



Weather Forecast Improvements at the UK Met Office: Responding to the Big Data Challenge

Vicky Pope

Input from Rich Carne, Alex Longden, Derrick Ryall

January 2017

Weather Information Value Chain

Monitor
&
Observe

Model &
Forecast

Interpret

Produce

Decision
making

Economic
Value



Monitor
&
Observe

Model &
Forecast

Model and observations improvements

March 2016

November
2016

Spring 2017

2017

Autumn 2017

2018-19

Better use of
observations

Biggest
improvement
in a decade

Bigger UK
domain

Extend runs
to 5 days

Improved
forecasts of
showers

Global
model
resolution
increase to
10km

New UK
hourly
nowcasts

New radar
network

Precipitation
type
Doppler
winds
Increased
resolution

Run UK
ensembles to
5 days

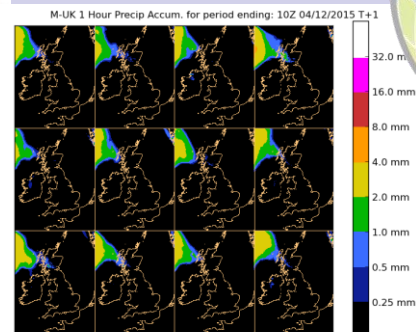
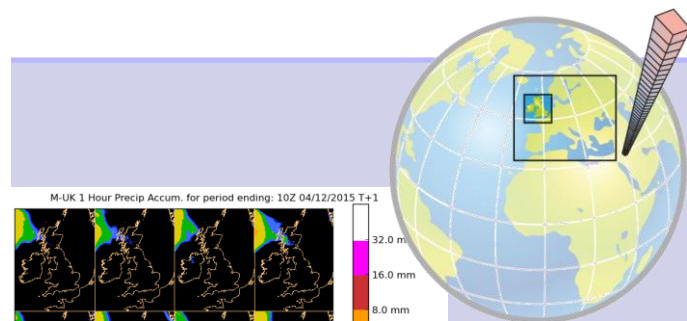
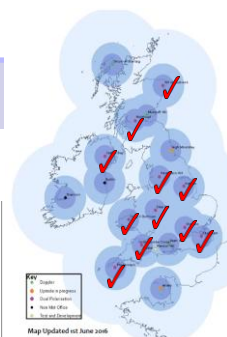
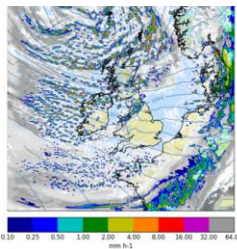
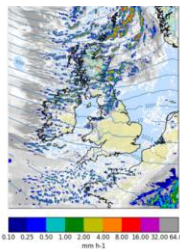
Increased
vertical
resolution

Couple
atmosphere
and ocean

Better
convection



Improved showers



1.2 Pflops

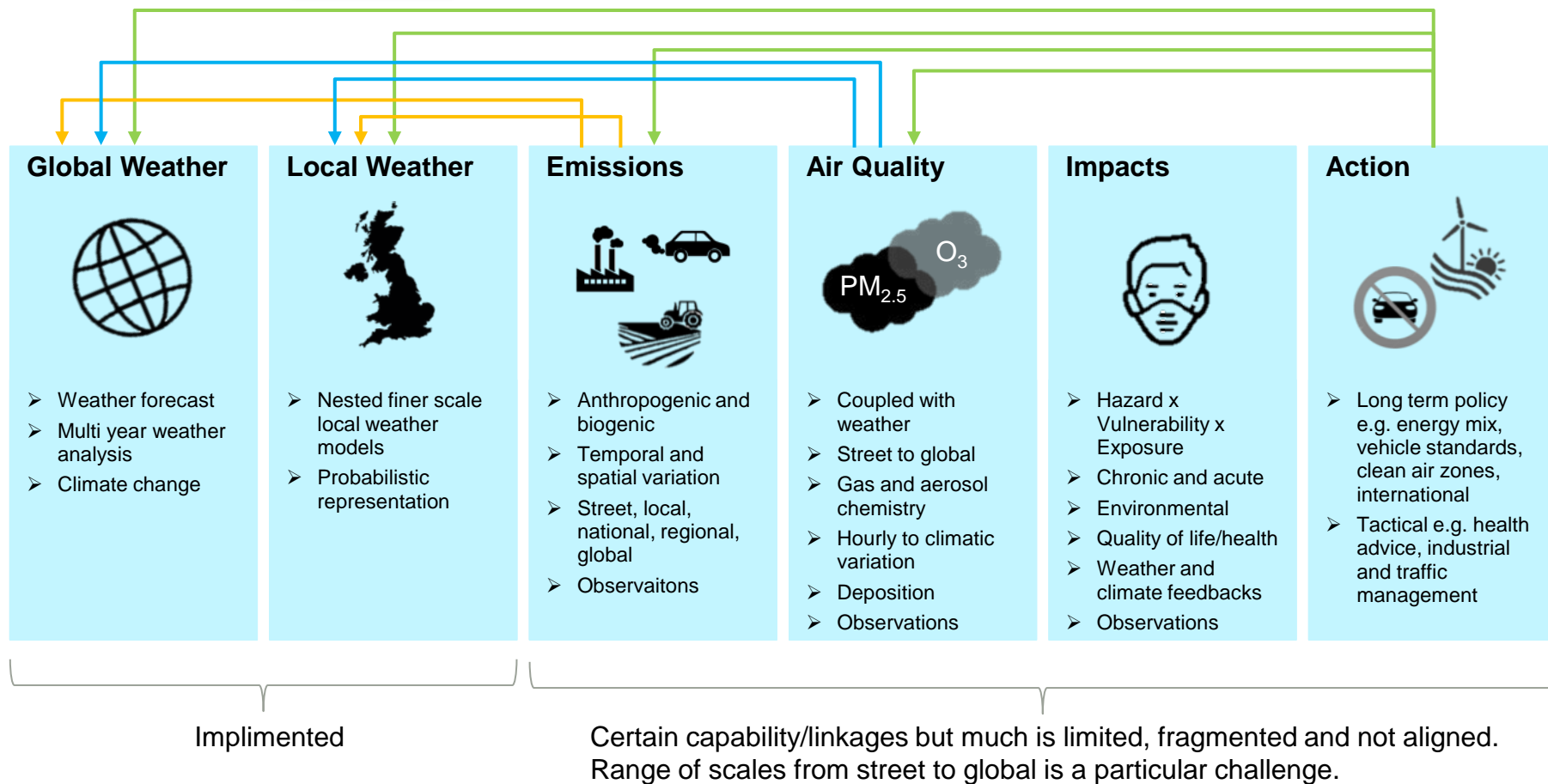
8 Pflops

16 Pflops

Integrated Approach to Air Quality Risk:

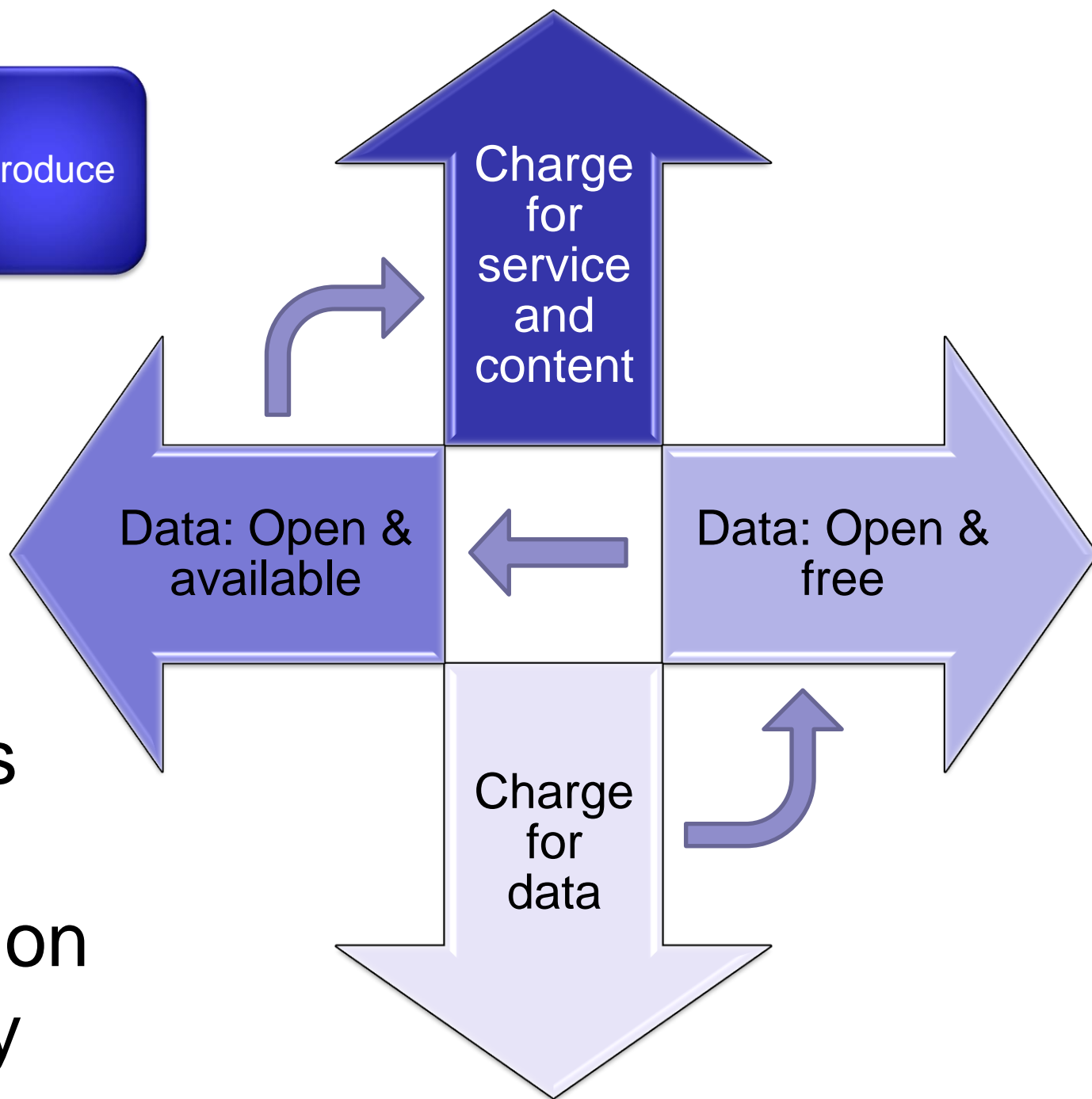
Joining models, data and policy

Feedbacks



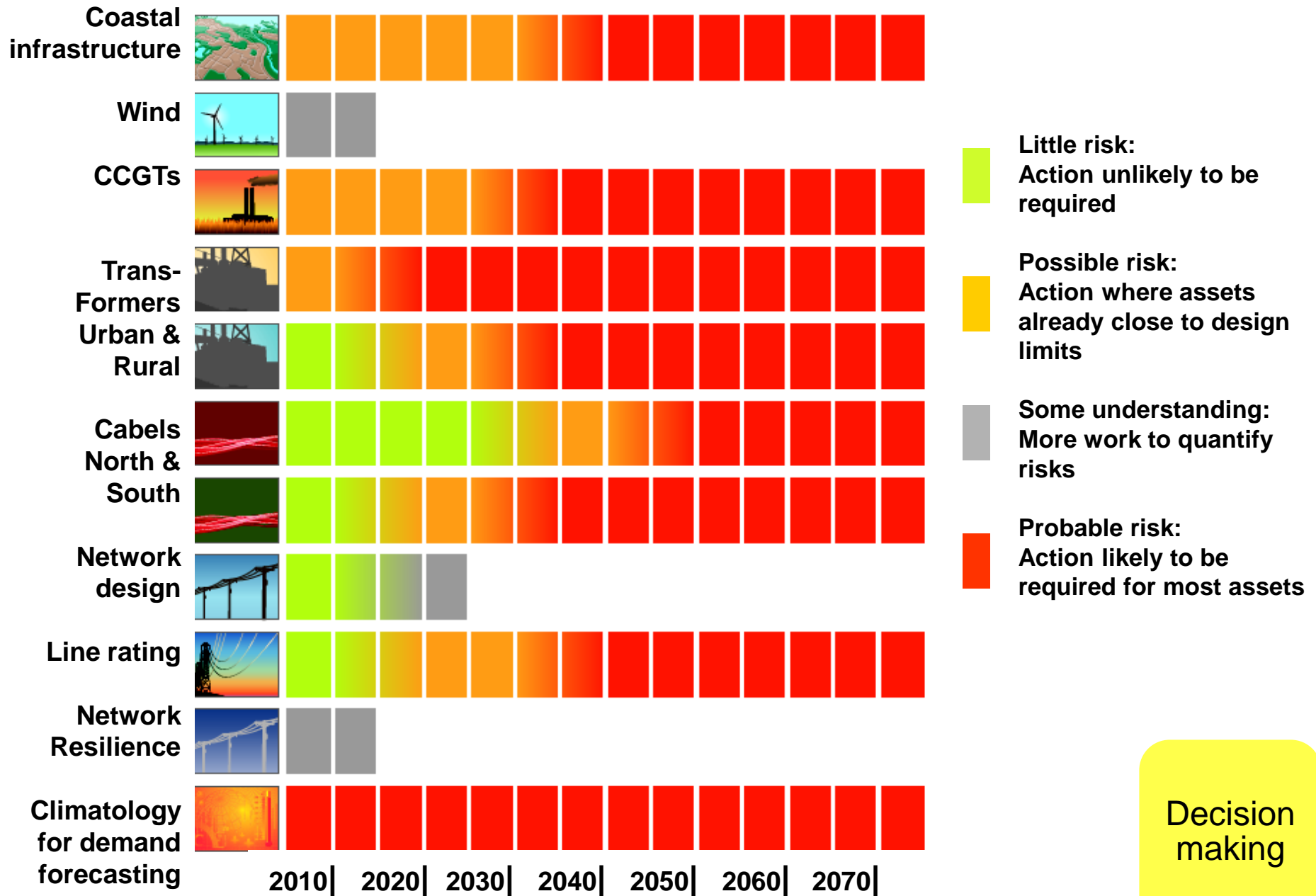
Should be set in a probabilistic framework.

Produce



Changes
in the
information
economy

Climate change adaptation guide for Energy Phase 2 project



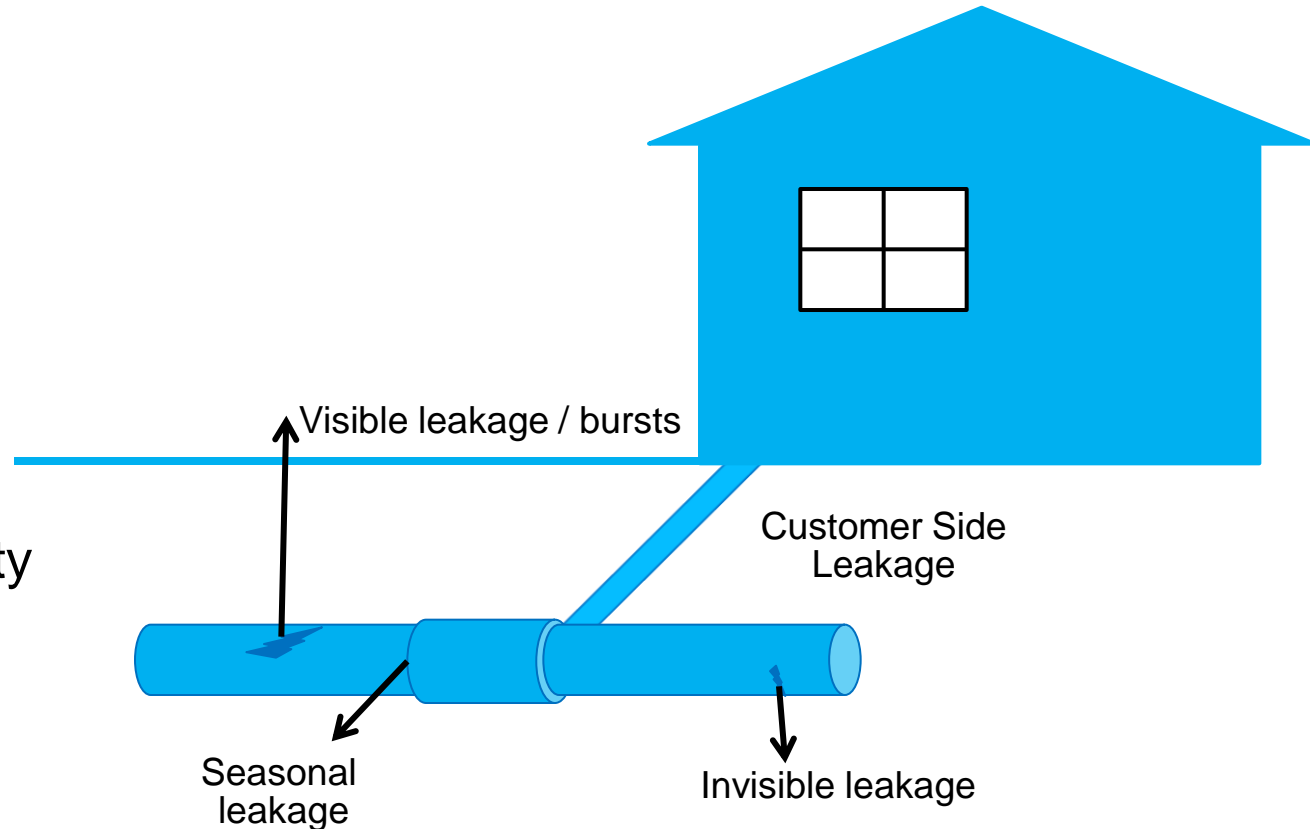
Decision making

Decision
making

Economic
Value

Leakage is complex

- Pipe material
- Pipe depth
- Pipe age
- Soil type
- Pressure
- Traffic vibrations
- Contractor activity
- **Weather**



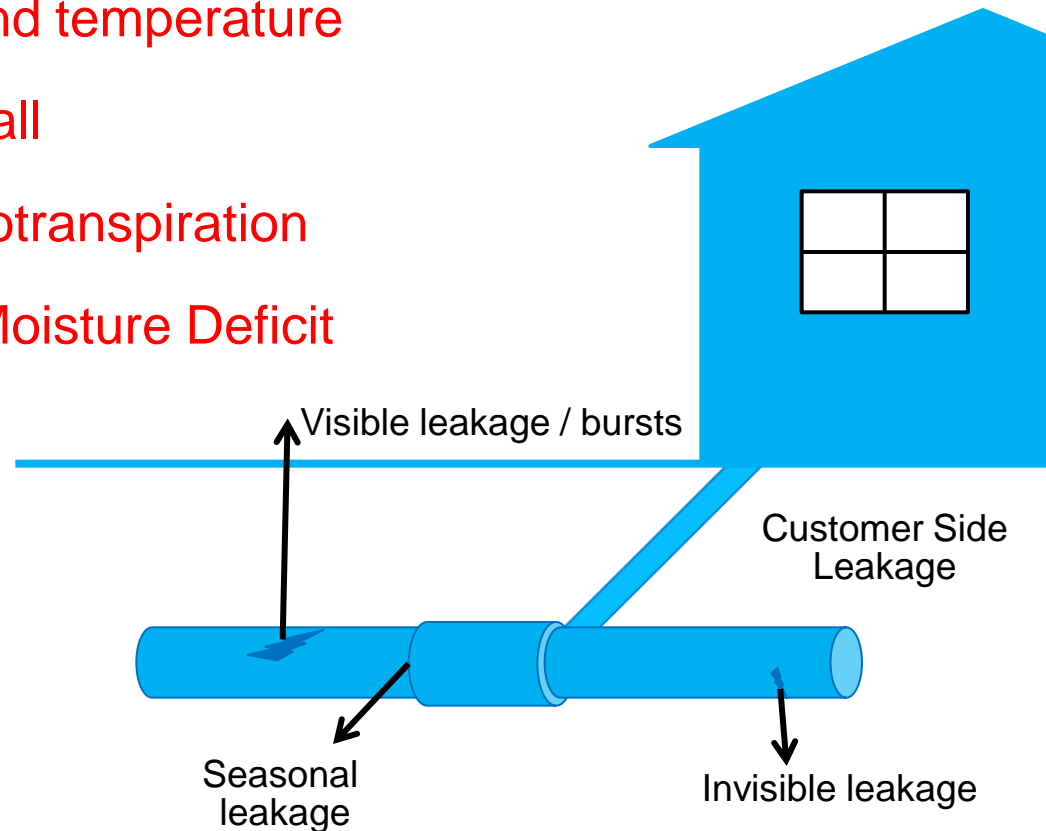
Decision
making

Economic
Value

Modelling should be complex

- Pipe material
- Pipe depth
- Pipe age
- Soil type
- Pressure
- Traffic vibrations
- Contractor activity

- Air temperature
- Water temperature
- Ground temperature
- Rainfall
- Evapotranspiration
- Soil Moisture Deficit





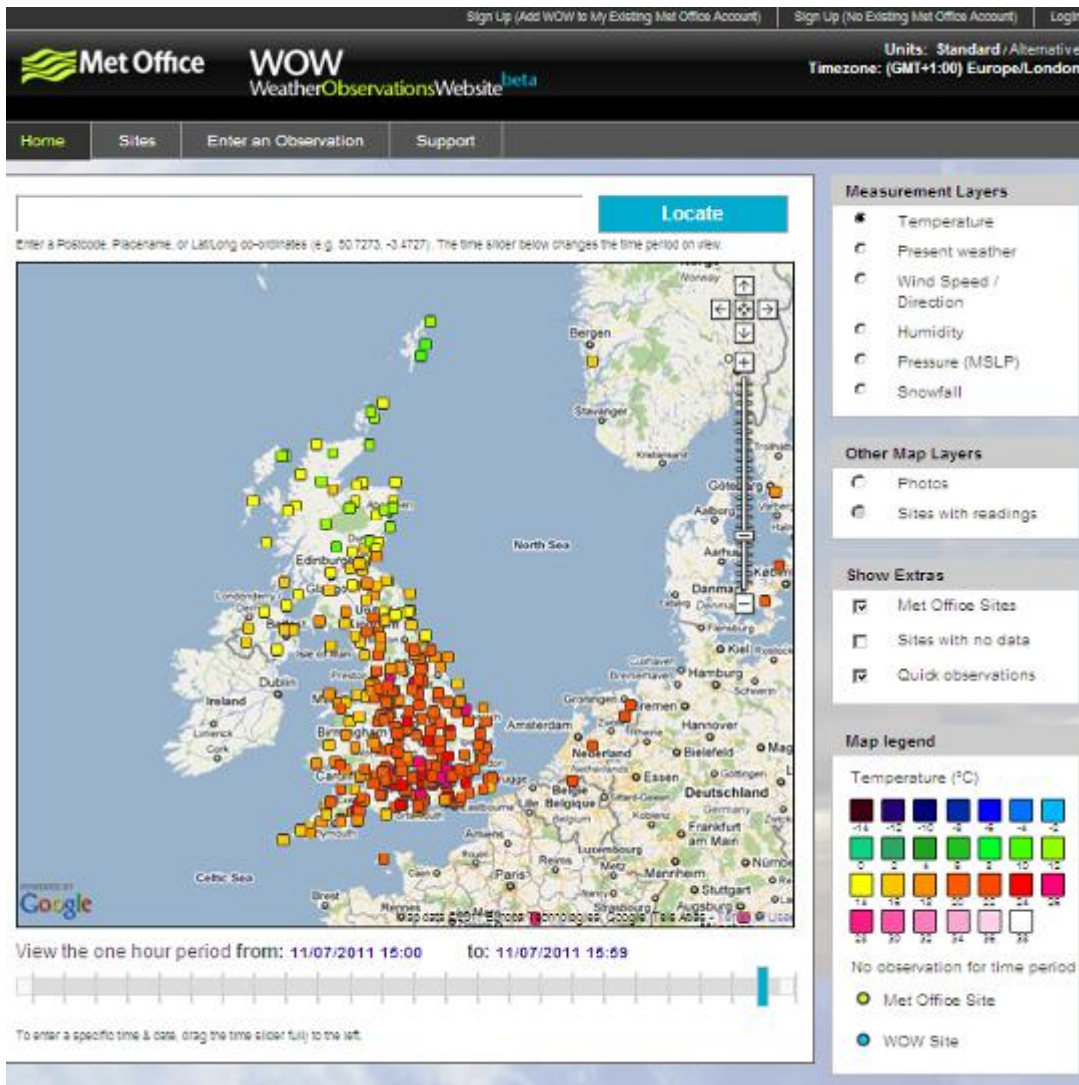


Monitor
&
Observe

New ways of working

Weather Observations Website

- Launched June 2011
- Over **28 million** observations received...
- ...from over 1700 sites worldwide
- Users in 145 countries



<http://wow.metoffice.gov.uk/>

Produce

Informatics Lab

Created in 2015

Two purposes:

**Making environmental
data/science useful**

**Transform ways of
working and culture**



Produce

What do we do?

High-performing & engaged teams — Transformation

From (big) data to information — Data Analytics

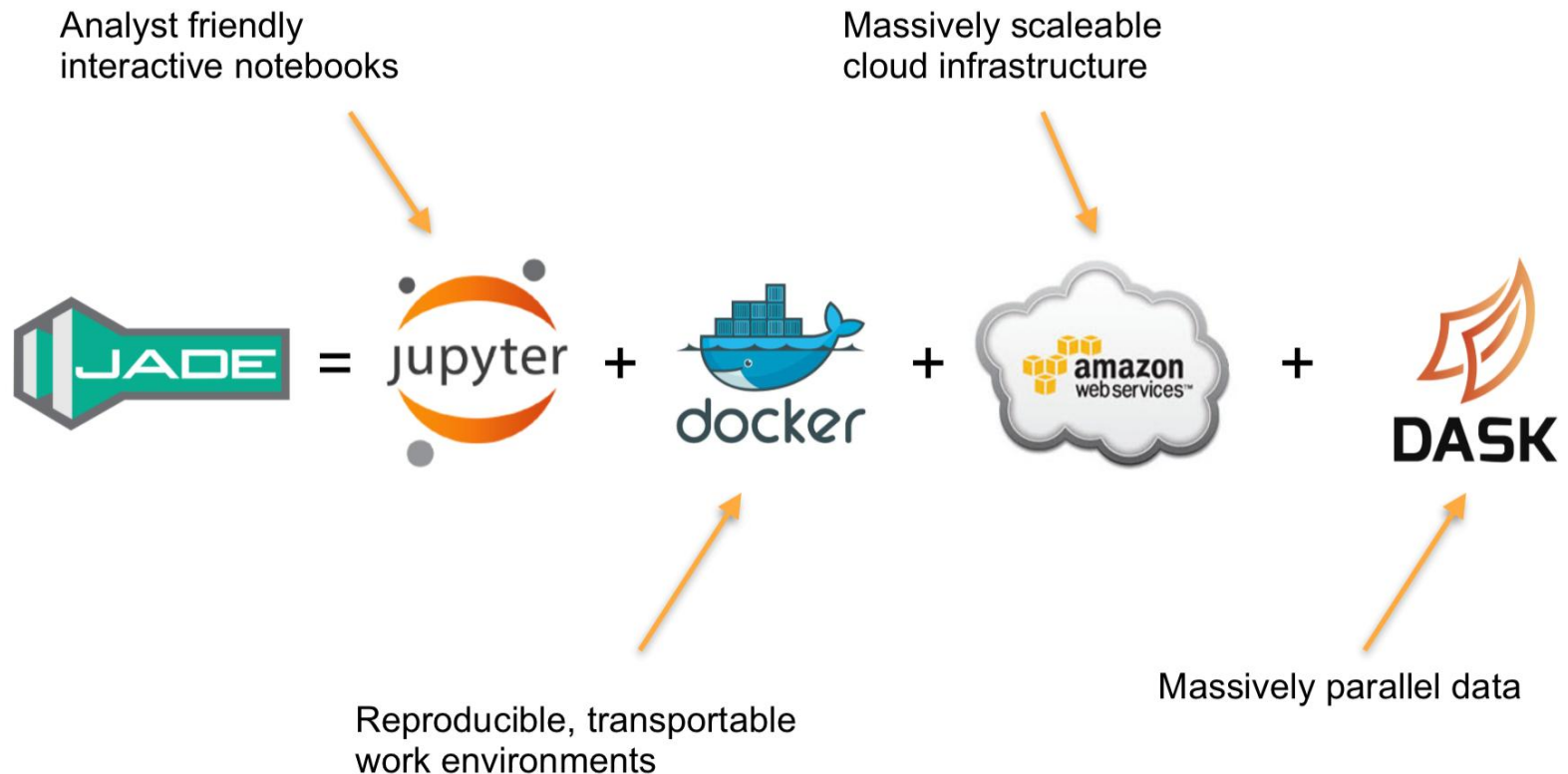
From information to decisions — Interactive Media

www.informaticslab.co.uk

Produce

New ways of working

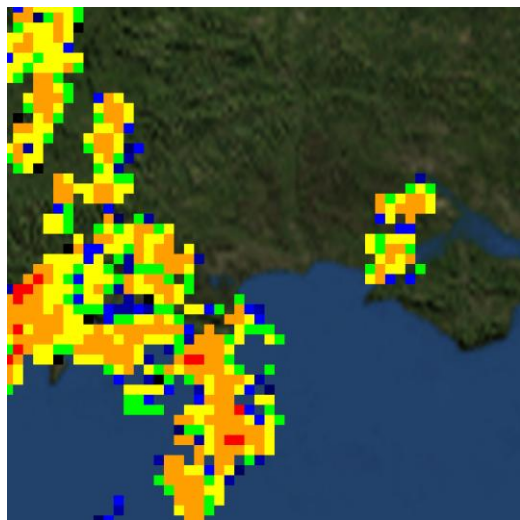
 **Met Office** Informatics Lab



Decision
making

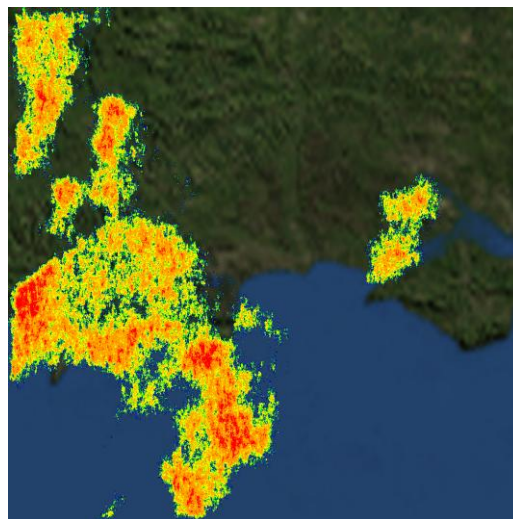
The next generation mobile network will have a greater weather dependency

“Weather elements such as rain have the potential to degrade the performance of communications networks at these new higher frequency bands. With our expertise in both numerical weather prediction and the remote sensing of the atmosphere – for example, weather satellites and radar – the [Met Office](#) is well-placed to contribute realistic high-resolution weather scenarios and the associated impacts on signal transmission to our project partners,”



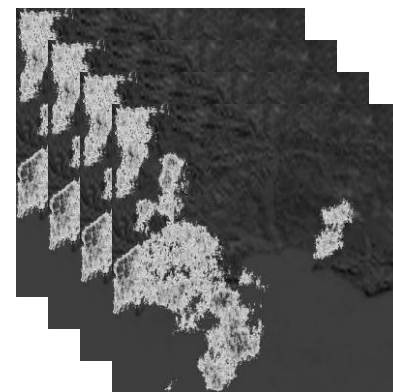
T+0 UKPP @ 2 km

New ways of
working



T+0 UKPP @ 100 m

k_{ext} & k_{abs}
@ 25 32 41 84 GHz



Project led by Ordnance Survey
Stephan Havemann, Robert Scovell, Jean-Claude Thelin, Dave Jones

HPC Complex – Collaboration Space

“A place in which the Met Office creates and builds opportunities for business growth and scientific & technical collaboration”



HPC Complex - Collaboration Space

- **Demonstration venue :-**
Hacks, Demos & Exploration
- **Conferences & workshops :-**
Technical, Scientific & Business
- **External Collaboration:-**
*Longer term (months) collaborations
e.g. ERI (incubation) & Data Analytics Hub*
- **Trial Space:-**
*Providing a space in which to trial new ways of
working &/or an Innovation hub for UK
government and industry*



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