Fire weather & Smart forestry

Nokia challenge:
5G IoT light poles for Smart Cities

Abhishek Dandekar & Jaakko Laiho @ IoThon 2019

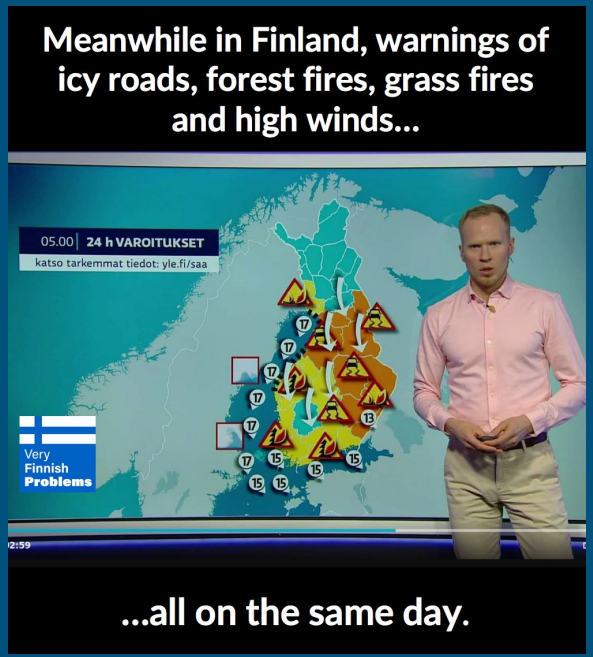
Perspective: Ljusdal City, 2018

Natural cause: Lightning strike & prolonged drought

10 000 hectares, ~25 buildings affected [1]

Prediction: forecasts are not *hyperlocal*
Detection: lookout towers *ineffective*
Suppression: controlling spread *difficult*

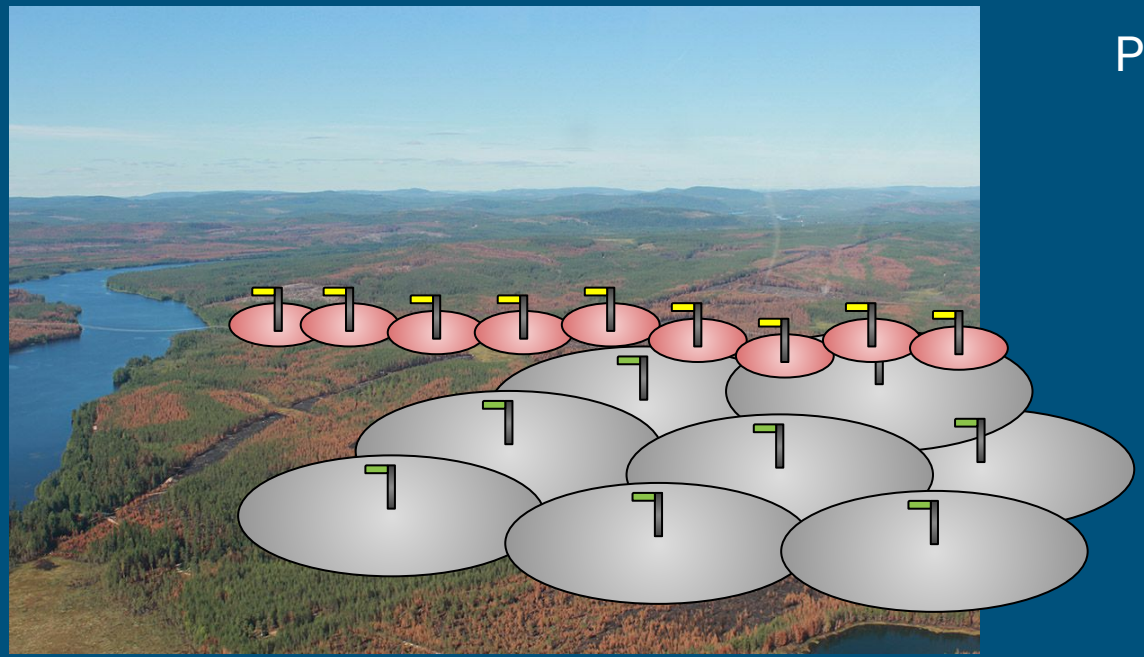
How are forest fires predicted & detected now



Weather forecast from 4.5.2019

Typical watch tower setup

Proposal: LuxTurrim5G & µMEC network as gateway to in-forest weather station nodes



Prototype setup:

- 5G IoT device: Arduino MKR NB 1500 [2]
- Air quality sensor: Bosch BME680 [3]
- Storage: InfluxDB [4]
- Information service: Telegram chat bot @FireWeatherBot

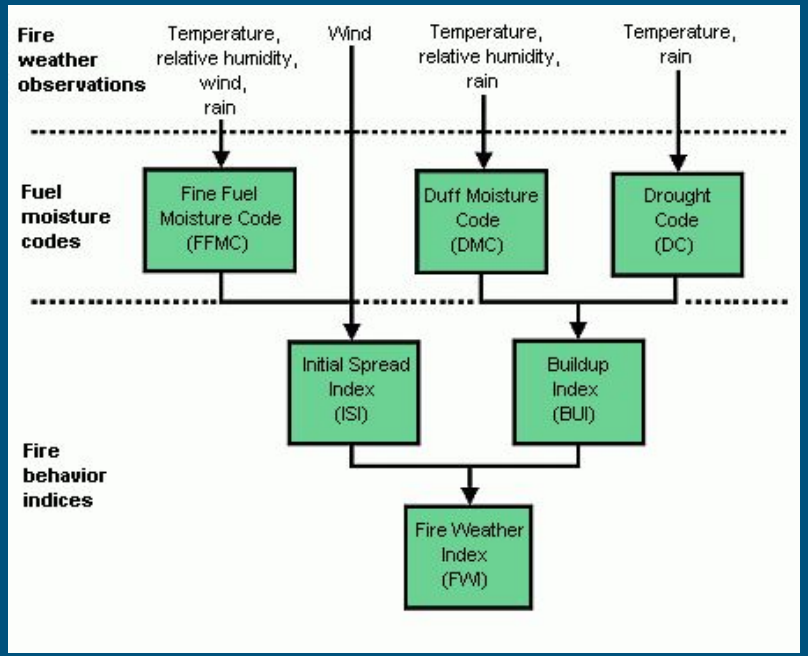
Accurate Predictions: Micro-weather sample algorithm

Temperature: Heat can trigger spontaneous combustion

Relative Humidity: Long drought period increases forest fire risk index

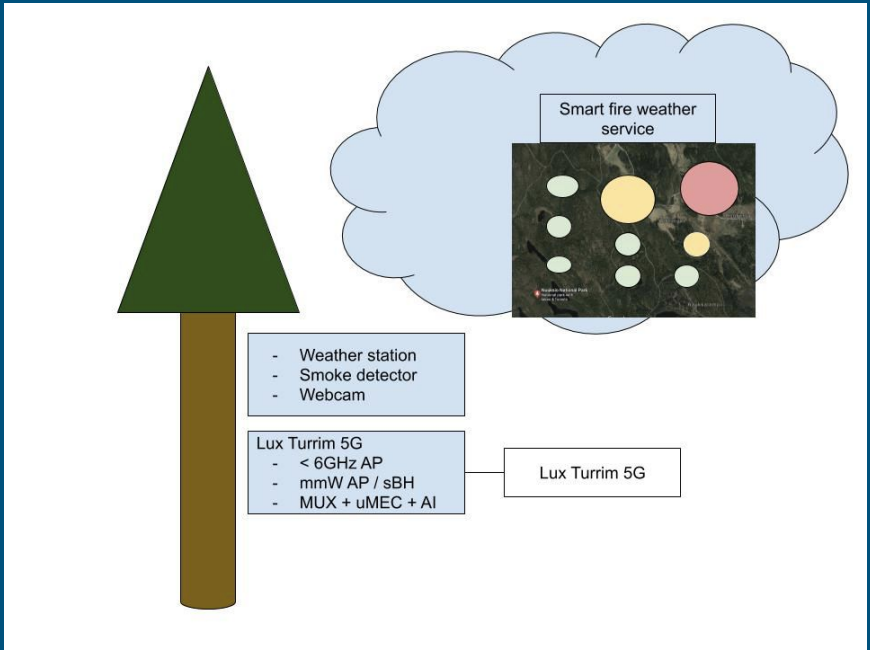
Wind Speed: Increases fire spread rate

Rain & Precipitation: Reduces fuel by soaking the soil



Canadian Forest Fire Weather Index (FWI) System [5]	
Risk	**Index**
Very Low	0-5
Low	5-10
Medium	10-20
High	20-30
Very High	>30

Product Concept & Features



Concept art

- Fire Prediction
- Fire Detection
- Fire spread Monitoring
- 5G connectivity in wilderness
- Cloud Service: Localised FWI Heatmap

- Tree density count
- Wood mass estimate
- Forest ground health

Value in society

Private forest owners:

- Value: €10k / hectare of average forest in Central Finland
- Cost: €250 + €1 / hectare forest evaluation currently [8]

Public actors: California 2018 wildfires: [9]

- $400bn estimated total economic loss
- 68mil tonnes Co2 released into atmosphere

Access providers

- First-to-market: Financial argument for providing 5G coverage in ‘wilderness’

Firefighters

- Real-time fire spread monitoring
- Better fire fighting strategies
- Better resource placement
- Faster response -> cheaper response: suppression cost increases by 25000% if fire grows large [6]

5G IoT is a better solution

Allow us to demonstrate

Backup slides

Lean Canvas

Designed for:

Designed by:

On: Day Month Year

Iteration: No.

Problem
Top 3 problems

Forecasts NOT hyperlocal

Current infra e.g watch towers ineffective

Fire Detection is hard

Existing Alternatives

None

Solution
Top 3 features

Forest fire prediction with forest weather index

Forest Fire detection

Growth monitoring

Key metrics
Key activities you measure

Number of active sensors

Number of detected fires

Unique Value Proposition
Single, clear, compelling messages that states why you are different and worth buying

Hyperlocal Fire weather detection with real time data updates

High-Level Concept

IoT weather station for forests!

Unfair Advantage
Can't be easily copied or bought

Partnership with Nokia LuxTurrim5G

Channels
Path to customers

Adverts

Customer Segments
Target customers

Forest owners

Metsähallitus

Skogsstyrelsen

Early Adopters

Individual Forest owners

Insurance companies

Cost Structure
Customer acquisition costs,
Distribution costs,
Hosting,
People, etc

Customer acquisition

Deployment costs

Partnership costs

Revenue Streams
Revenue model,
Life time value,
Revenue,
Gross margin

Subscription model for individual customers

B2B revenue e.g from Metsähallitus, Nordea, pohjola

Wildfire detection: The faster, the better

Early detection is critical:

- Cost of suppression increases by ratio of 250:1 if wildfire manages to becomes large! [6]

No smoke without fire: Real-time smoke detection with MQ2 sensor [7]

- Wildfire detection fast, cheap, low power

[Optional] 360 webcam can be toggled to provide:

- Critical viewing locations during wildfires

Forest Development Monitoring

Forest fires: High impact, low frequency. What value can sensor system provide during ‘downtime’?

Growth monitoring for benefit of forest owner

- **Wood mass** analysis with machine vision
- **Forest ground** vegetation
- Monetization:

Is this truly a state-of-the-art solution?

References

[1]https://www.ljusdal.se/samhallegator/krisochsakerhet/informationombranderna2018/aboutthefiresinenglish.4.6cbbb702164e16264514c295.html
[2]https://store.arduino.cc/arduino-mkr-nb-1500
[3]https://www.bosch-sensortec.com/bst/products/all_products/bme680
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[6]https://www.accuweather.com/en/weather-news/accuweather-predicts-2018-wildfires-will-cost-california-total-economic-losses-of-400-billion/70006691
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