NERC Environmental Virtual Observatory Pilot Project

Realising the potential of environmental data, models and tools

The Pilot

- The pilot Environmental Virtual Observatory (EVOp) is a 2-year, NERC-funded, initiative, which started autumn 2010.

- A proof-of-concept project to demonstrate that linking data, models and expert knowledge can provide cost-effective answers to a wide range of environmental issues

- Consortium of 13 organisations led by CEH, the University of Reading and University of Leeds

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The EVOp Vision

- To make environmental data more visible and accessible to a wide range of potential users and free to use for public good applications

- To provide tools to facilitate the integrated analysis of data, greater access to added knowledge and expert analysis, and visualisation of the results

- To develop new, added-value knowledge from public and private sector data assets to help tackle environmental challenges

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Why?

- Environmental issues require joined up approach – merging disciplines to create solutions and inform policy makers.

- New technology has resulted in us gathering data at unprecedented rates& volumes

- … posing new challenges in the interpretation and communication of the data and derived information

- New technology presents opportunities to exploit new ways to investigate pressing environmental questions.
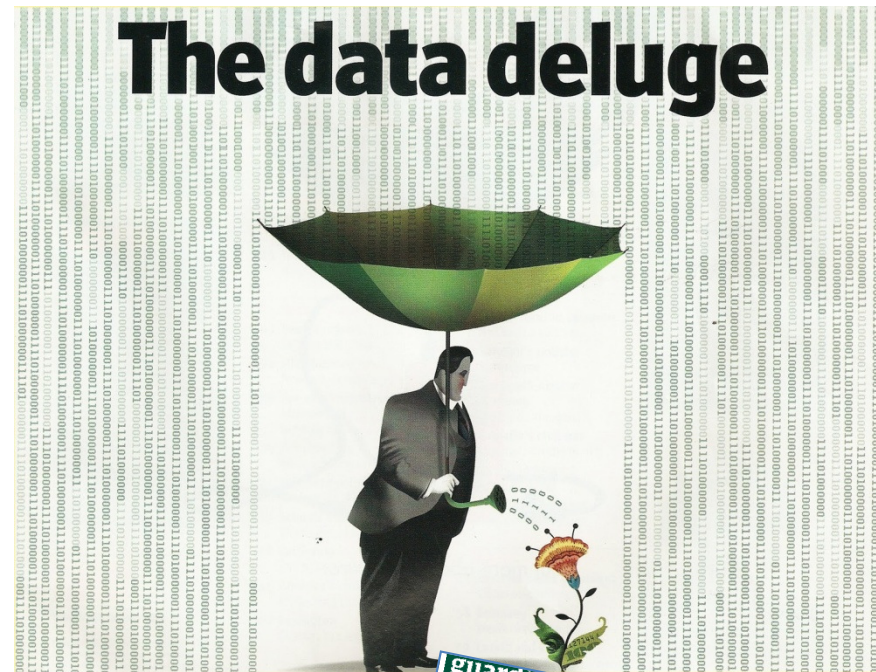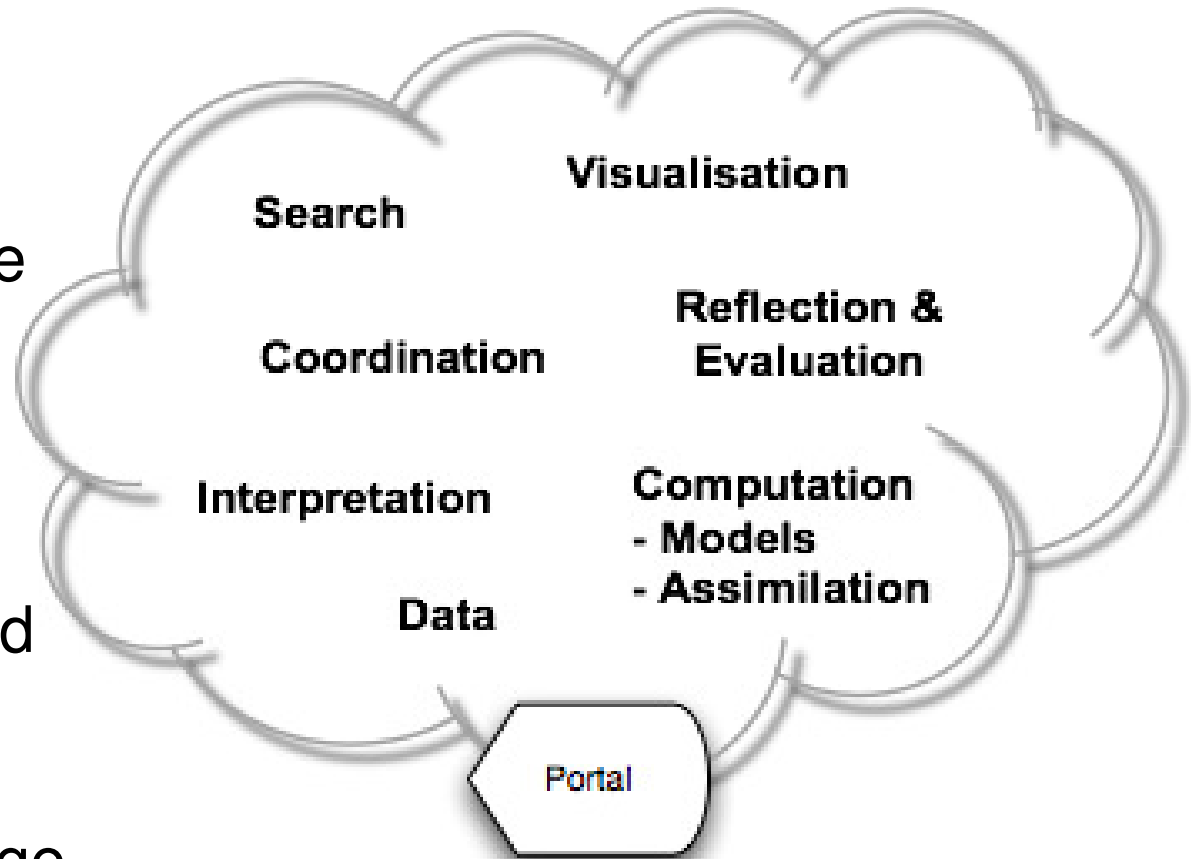
Implementing an environmental cloud
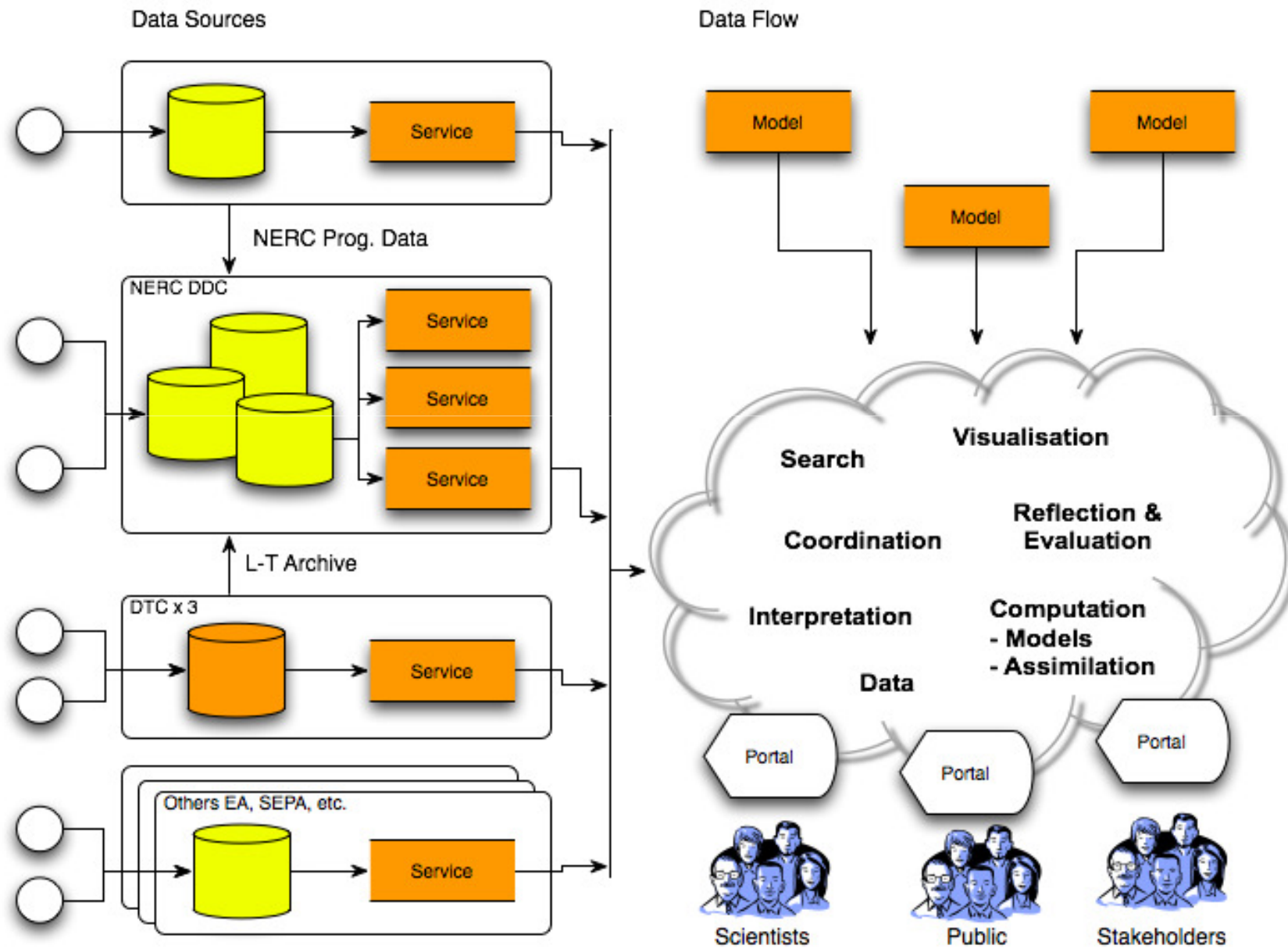
A space for:

- Exploring data
- Linking models
- Accessing knowledge
- Visualisation tools

To deliver more:

- Efficient, effective and transparent use of environmental data, models and knowledge

Implementing an environmental cloud

The EVOp approach…

- ... try it out on real exemplars:

    - Exemplars at three spatial scales (local, national and global)

    - Addressing different issues, appealing to different audiences

    - Dealing with real data, models and visualisations

    - Demonstrating potential through series of storyboards

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User profile (Local):   Farmer

User scenario: Flooding, particularly muddy flooding, are a problem in the Morland subcatchment of the river Eden. Questions are posed by some farmers at catchment flooding workshop where the EVOp tool is being demonstrated. They are trying to reconcile pressures to increase food production with flooding in the local area.

1. Posing the question	2. Local community website	3. EVOp webpage – login to portal
	MyCatchment Ask a question Upload my info What do you think?	 **User Login**
Questions relating to mitigation of flooding and pressures to increase food production are posed at a workshop.	Extra MyCatchment page on Eden DTC website showing Morland catchment and location of live data feeds with links. Later it may be possible to upload photos and comments and other people's data? Ask a question button links through to EVOp website.	User logs in to portal

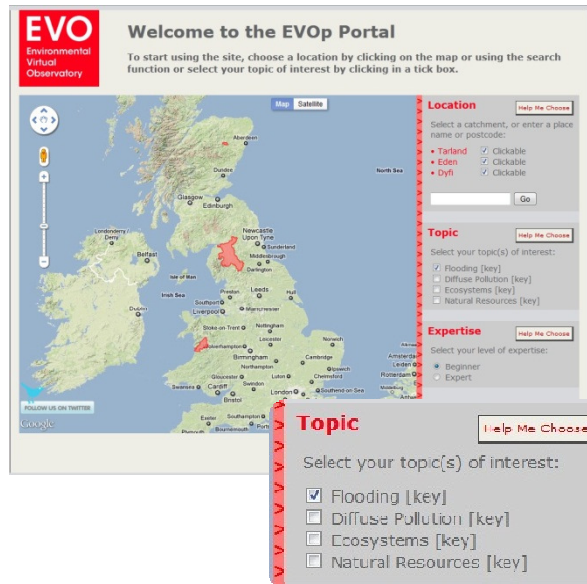**User scenario:**   Flooding, particularly muddy flooding, are a problem in the Morland subcatchment of the river Eden. Questions are posed by some farmers at catchment flooding workshop where the EVOp tool is being demonstrated. They are trying to reconcile pressures to increase food production with flooding in the local area.
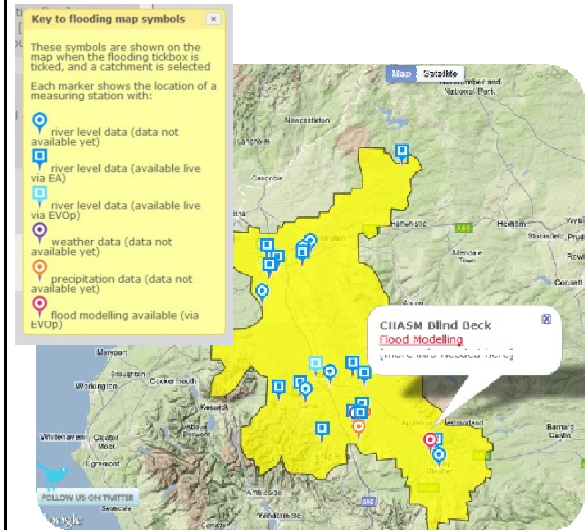
4a. Selection of location and topic	4b. Selection of level of expertise	5. Selection of subtopic from sites within the Eden
User selects location of area they are interested in, may also need search box by name or postcode. User selects topic (only flooding available)	User selects level at which they want to interact with data. This screen differentiates users and determines what accessibility is needed in the rest of the portal.	User selects flood modelling from the different flooding data options available in the Eden

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5. Flood modelling parameterisation

Current conditions scenario

Run Topmodel

6. Flood modelling output

Your Flood risk prediction #1

What does this mean?
Mouse over graph

Chance of this area flooding? Use Slider

Low   High

What does this mean?

Animate Prediction

7. Flood model interpretation and implications

Impacts of Flooding #1

Impact Table	
Environmental	Flood covered X km^2
Economic	Loss of farmland £X, Damage to property £X
Social	X number of houses flooded

Tell me more about:
- Uncertainty in these flood estimates
- The impact table

What do you think?

Calculate costs and benefits of options

Simulation selection for beginner leads to default model selection and simple parameterisation screen. User selects current conditions case to test current flood impact. Run Topmodel runs the model with these specifications.

Outputs from current conditions scenario: hydrograph with Synchronised images of flood progress to visualise how hydrograph represents the flood on the ground. Flood risk map – from offline modelling with uncertainty slider. Interpretation of impact and further explanation on What does this mean?

Summary table based on model results. Links for video explanation of issues around model uncertainty and how to interpret impacts. Potential for future CBA output to quantify cost of measures vs savings in flood avoidance. Option for user to provide feedback on model output link back to community website?

User profile (Regional):   Defra/Environment Agency/SEPA/WAG

User scenario: Government is struggling to implement the WFD, and to meet its OSPARCOM reporting obligations and wants to know what the impact of its existing policies will be on N and P flux to coastal waters

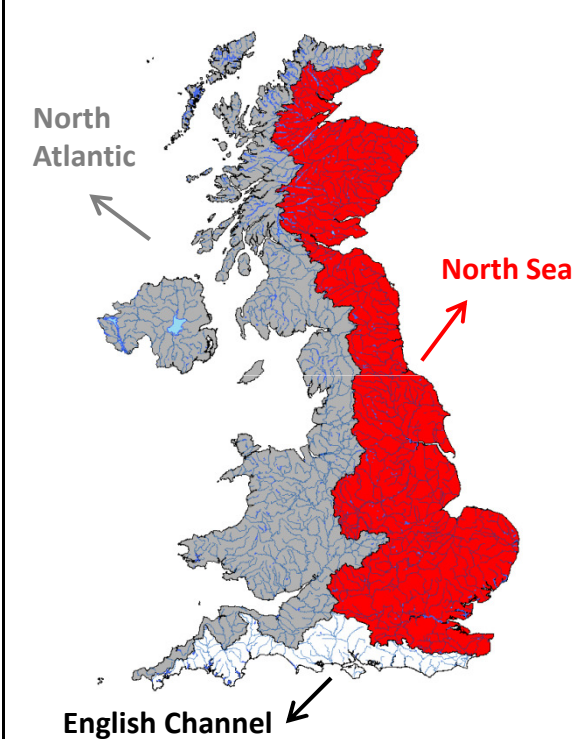| 1. Policy document images	2. EVOp webpage and portal	3. Major UK drainage units
	 www.environmentalvirtualobservatory.org	
Government wants to know what percentage reduction in N and P flux to coastal waters is possible using existing policy instruments	Defra/EA/SEPA/WAG staff have had a briefing on EVOp and are involved in the PAG. Staff are directed to log in to the EVO portal	User selects (from a clickable map) the scale at which they require modelled output: (4a) **Individual catchment** (4b) **WFD RBD** (4c) **OSPAR reporting unit** >>>>

User profile (Global): UN Agency / DECC

User scenario: There is concern that there could be a positive feedback from release of soil carbon back to the atmosphere further accelerating global warming but there is uncertainty in emissions and differences between GCM predictions. Where globally are these uncertainties greatest and therefore where is new science best focussed?

4. Map of the globe	5. Uncertainty /Model comparisopn tools	6. Variable selection
Select from: All / Asia / North America / South America / Antarctica / Europe / Australia	**Select tool:** Tool 1 / Tool2 / Tool3 / IMOGEN	**Variables :** Plant functional type / Change in soil carbon / Change in run-off / Change in soil moisture / Meteorology
User selects either from a clickable map or from a section of buttons the scale at which they require modelled output:	User selects the IMOGEN tool which would be just one option in the full EVO cloud. A hover tab indicates IMOGEN is a combined GCM analogue model and GCM land surface representation. Ther e is also information on suitability, run time, past example libraries of outputs , linked website etc	User selects (point & click) from a range of variables . Change in soil carbon is selected here

What the pilot will achieve…

- A working portal, albeit tested under controlled "closed" conditions with end-users

- Initiate awareness of new capabilities offered by new technology

- Start building a new EVO community and skills

- Identify issues, opportunities and barriers in advance of a full EVO (e.g. data sharing, IPR, security, governance, scalability, standards, international collaborations, etc..)

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Benefits of the full EVO to science…

- Enabling better, more productive, policy relevant, science

- "Democratisation of science" – opening science to beyond those 'in the know', enabling better access to data, information, knowledge, models and tools

- Stop re-invention of wheels and repeated blind alleys (e.g. re-implementing models, 'reinventing' work due to poor communication or lost knowledge, repeating data collection)

- Enhanced reputation of greater transparency and contribution to societal needs

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Thank you

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