SEPA
Scottish Environment Protection Agency

Integrating sensor technologies with traditional environmental monitoring approaches

@sepasensornet

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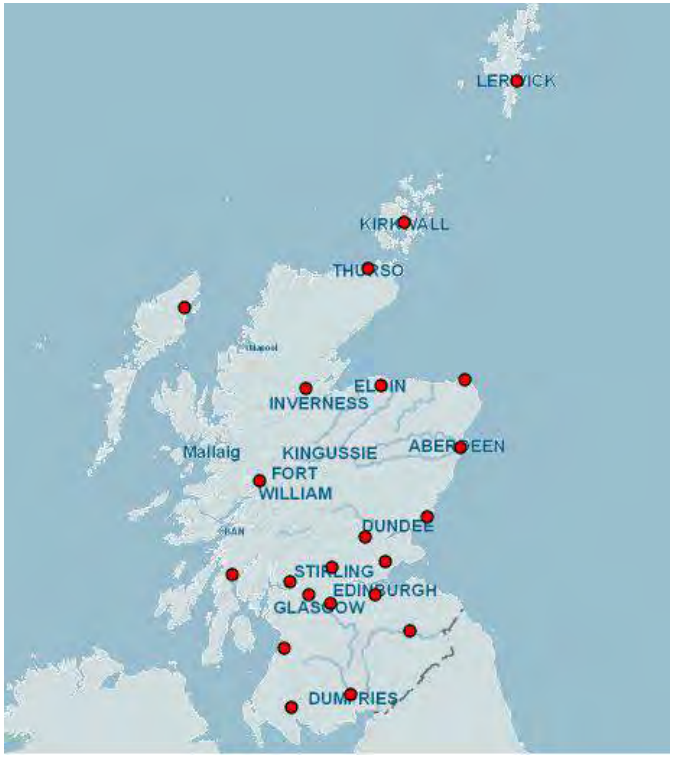
Scottish Environment Protection Agency

Air
Water
Land

- 1300 staff
- 22 offices
- 80 000 km^2 of land
- 24 800 km of monitored rivers



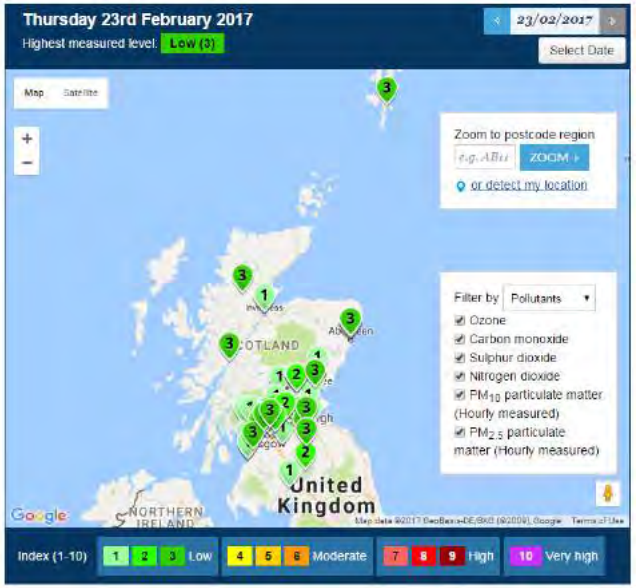
- 8700 Ecology/chemistry samples for 2016
  - Approx £6million
- SEPA is responsible for the national flood warning system but:

  <u>Only</u> 519 gauging stations

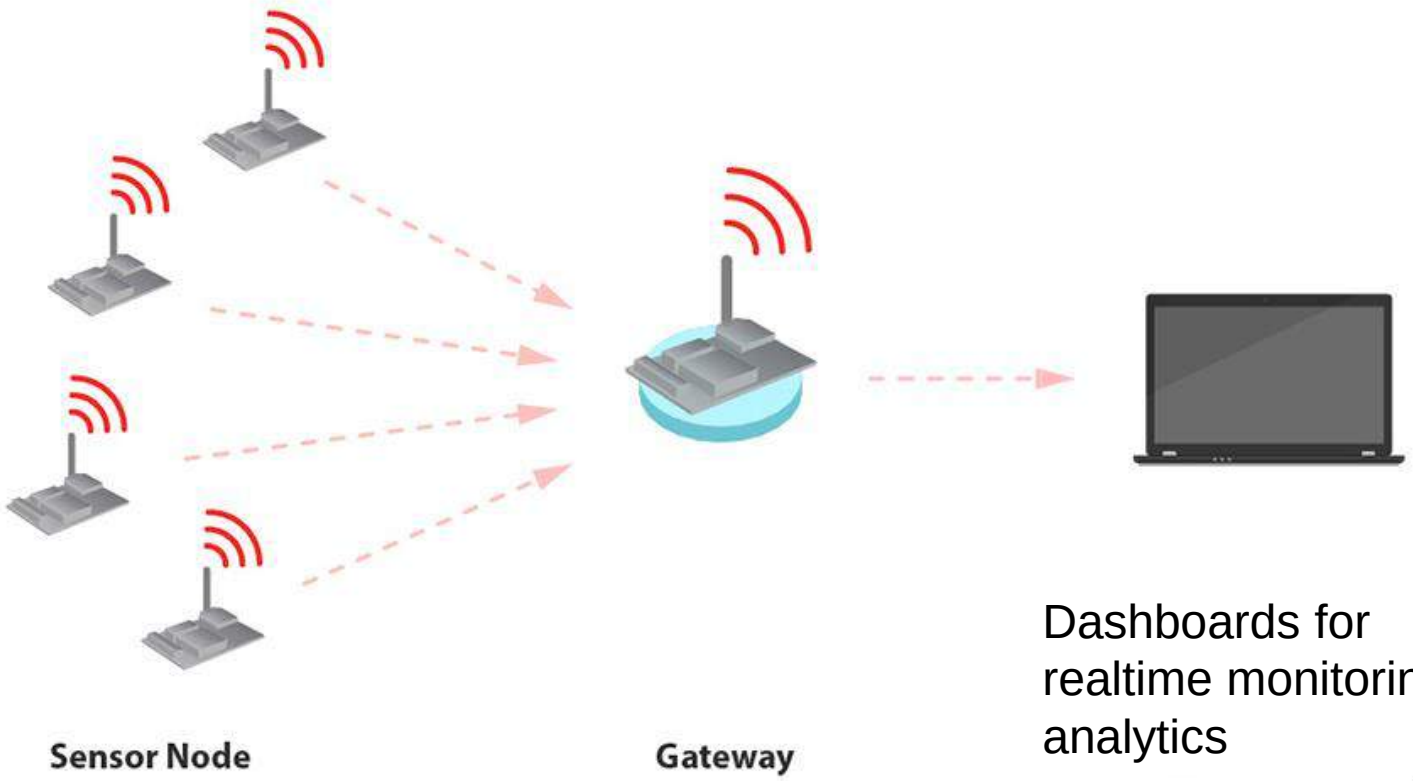
  Approx £250k each

Air quality monitoring

Latest pollution map



The vision…….LoRa (Long Range)



Dashboards for realtime monitoring / analytics

- Meteorological (temp, humidity, pressure, rainfall, wind, sunshine, UV
- Chemical – pH, conductivity, Nitrate, Dissolved O2, Ca, turbidity, phosphorous
- Atmospheric – Co, Co2, No2, O3, CH4
- Soil moisture
- Proximity/levels
- On/off

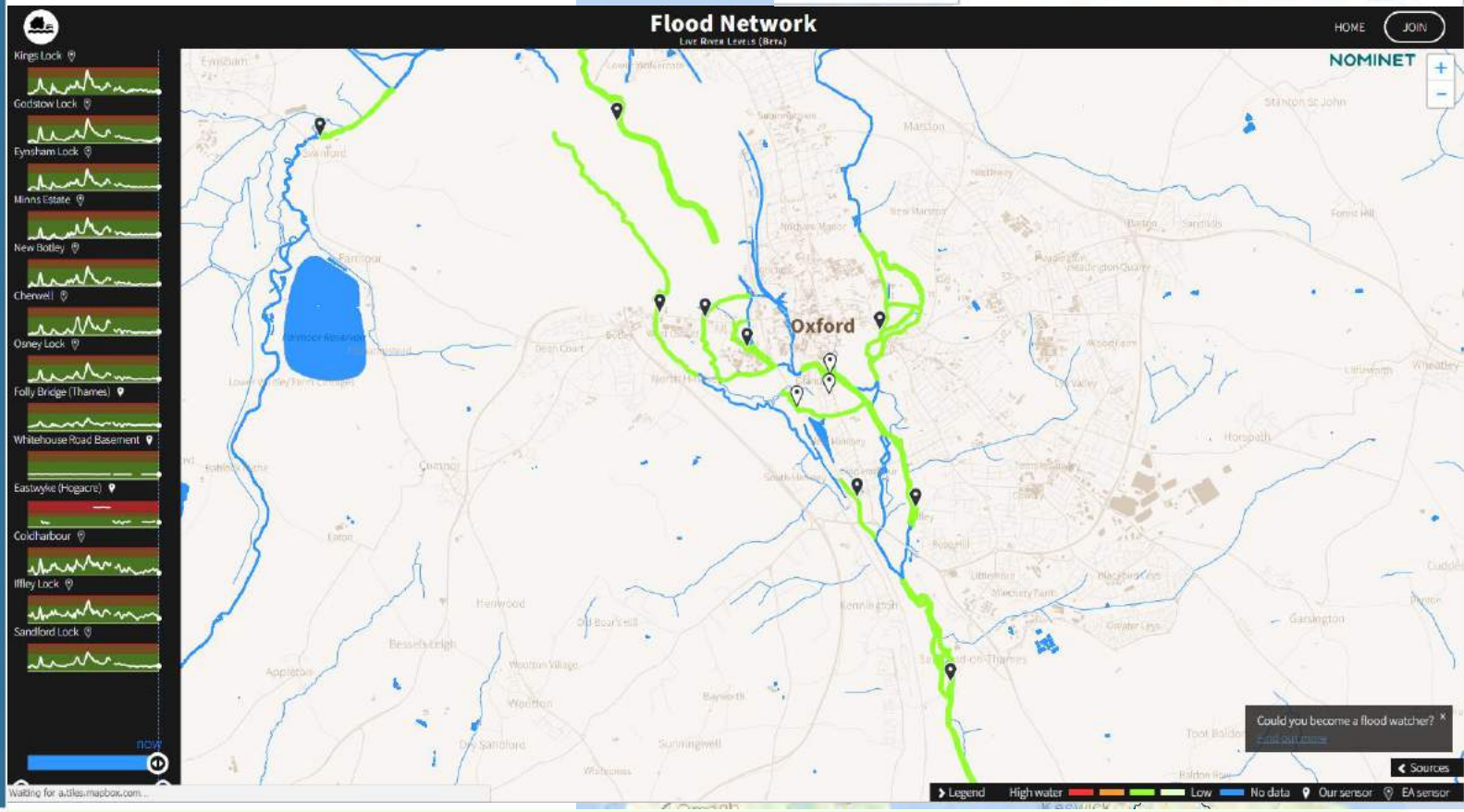
The vision……

The vision.....

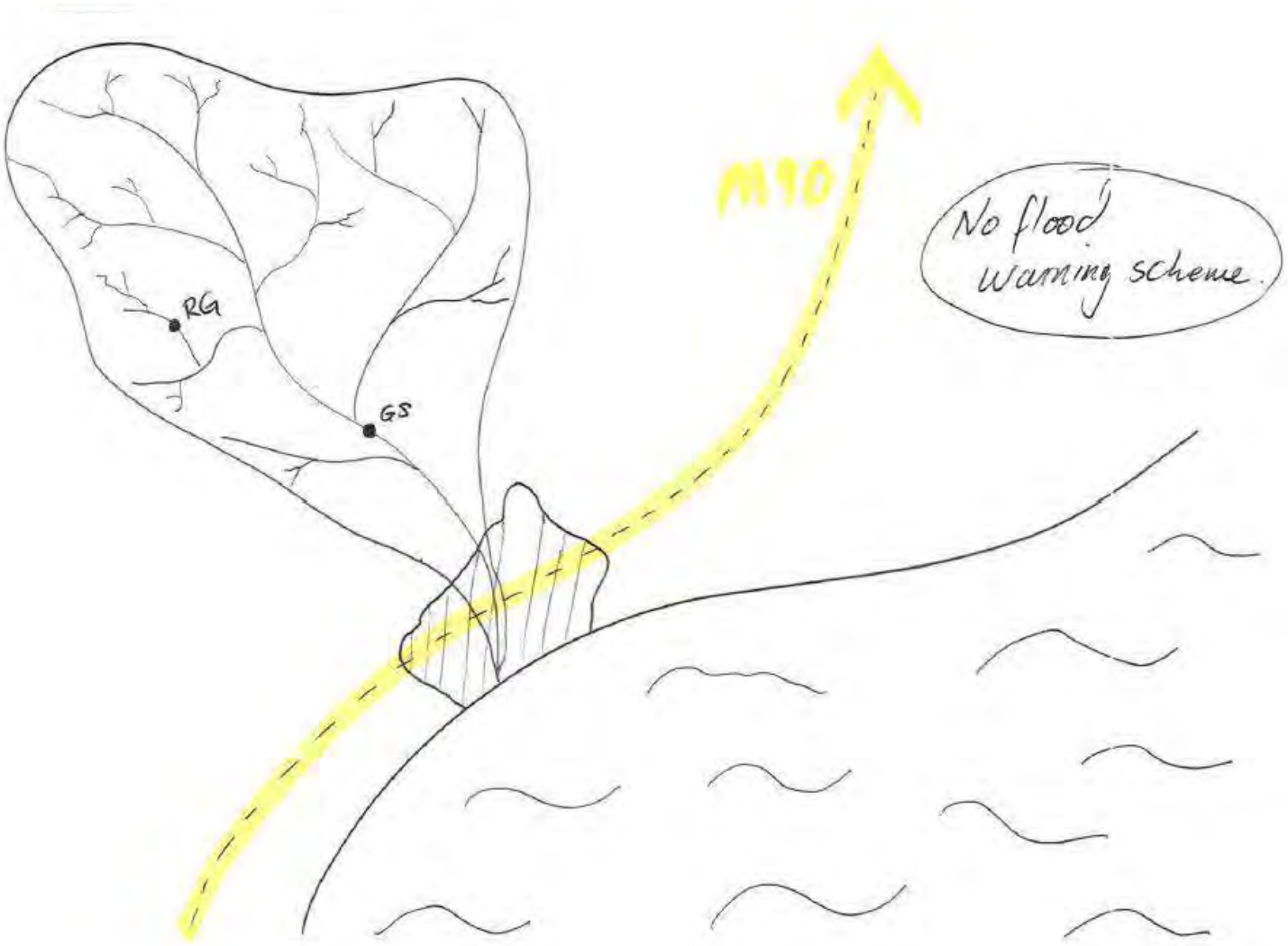
Establish a national net

LoRaWAN Gateways or

Realtime sensor dashboards



Test case 1 – Flood early warning



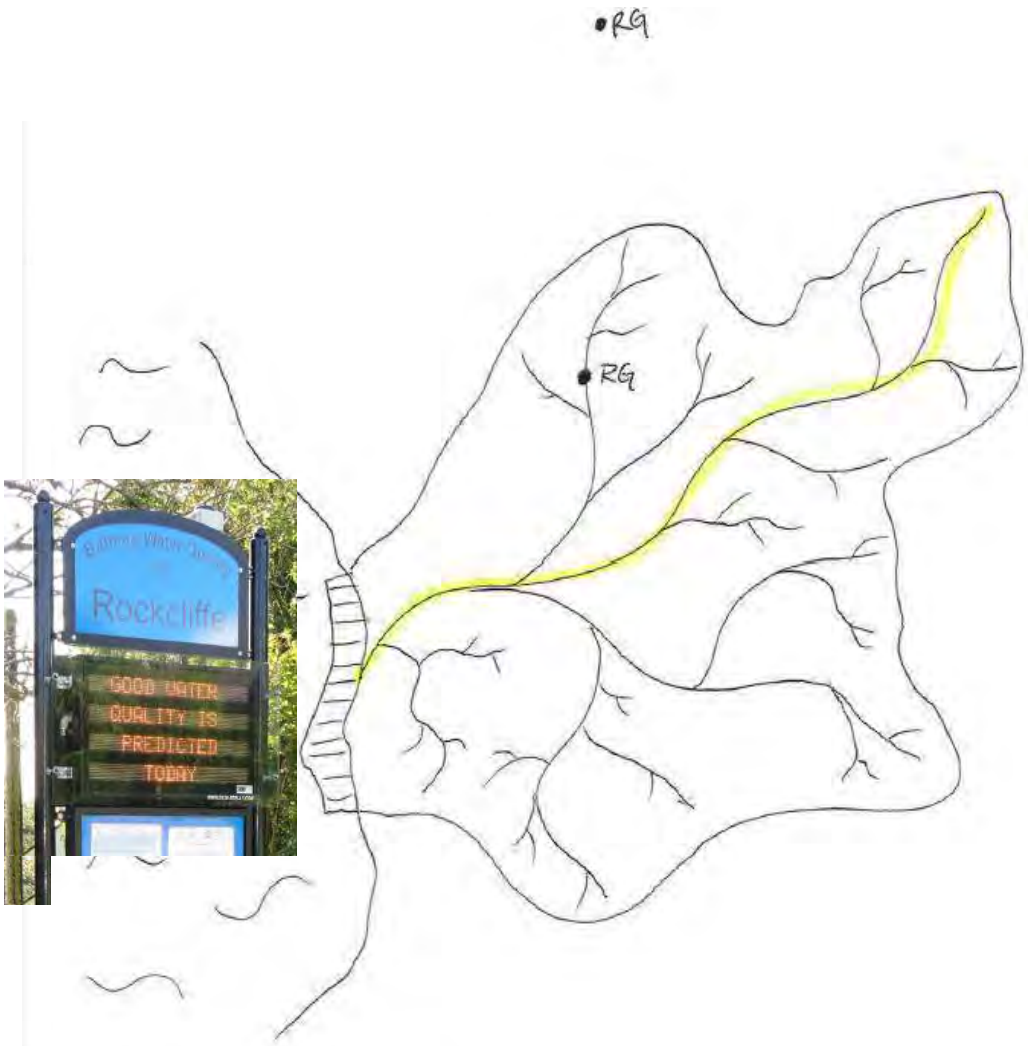
Challenges

- Flood early warning relies on realtime catchment-wide sensing of:
  - Rainfall
  - River levels
  - Current equipment too expensive for nationwide coverage

- How can sensors help?
  - Move to cheap autonomous sensor technology
  - Improved spatial coverage
  - Improved sampling frequency

- Benefits
  - Earlier warning of approaching flood
  - Action taken sooner on the ground – emergency services etc.
  - More time to evacuate

Test case 2 – bathing water quality models



Challenges

- Bathing water quality is driven by faecal indicator organisms (FIOs)
  - Lab analysis – too slow and expensive for realtime prognoses
  - Current models built on traditional surrogates e.g. rainfall etc etc.

- How can sensor data help?
  - Turbidity as proxy for FIOs
  - Realtime UV sensing as die-off indicator
  - What can we infer about FIOs from sensor data?

- Benefits
  - Improved prediction of bathing water quality

What SEPA would like out of this….

- Design/optimisation of sensor network
  - Positioning of sensors
  - Frequency of sampling
  - Performance of network
- Analysis/data handling
  - Machine learning
  - Automated processing
  - Alerts
- Implementation of solutions
  - Cloud-based data storage/analysis/tools
  - Sharing code/compatibility

Reliable results for decision-making

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