# IoT&Data Management Infrastructure Global Alliance
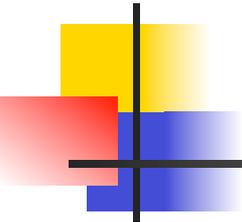
Jon Crowcroft
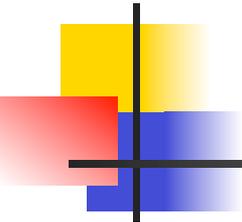
http://www.cl.cam.ac.uk/~jac22

http://www.turing.ac.uk

http://www.hatdex.org/
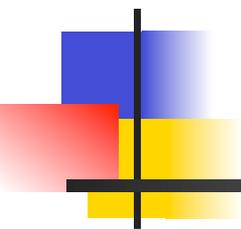
https://blog.docker.com/2016/05/docker-unikernels-open-source/

# 1 Warehouse -> 10,000 Rack Scale Systems

- Current IoT logs back to central cloud
- Doesn't scale for lack of locality reasons
  - Latency
  - Availability
  - Privacy
  - Energy
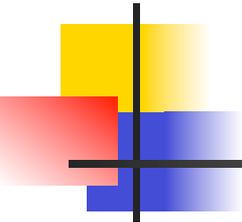  - Legality
  - >...Add yours here...<

# Alternative

- Rack scale system
  - Placed at every cell tower/pop
  - Serves ~5000-10,000 users
  - 1000 ARM core system*16
  - Can run 2000 mirageOS on 1 ARM now!
- Availability
  - Replicate (lazily/securely) to others
  - And to legacy central cloud
  - For fast failover/disaster recovery etc
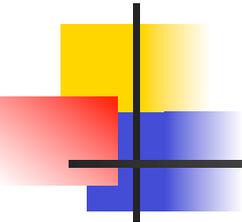
# Challenges #1

- Now need to run distributed analytics
  - London 10M people=> 1000 racks
  - Query processing over this feasible
  - Done by network managers already
  - Magpie: http://mor1.github.io/publications/pdf/osdi04-magpie.pdf
  - Constellation: http://mor1.github.io/publications/pdf/msrtr08-67-constellation.pdf

# Challenges #2

- Distributed Differential Privacy
  - Weak Homomorphic Crypto
  - Reverse path targeted notification/advert/ recommendation
- Privacy preserving profiles
  - Fair ML/Classifier algorithms
  - https://arxiv.org/abs/1507.05259v4