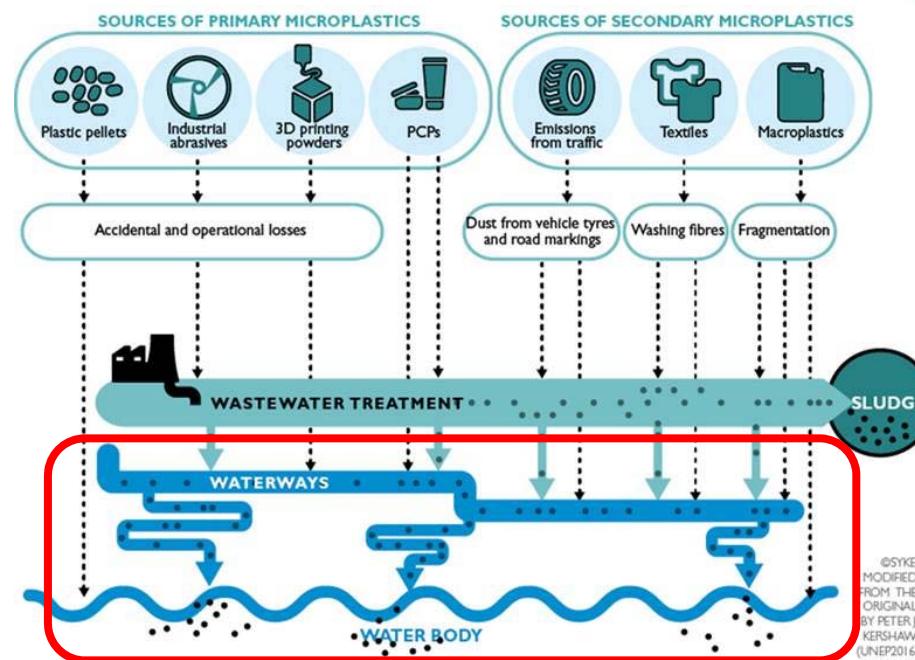
- Plastic industry and fabricators
- Personal care products
- Traffic
- Textiles
- Fragmentation of macroplastics

Aquatic-based sources

- Fisheries and shipping sectors
- Illegal dumping/littering

Pathways

- Stormwaters
- WWTPs (wastewater & sludge)
- Atmospheric deposition

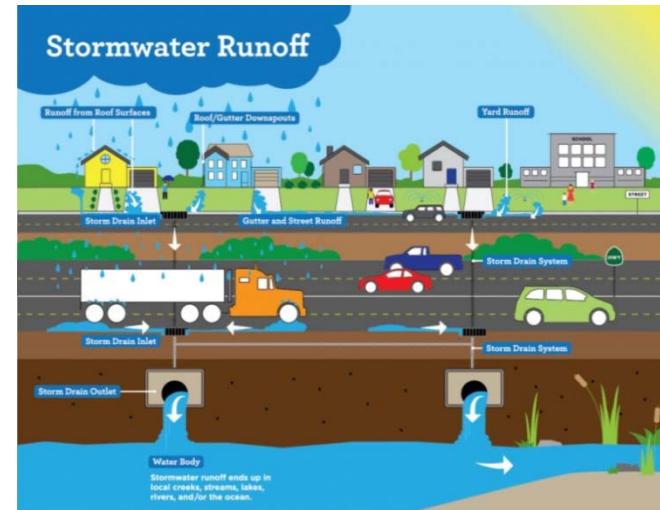


Stormwaters as pathways for microplastics to the aquatic environment

- **Stormwaters suggested as a significant pathway for MPs**

- Large amounts of untreated stormwaters are discharged into aquatic environments
- climate change, urbanization
- Role of stormwaters as a pathway of MPs to aquatic environments may be significant and grow in a future

- **Stormwater management can offer solutions to reduce the MP discharges into the environment**



Motivation

Sampling

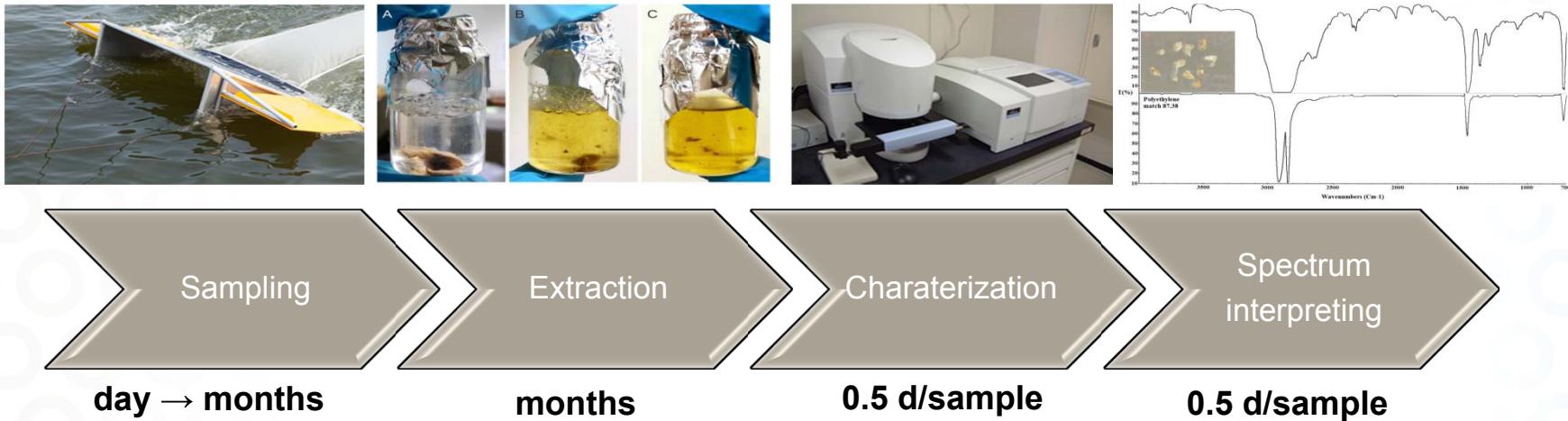
Analyses

Results

Outlook

Knowledge gaps

Methods for microplastic detection – how to find a needle in a haystack ?

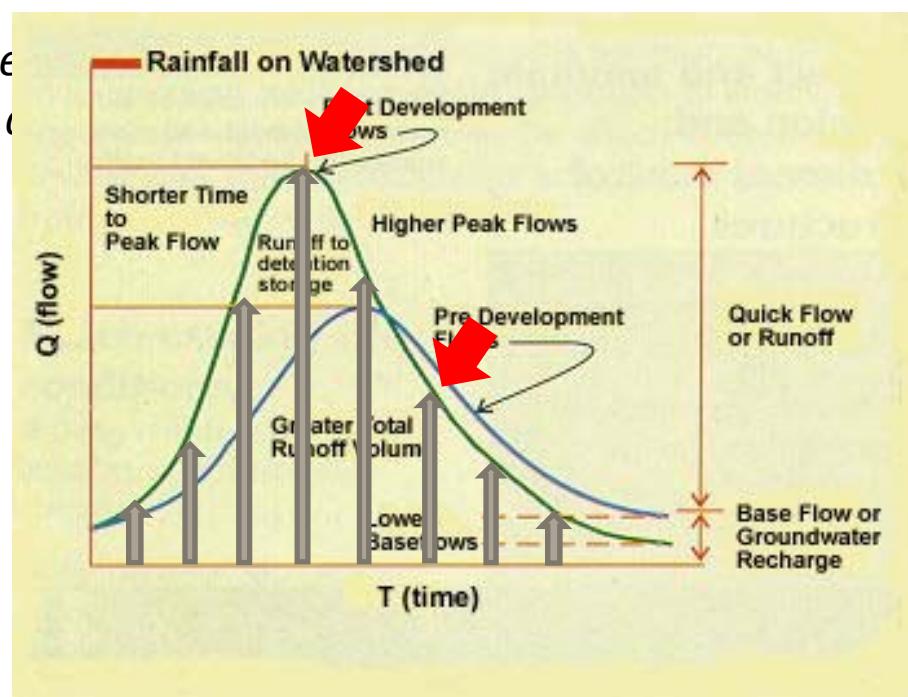


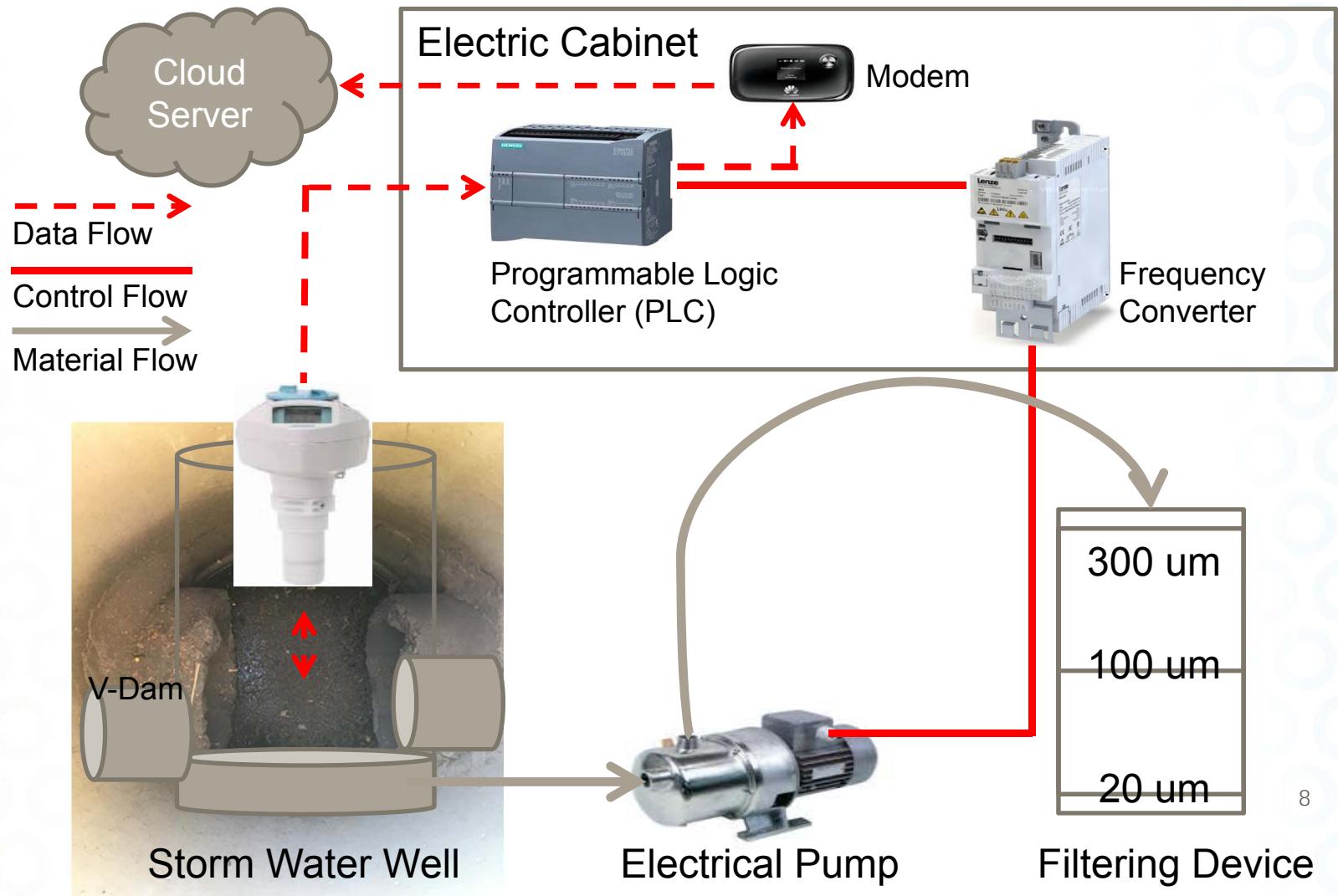
- currently neither sampling, extraction, nor characterization methods are standardized, making studies hardly comparable

Stormwaters as pathways for microplastics to the aquatic environment

- "Watershed activities can be clear"

*between human
not always*





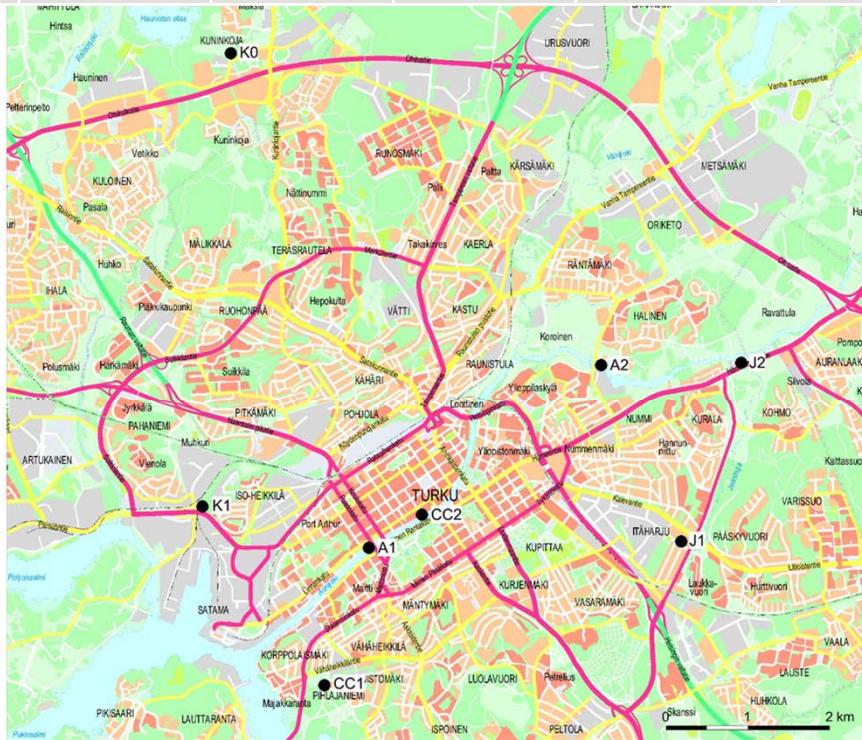
Hulevesien mikromuovit – esiselvitys Turun kaupunki

- Hulevesiä ovat kadulta, pihalta ja katoilta valuvat sadet ja sulamisvedet.
- Hulevedet johdetaan hulevesiviemäriin, josta ne ohjataan (käsittelemättömänä) vesistöihin
- Hulevedet irrottavat ja kuljettavat mukanaan epäpuhtauksia, kiintoainesta (myös roskia!) ja ravinteita
- Hulevesistä mikromuovien kauttakulkureittinä luonnon vesistöihin tiedetään hyvin vähän
- Löytyykö hulevesistä mikromuovia?

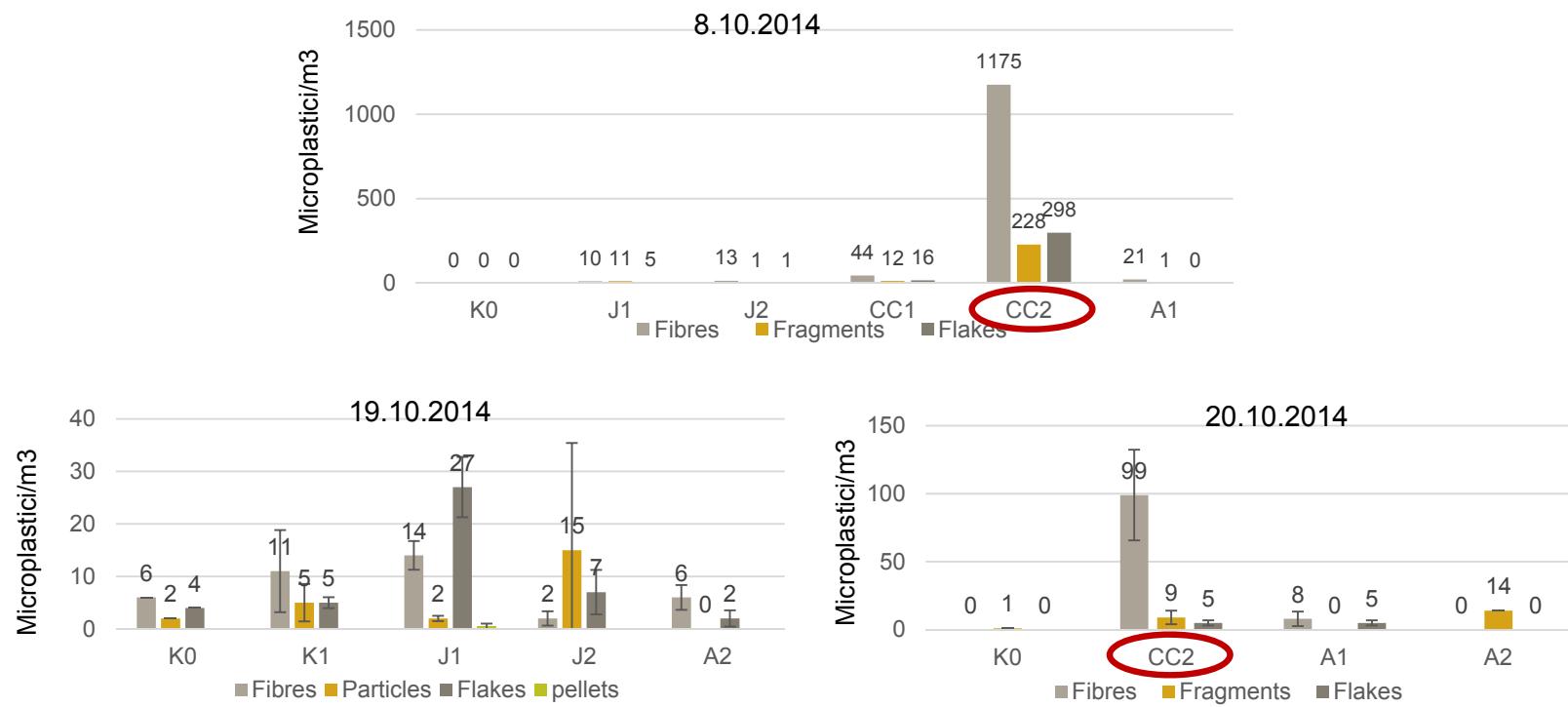


8 näytteenottopaikkaa

Näytteenottopaikka	Kuninkoja 0 (KO)	Kuninkoja 1 (K1)	Jaaninoja 1 (J1)	Jaaninoja 2 (J2)	City center 1 (CC1)	City center 2 (CC2)	Aura river 1 (A1)	Aura river 2 (A2)
Kuvaus	Referensi	Liikealue, asuinalue	Teollisuusalue	Teollisuus-, asuinalue	Keskusta, asuinalue	Keskusta, viemäri	Keskusta	Yläjuoksu



Mikromuovin määrä hulevesissä



- Stormwaters are pathways of microplastics to the aquatic environment
- The role of stormwaters as pathways is, however, practically unknown
- What are the factors affecting the amount of MPs in stormwaters?
- How to gain good reliable, good quality data?
(= how to sample representative samples from rain events?)

Motivation

- (Standardized) methods
- Estimations of MP discharges via stormwaters (mass/particle count?)
- Other pathways
 - municipal wastewater & sludge
 - industrial wastewaters
 - rivers
 - atmospheric input

Sampling

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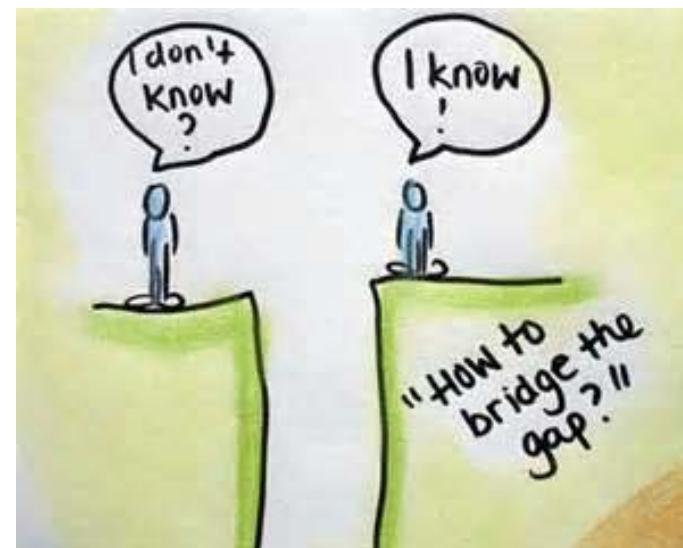


Photo: Chuck Carey

Thank you!

Partners in crime;

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- Sib-lab (University of Eastern Finland)
- Maj and Tor Nessling Foundation
- Academy of Finland

