The uncertainty enabled Model Web (UncertWeb)

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The project

- ► FP7-ICT-2009-4, Feb 2010 – Jan 2013.
- ► ICT-2009.6.4: ICT for environmental services and climate change adaption.
- ► partners:
  1. Aston University (D. Cornford coordinates)
  2. Westfäalische Wilhelms-Universitaet Münster (ifgi, E. Pebesma)
  3. EC DG Joint Research Centre (JRC, G. Dubois)
  4. Consiglio Nazionale delle Ricerche (CNR, S. Nativi)
  5. The secretary of state for environment, food and rural affairs FERA (UK, J.P. Gosling)
  6. Wageningen Universiteit (G. Heuvelink)
  7. Norsk institutt for luftforskning (NILU, B. Denby)
  8. Technische Universiteit Eindhoven (H. Timmermans)
- ► Total budget: 3.7 M €, EU contribution: 2.8 M €

Context / motivation

GIGA: garbage in, garbage out
SOTA many environmental models:
whatever in, garbage out
What is garbage?
Your garbage might be my treasure.

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Less abstract:

- environmental sensor data contain noise, e.g. measurement error
- environmental models typically take sensor data as input
- models cannot correct errors (but may cancel some)
- at best, environmental models could *propagate* these errors.
- chained models (model B's input = model A's output) should propagate errors (easy by Monte Carlo simulation!)
- by *approximating* reality, models *introduce* errors, and should inform the user about (annotate its output with) the degree to which this happens (difficult?).

UncertWeb goal

- the Model Web (GEOSS AR-09-02.d task) has the goal to *develop a dynamic modelling infrastructure (Model Web) [...] composed of loosely coupled models that interact via Web services, and are independently developed, managed, and operated.*

- UncertWeb goal: to uncertainty-enable the Model Web

- Problem: the Model Web is still a vision:
  - its components (open, interoperable data and model services) do not yet exist
  - interoperable standards typically try to solve *everything*, making full support difficult.

Project overview

WP1 Standards for coupling models under uncertainty:
- UncertML 2.0: describing probabilistic information (domain independent)
- API: uncertainty transformation service
- profiles for space/time data (O&M, GML), processes (WPS, SOAP)
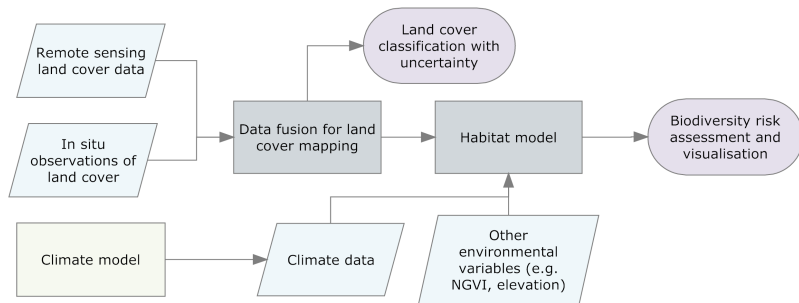
WP2 Chaining and discovery services under uncertainty

WP3 Tools for practical application of UncertWeb
- uncertainty elicitation
- communicating and visualizing uncertainty
- efficient computation of uncertainty source contributions
- using UncertWeb for decision making

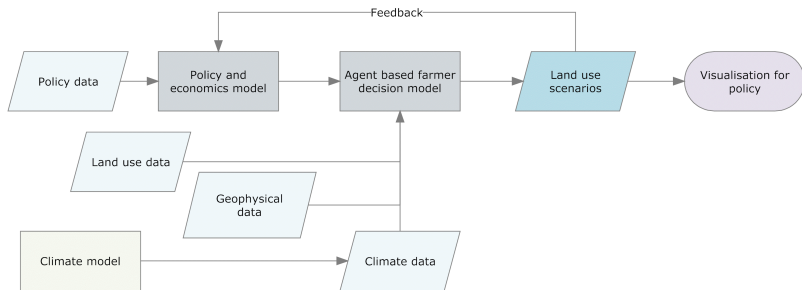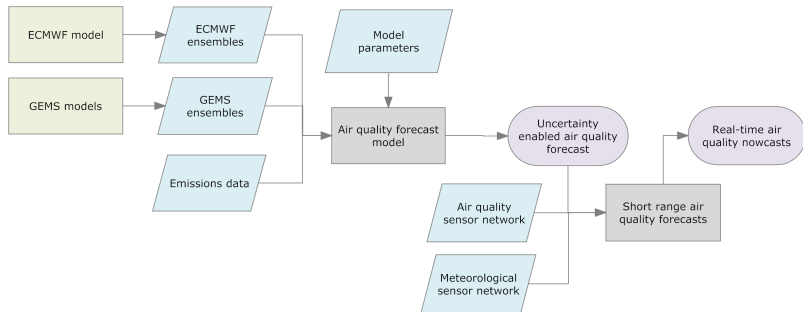WP4-7 use cases (next slides)

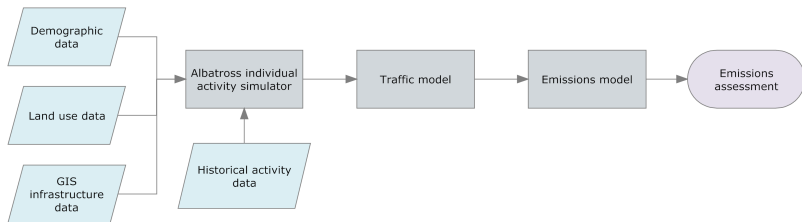WP8 integration

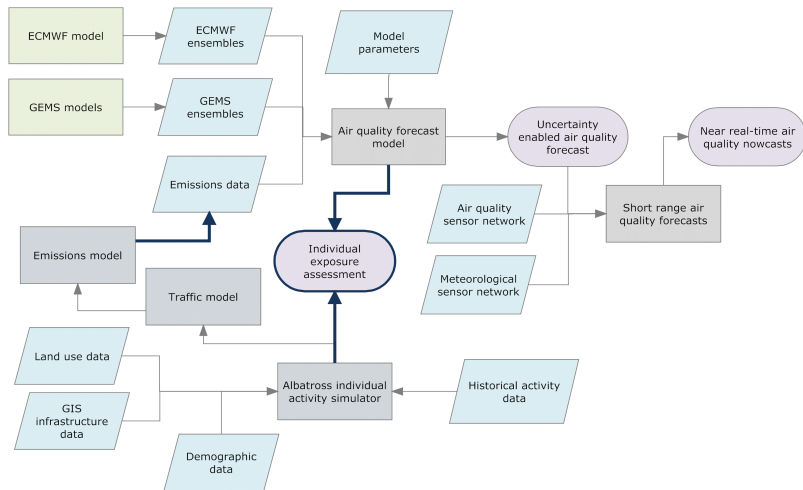# WP4: biodiversity modelling

WP5: food chain modelling

WP6: air quality modelling

WP7: human activity modelling

WP8: integrating air quality and human activity modelling

Concluding:

- Who wants a Model Web for which the value of its output is unknown?
- UncertWeb will develop S&T to quantitatively assess and communicate the value of information in the Model Web
- to do this, UncertWeb will use the probabily framework, which has proven its value in many areas of society.