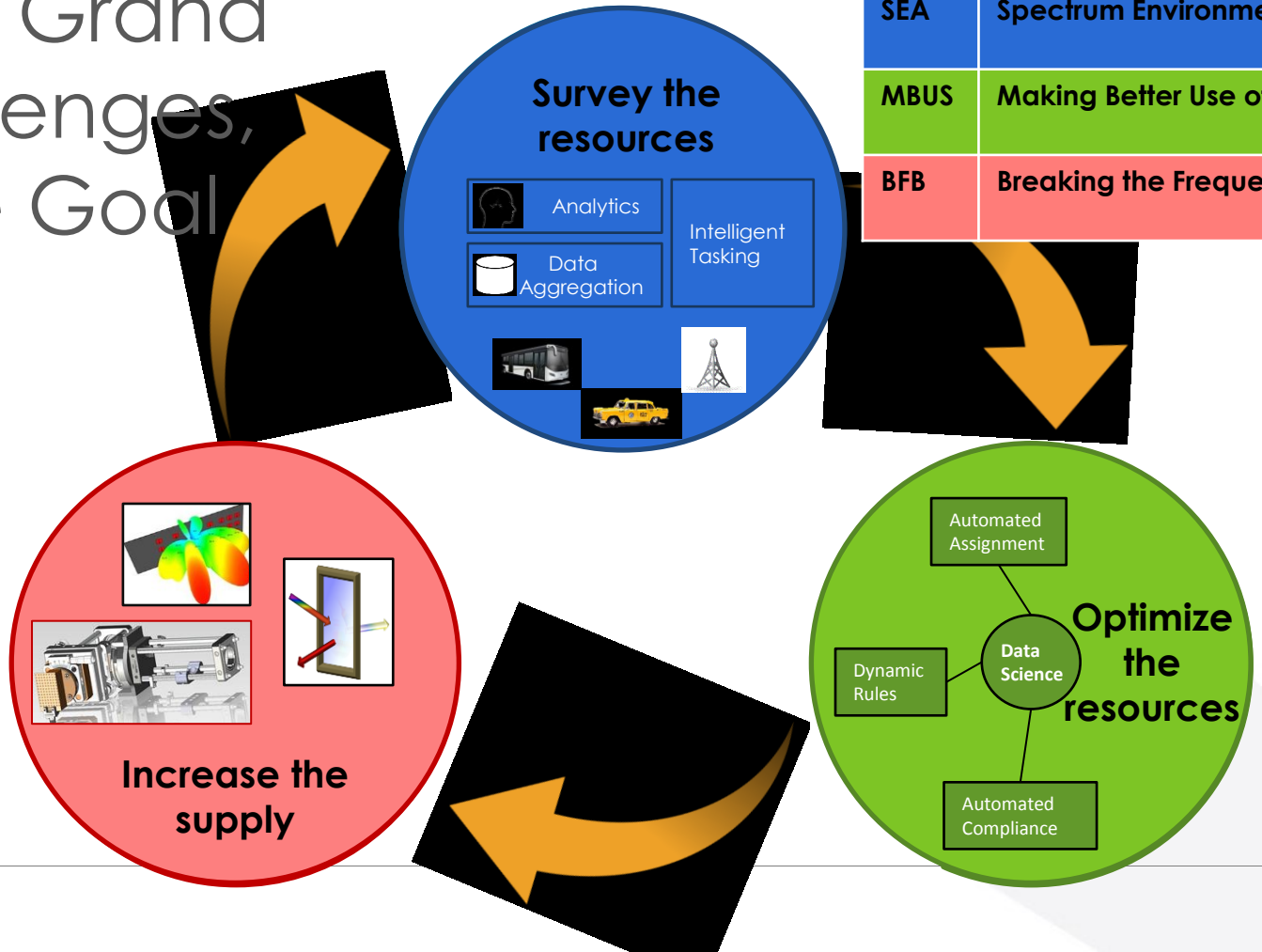
"What is Possible" and "What Works"

Marc Levesque
ISART 2018

Three Grand Challenges, One Goal

SEA	Spectrum Environment Awareness
MBUS	Making Better Use of Spectrum
BFB	Breaking the Frequency Barrier



Crowdsourcing and Sensors

3rd Party Internet of Things Sensors

Crowdsourcing

Mobile Sensing

Fixed Sensing

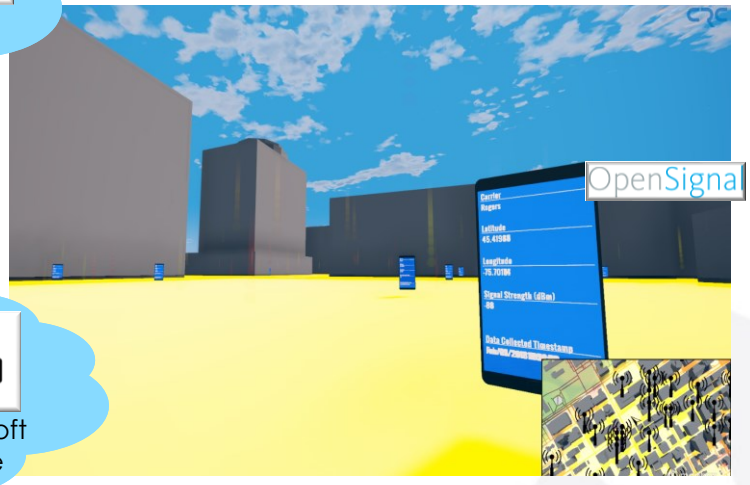
3rd Party Cloud Services

eWhere

OpenSignal

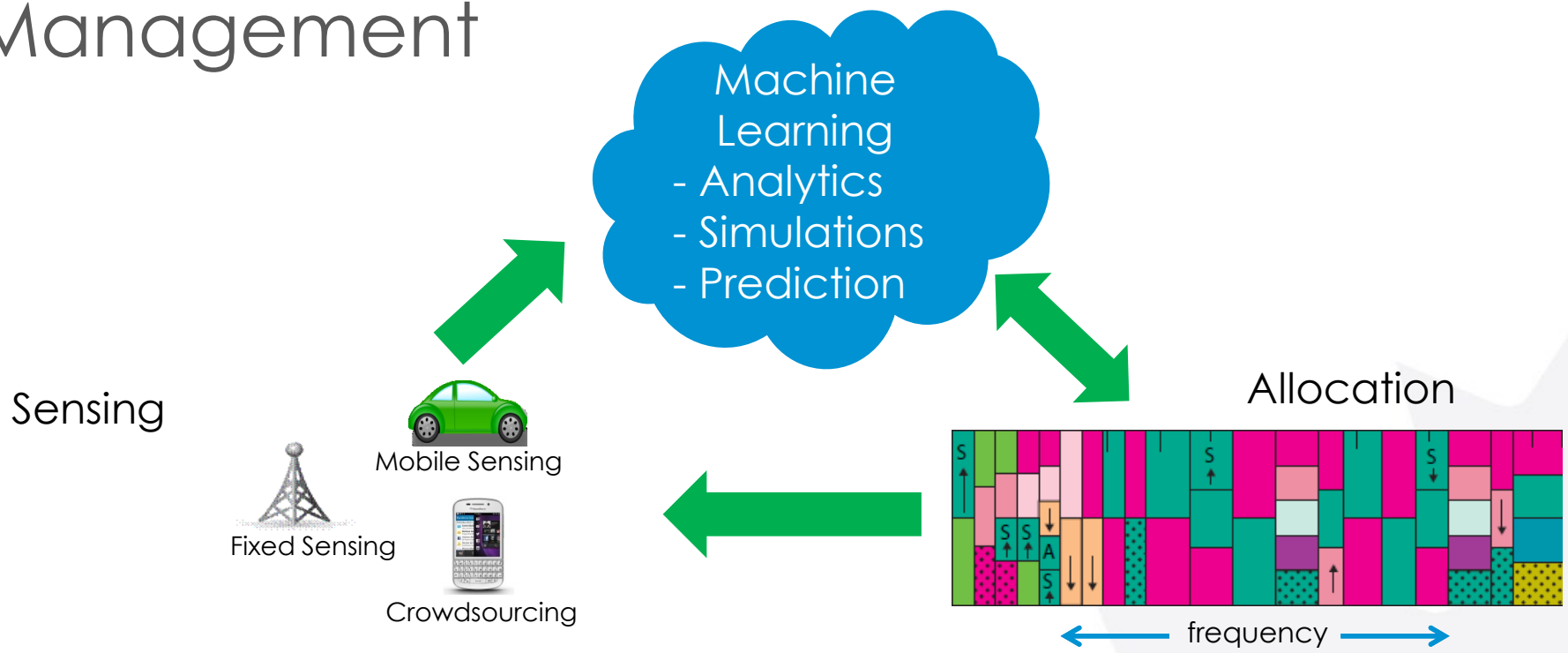
Big Data Analytics
Machine Learning
Storage

Microsoft Azure



diverse and cost-effective data collection involving Canadians – for Canadians

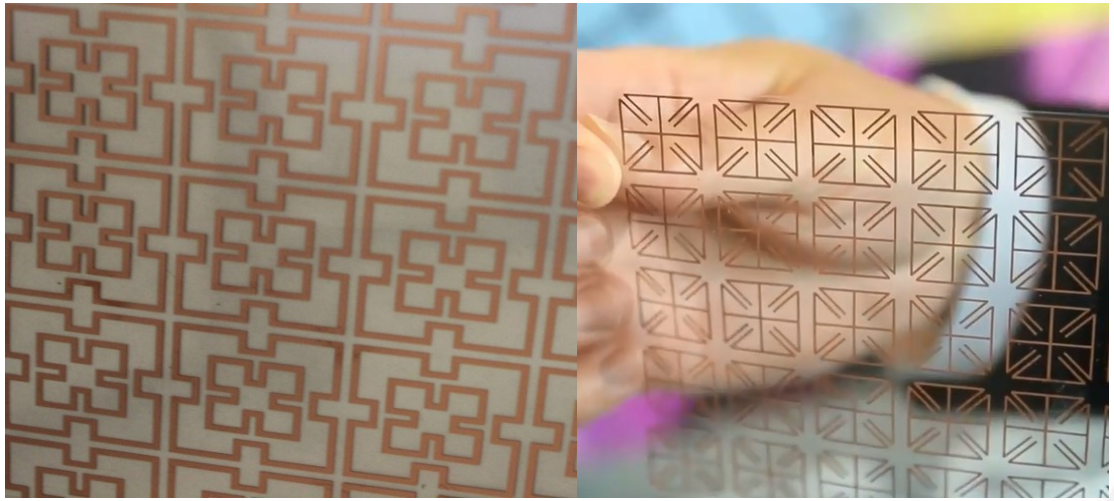
Machine Learning for Spectrum Management



towards dynamic spectrum allocation

Engineering the Environment

To enhance and control wireless coverage



National Research Council Canada
Conseil national de recherches Canada

GGI SOLUTIONS

"going where no wave has gone before"

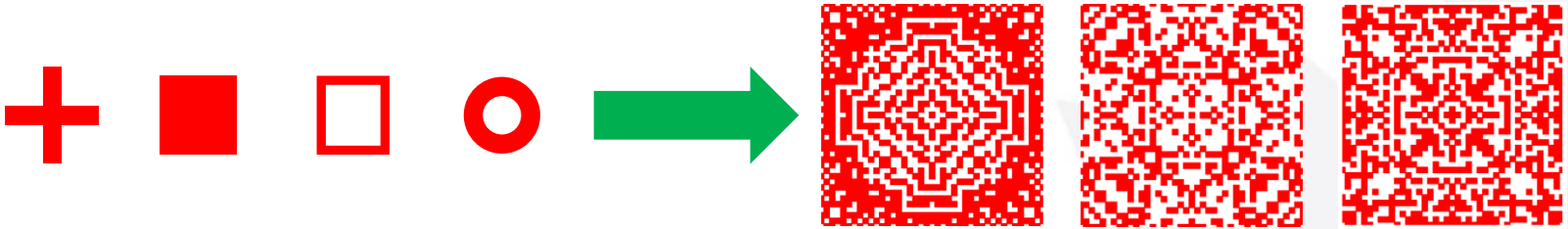
Cloud Super Computing

- For research and design of engineered surfaces
- Automate using supercomputing to innovate faster and scale

Computer-generated engineered surface designs

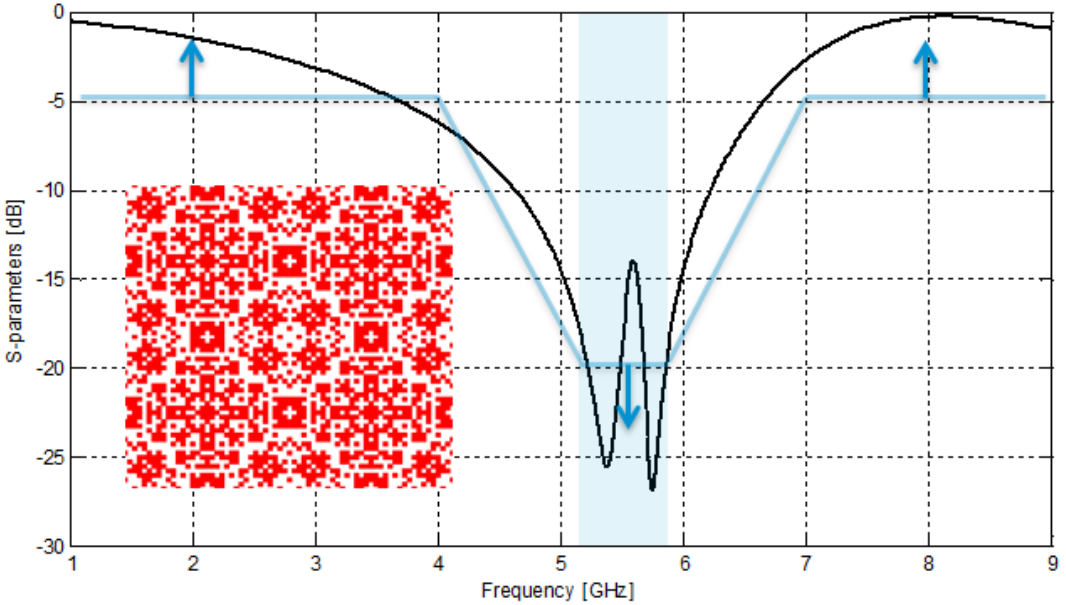
- Pixelized approach
- 10^{70} possible designs
- Atoms in the Universe: ~ 10^{80}

from: **to:**

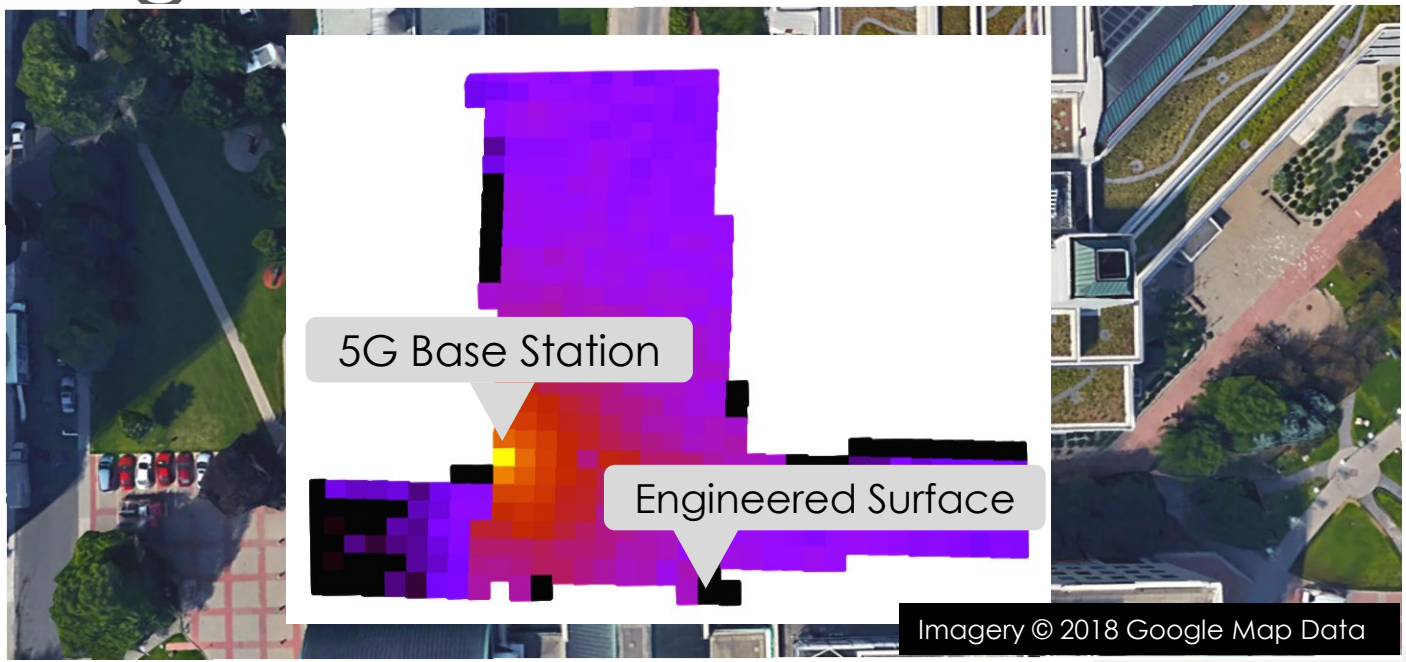


faster innovation: from 1 design per year to 5 per day

Video: Automating Surface design with Cloud Super Computing



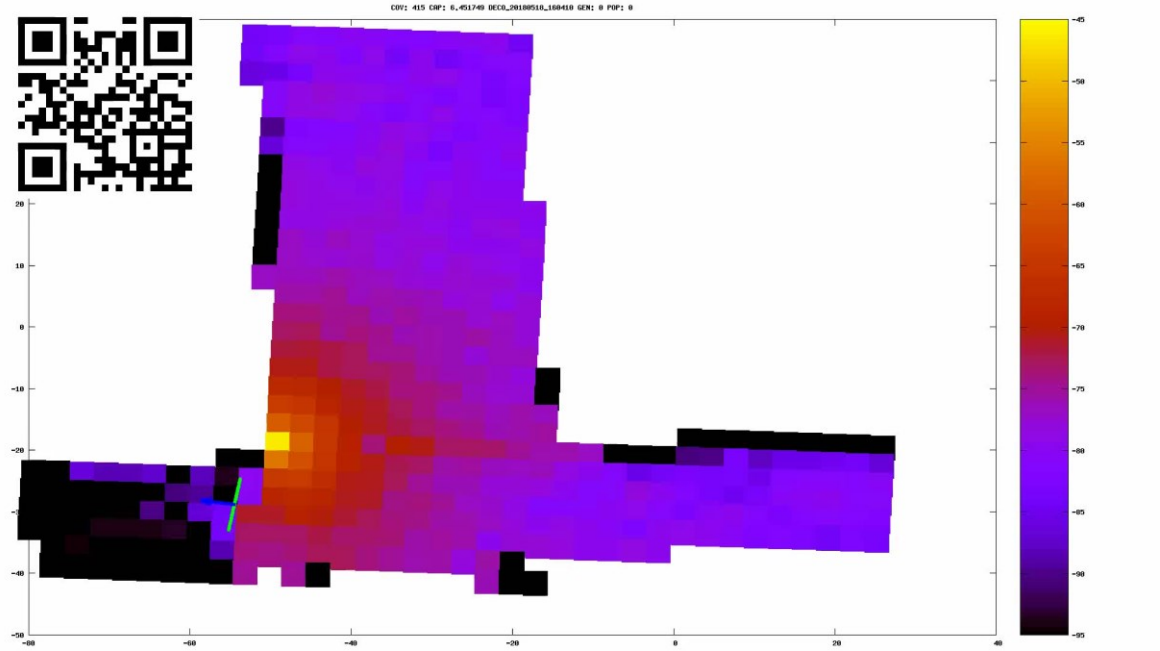
AI Engineered Surface Placement



Weak — Strong

for large scale urban deployment

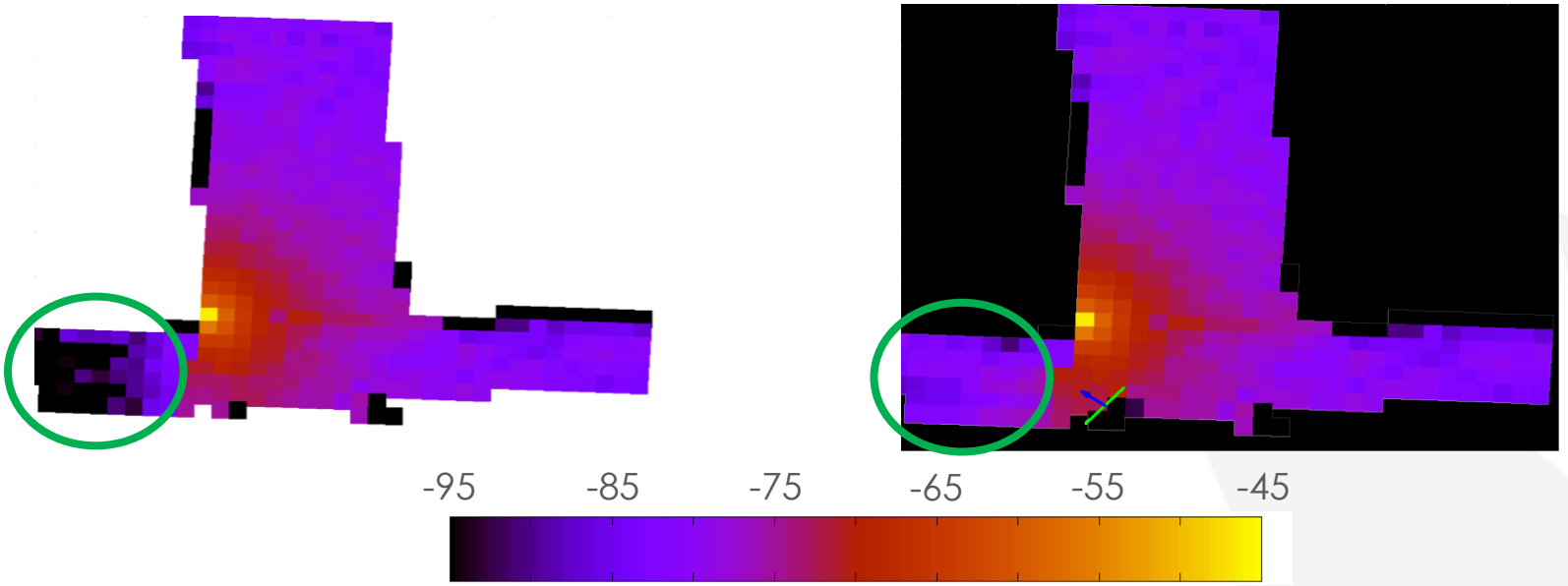
Video: AI Surface Placement



Enhanced Coverage

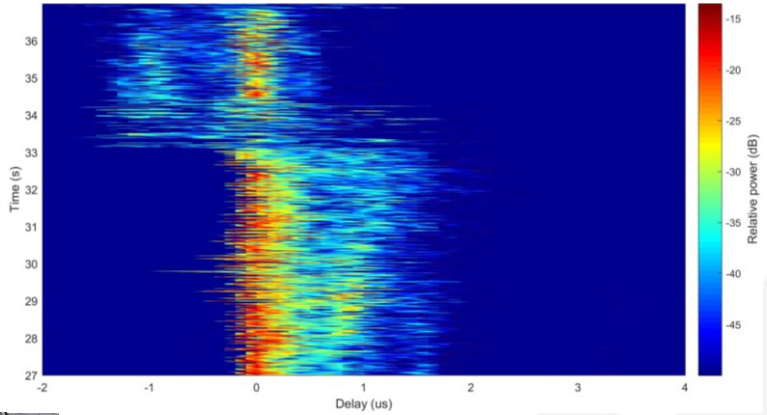
No Engineered Surface

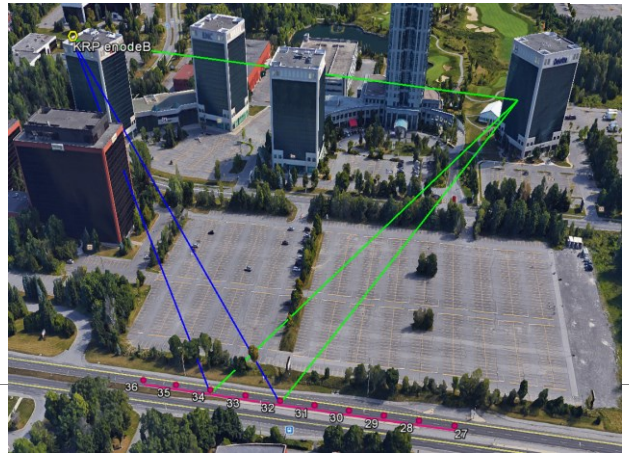
With Engineered Surface



Characterizing the Environment

Can large numbers of lower-precision measurements taken across time and space yield meaningful information about radio propagation in a prescribed geographical area?





Larger-Scale Mapping

Thank You!