



Ricardo-AEA

UK model results for compliance assessments and e-Reporting

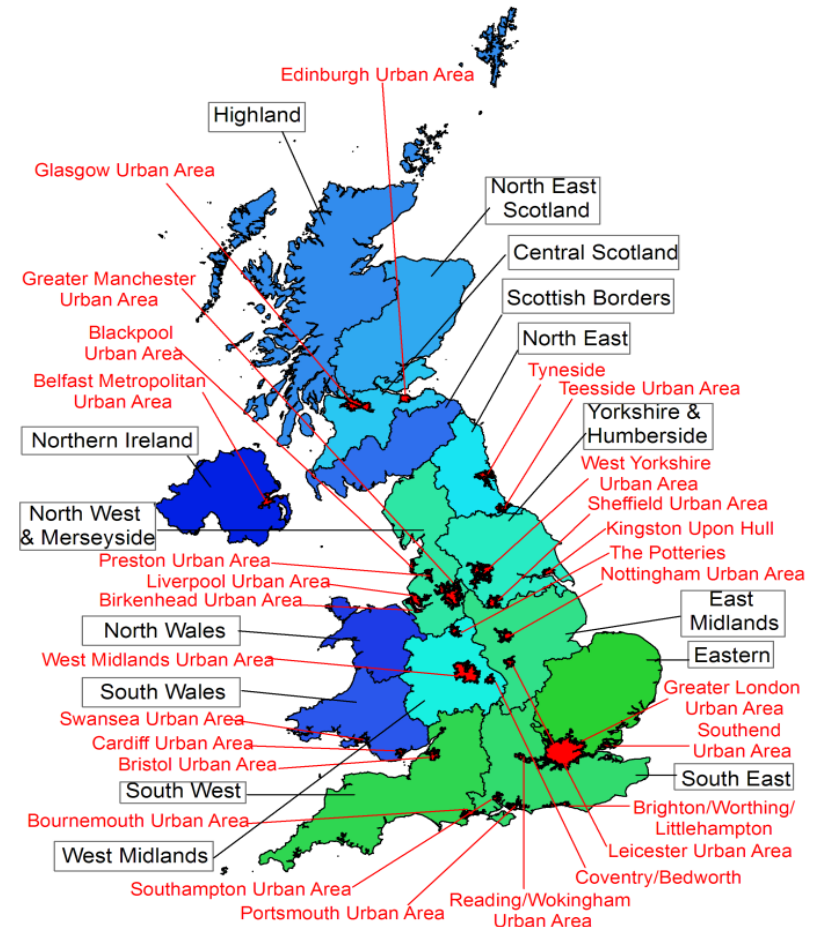
FAIRMODE Technical Meeting

Oslo, 28-29 April 2014

Presented by: Keith Vincent

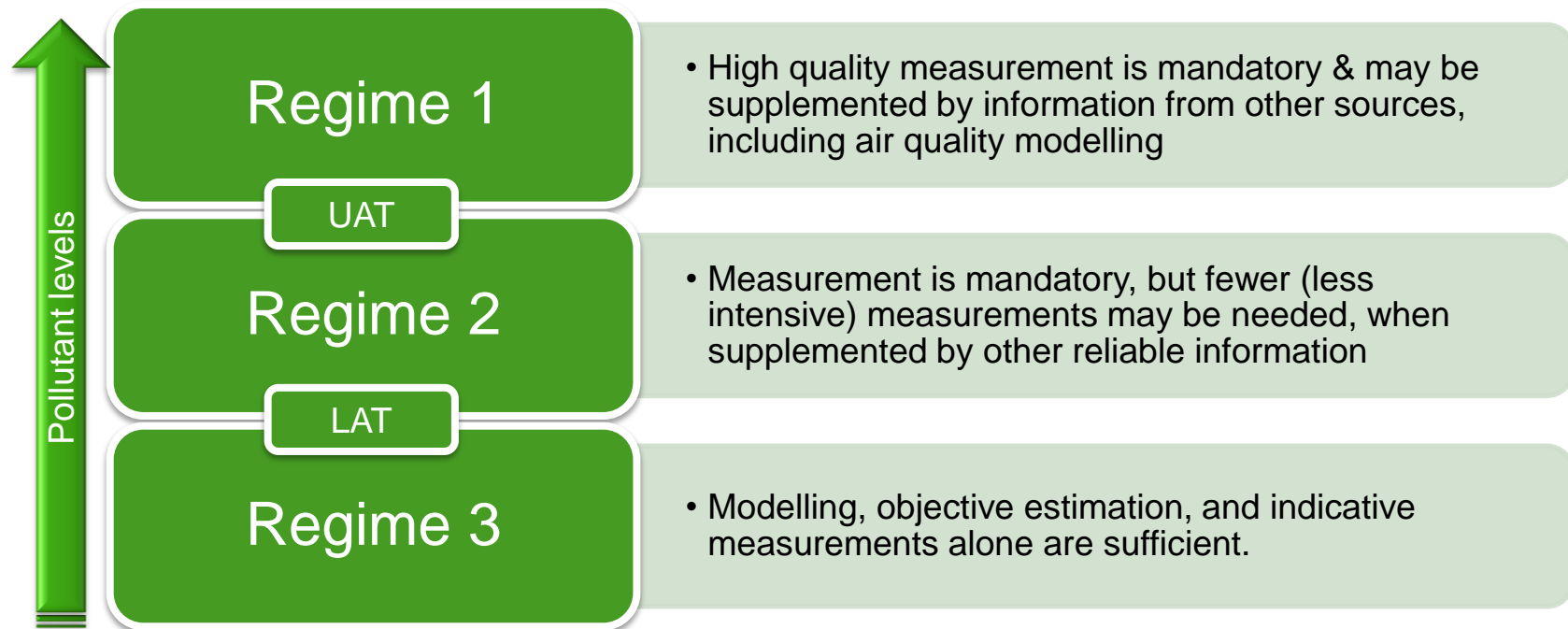
Keith Vincent, Tony Bush, John Stedman, Daniel Brookes

- Using AQ models in compliance assessments
- Benefits of using models
- UK experience of using and reporting model results
- Implications of a more complete assessment that includes model results
- e-Reporting requirements



- UK makes widespread use of fixed measurements and models in its Air Quality compliance assessments
- Modelling and objective estimation are forms of supplementary assessment data as set out by
 - Articles 6, 7 and 10 of 2008/50/EC
 - Article 4 of 2004/107/EC
- These articles recognise that models can be used to supplement fixed measurement for assessment of AQ
- UK has interpreted “supplement” to mean “support” assessments based on fixed measurement recognising that
 - We cannot always put fixed measurement in the most highly polluted locations
 - We are generally interested in concentrations away from fixed stations
 - There is a general need to inform on the spatial distribution of pollutant concentrations to support an efficient assessment regime

- See <http://ec.europa.eu/environment/air/pdf/guidanceunderairquality.pdf>



- This Guidance recommends that MS should carefully consider the uncertainty of the model before using it to predict compliance / non-compliance

Benefits of incorporating model results in the compliance assessment

- UK use models to support monitoring network design
 - Supports efficient compliance assessment regime design
 - Targeting pollution hotspots with high quality monitoring
 - Reducing amount of fixed monitoring where possible and therefore reduced cost
 - Implementing compliance assessment regimes that are proportionate to the pollutant levels observed
- Model results can cover the whole of the Member State at locations relevant for assessment
- Models can also be used to provide other information required for air quality management:
 - Spatial extent of exceedance (a new e-reporting requirement)
 - Source apportionment
 - Baseline projections
 - Impacts of measures

- The models selected need to provide results relevant to the assessment requirements in Annex III of the AQD
 - Highest concentration in the zone. Typically at traffic locations but not including locations where the public do not have access and not including junctions
 - Urban background locations. Representative of exposure of the general population: typically representative of several square km
- Additional uncertainties associated with using models
 - Inputs (emission inventories, met data)
 - Model formulations (transport, dispersion, chemistry)
 - Model results cannot have lower uncertainties than the measurements!
- Availability of input data including:
 - Emission inventory maps
 - Meteorological data
 - Suitable measurement data for model calibration/validation

- A modelling assessment is carried out centrally for the whole of the UK
- Pollutants
 - AQD: SO₂, NO_x, NO₂, PM₁₀, PM_{2.5}, Pb, C₆H₆, O₃
 - DD4: BaP, As, Cd, Ni
- Annual mean maps built up from many layers
 - Regional (interpolated from rural measurements)
 - Point sources modelled using dispersion model
 - Area sources modelled using a dispersion kernel approach
 - Roadside increment model
 - Calibrated using automatic monitoring data
- Outputs
 - 1 km grid resolutions + ~9000 urban major road links

- Model results are summarised by calculating the maximum modelled concentration in each zone
- The higher of the measured and modelled concentration is then compared with the limit value in order to determine the status of the zone in the reference year to be reported.
- Up to and including 2012 the results of the compliance assessment were reported in the air quality 'questionnaire' according to decision 2004/461/EC
 - Status of zones (forms 8 and 9)
 - Extent of modelled exceedance (form 19)
- The 2013 compliance assessment will be reported via e-reporting according to decision 2011/850/EU
 - Status of zones (Dataflow G Attainment)

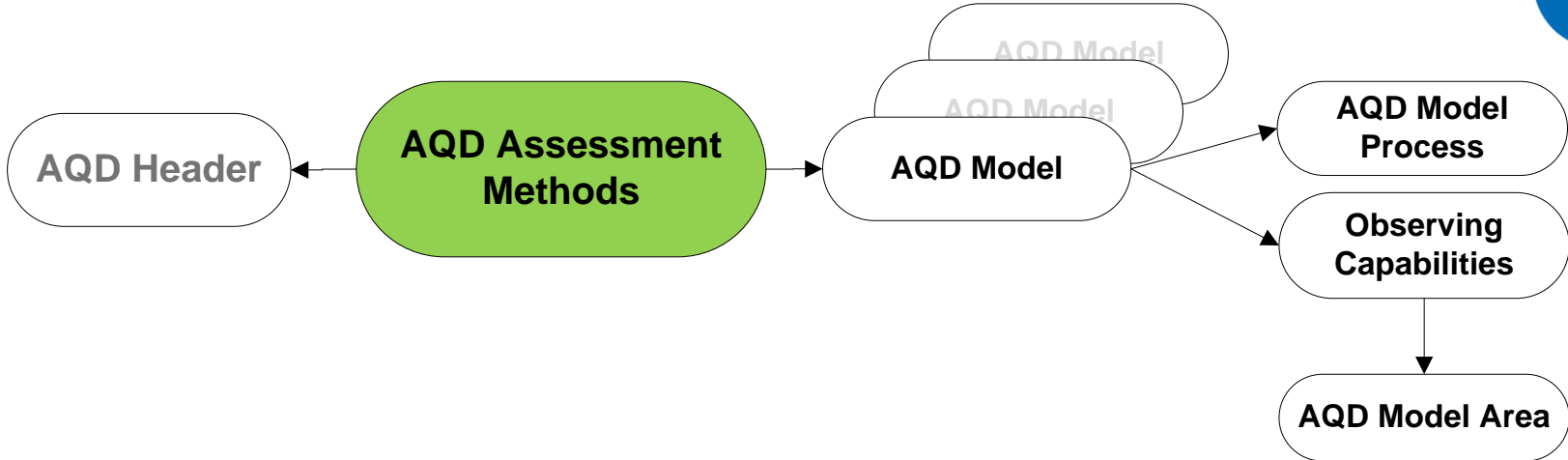
- Model results will include the maximum concentration in relevant locations across the whole zone
- Monitoring networks may not include the maximum location for practical or other reasons
- We have completed some calculations to explore the likely impact of including modelling

- 2011 Compliance assessment for annual mean NO₂
 - Germany: 36% of stations exceeding, 61% of zones
 - France: 10% of stations exceeding, 36% of zones
 - Italy: 19% of stations exceeding, 35% of zones
 - UK: 13% of stations exceeding
 - 93% of zones (as reported, including model results for all ~9000 receptors)
 - 60% of zones (an estimate using 500 receptors chosen randomly)
 - 30% of zones (an estimate using 150 receptors chosen randomly)
 - 19% of zones (monitoring results only)

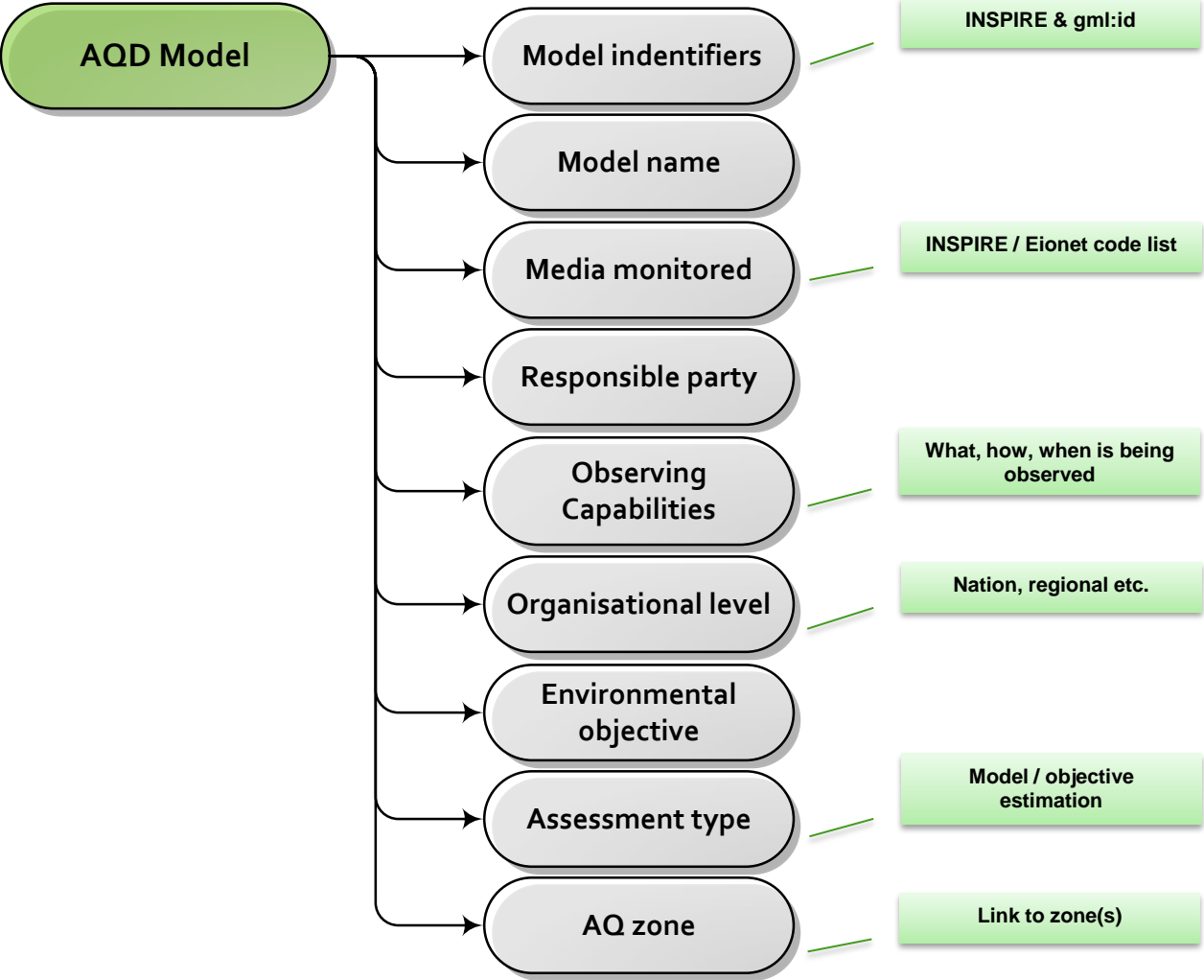
http://uk-air.defra.gov.uk/assets/documents/reports/cat05/1302150859_130213_Compliance_Assessment_Final.pdf

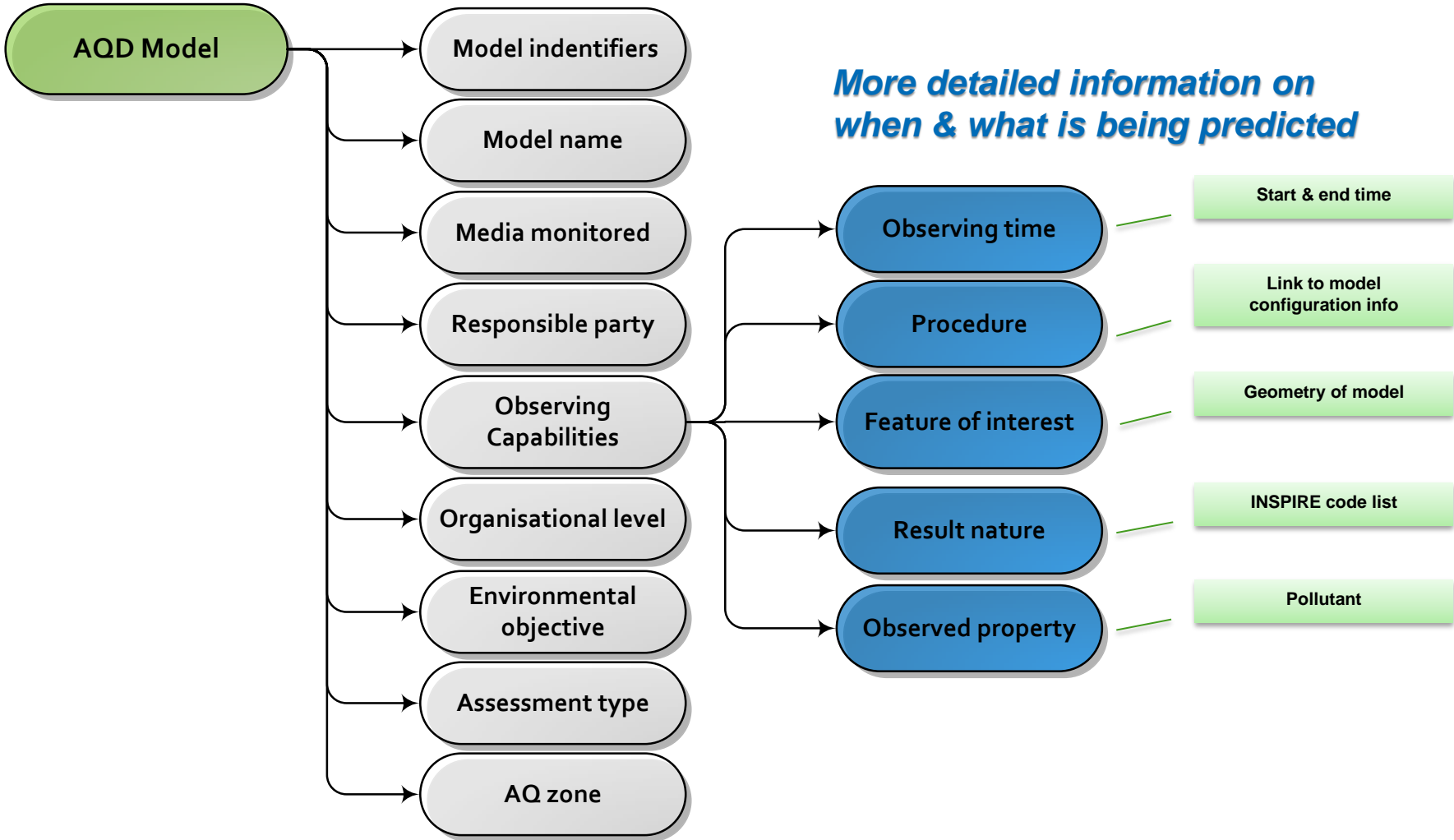
Reporting model information in Air Quality e-Reporting

- Provide descriptive information on your model
- Forms part of dataflow D on assessment methods



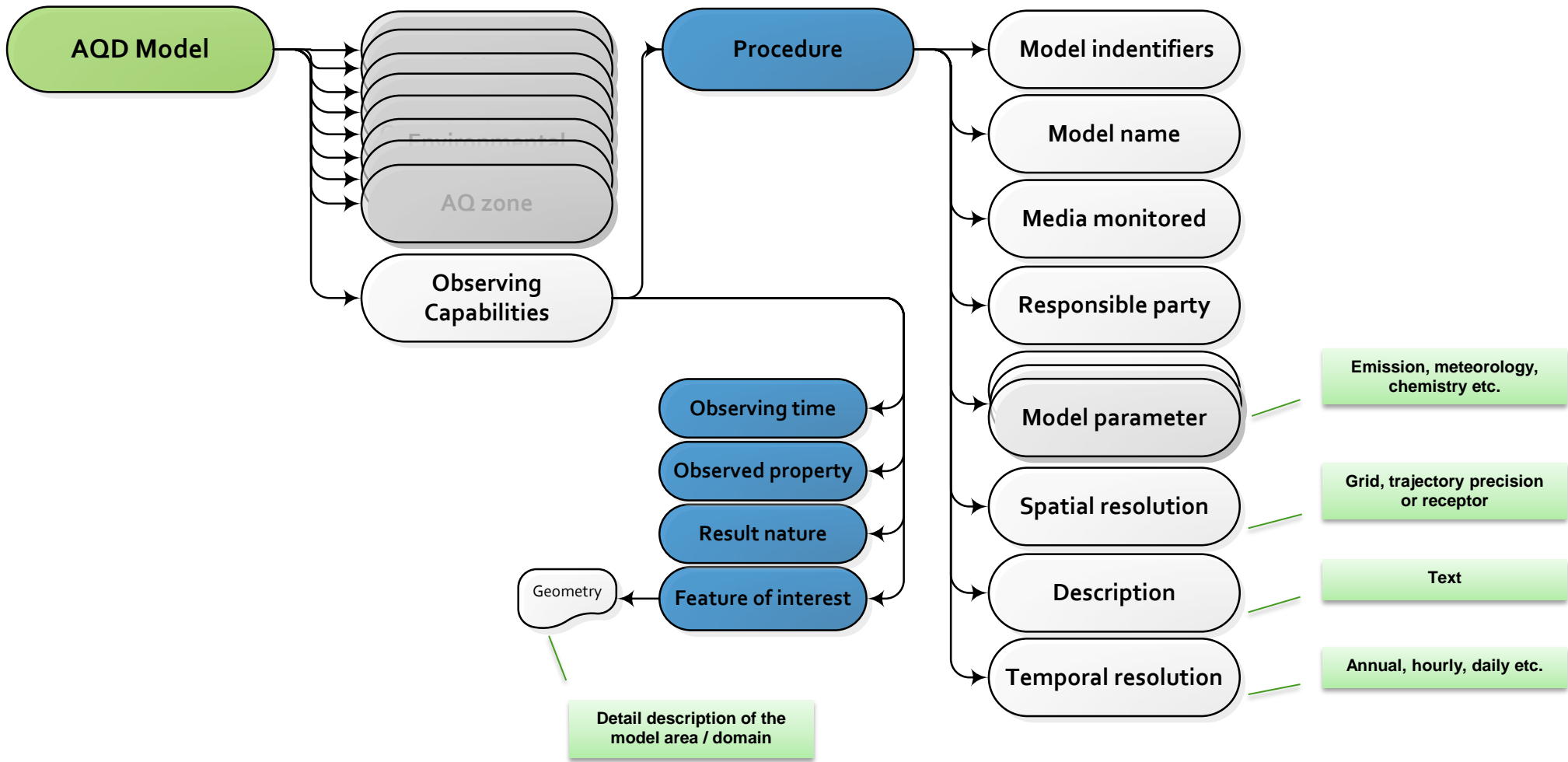
High level information on model





More detailed information on when & what is being predicted

Detailed information on how it is being predicted



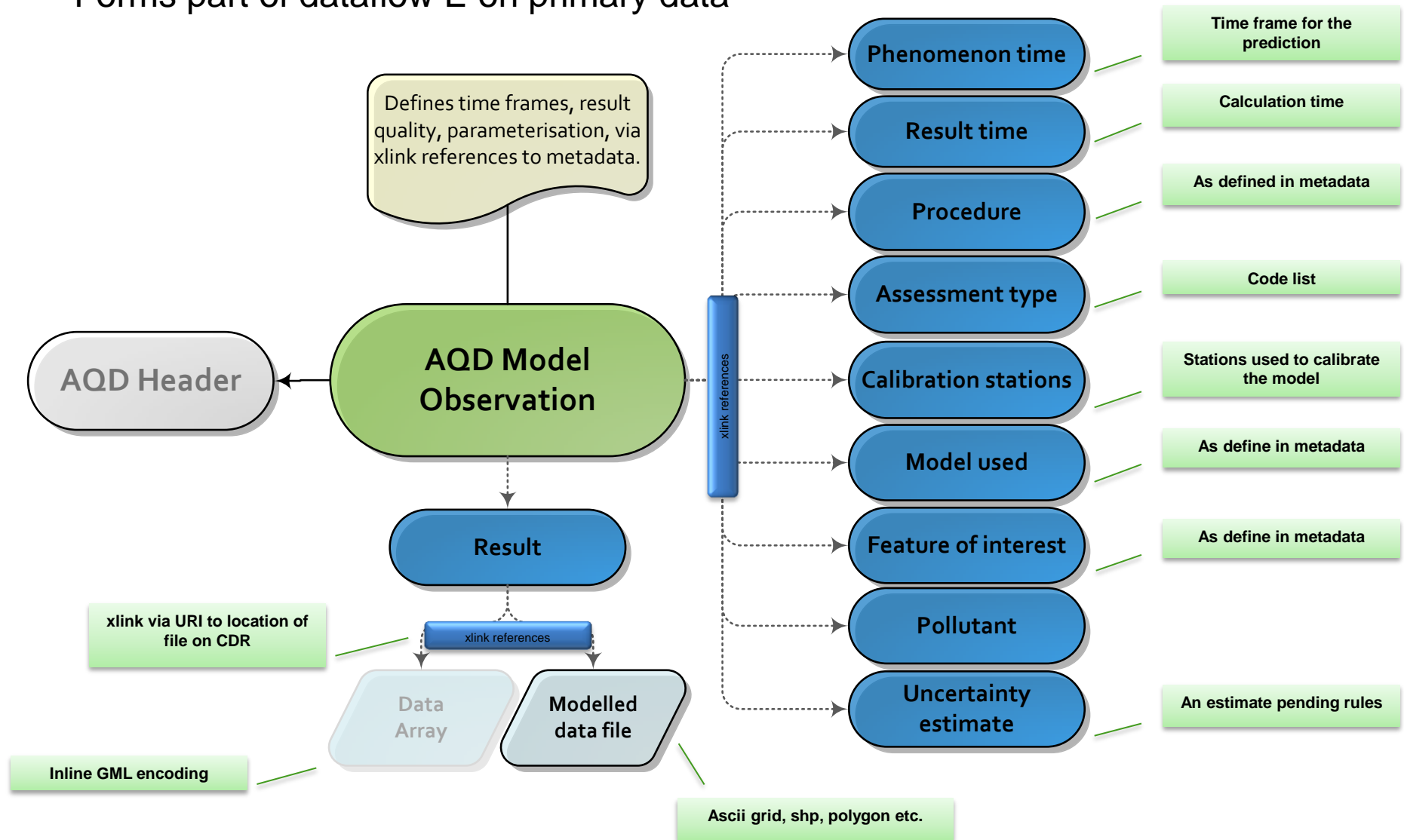
Air Quality e-Reporting examples for model metadata

- [*XML example model and model area*](#)
- [*Html example model and model area*](#)

- [*XML example model process configuration*](#)
- [*Html example model process configuration*](#)



- Forms part of dataflow E on primary data



Air Quality e-Reporting examples – model observations

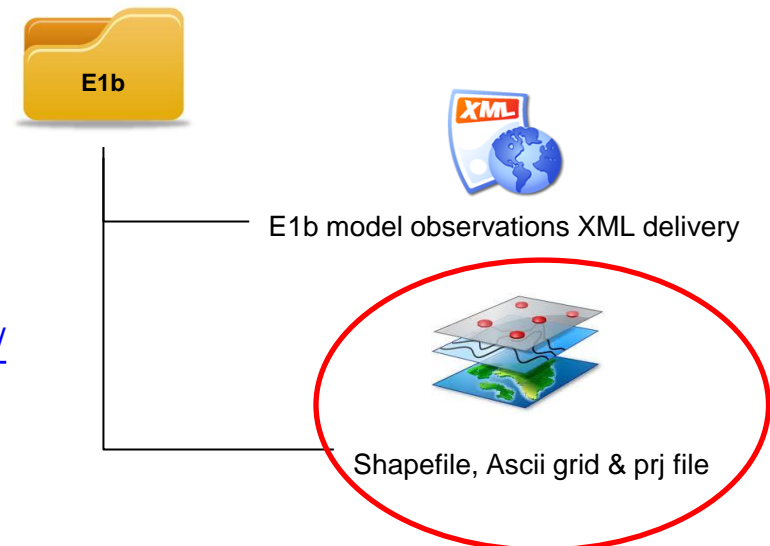
- [*XML example model observation data wrapper*](#)
- [*Html example model observation data wrapper*](#)



- CDR envelope will be organised with folders for each delivery
- Upload header and metadata to the D data flow envelope
- Upload observational header, observations and modelled datasets to the E1b envelope
- If uploading shapefiles, ascii grid etc for model observational upload to same folder as XML wrapper
- <http://cdrtest.eionet.europa.eu/gb/eu/aqd/e1b/envuvdcxw/>

Envelopes and subcollections

- ☒ (B) Information on zones and agglomerations (Article 6)
- ☒ (C) Information on the assessment regime (Article 7)
- ☒ (D) Information on the assessment methods (Articles 8 and 9)
- ☒ (E1a) Information on primary validated assessment data - measurements (Article 10)
- ☒ (E1b) Information on primary validated assessment data - modelled (Article 10)
- ☒ (E2a) Information on primary up-to-date assessment data - measurements (Article 10)
- ☒ (F1a) Information on generated aggregated data - primary validated measurements (Article 11)
- ☒ (F1b) Information on generated aggregated data - primary validated modelled (Article 11)
- ☒ (F2) Information on generated aggregated data - primary up-to-date measurements (Article 11)
- ☒ (G) Information on the attainment of environmental objectives (Article 12)
- ☒ (H) Information on air quality plans (Article 13)
- ☒ (I) Information on source apportionment (Article 13)
- ☒ (J) Information on the scenario for the attainment year (Article 13)
- ☒ (K) Information on measures (Articles 13 and 14)



- Benefits
 - Model results can cover the whole of the Member State providing a more complete compliance assessment
 - Reduced requirement for fixed monitoring
 - Models can also be used to provide other information required for air quality management
- Limitations
 - Models must provide results directly relevant to the locations for which assessment is required
 - Additional uncertainties associated with using models
 - Availability of input data including emission inventory maps

- Implications of using models
 - Monitoring networks may not include the maximum location
 - Use of models may tend to increase the proportion of zones with reported exceedances
- e-Reporting
 - Specific requirements to report
 - Metadata for models (Dataflow D)
 - Model results (Dataflow E)
 - Model results can also feed into the assessment of attainment (Dataflow G)

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