

## Integrated modelling in the Environment Agency

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## Content

- Background to the Environment Agency
- Integrated FRM modelling – the present
- Integrated FRM modelling – the future?

## The Environment Agency

- England and Wales only
- Duties and powers
- Head Office
- 8 Regions
- 23 Areas



## Flood Risk in England & Wales



At risk from flooding from rivers & the sea

- 2.3 million properties
- 11% of land
- 4.6m people
- Assets of over £237 billion

(NaFRA 2006 / NADNAC 2004)

## Flood Risk Management

- Mapping & modelling
- Controlling building in floodplain
- Raising awareness of flooding
- Forecasting & Warning
- Building defences



## Modelling Risk

$$\text{Risk} = \text{Probability} \times \text{Consequence}$$

- Modelling provides much of the information used to quantify risk and subsequent risk management activities
- Systems thinking is becoming common, with the S-P-R model increasing in use

## Modelling in Flood Incident Management & Forecasting

- NFFS
  - Real-time hydrologic and hydraulic models
  - Ranging from simple to complex
- Model derived ratings for hydrometric data
- Modelling to aid installation of telemetry
- Modelling for flood incident response planning

## Modelling in Flood Risk Mapping

- FEH / HiFlows
- S105 / SFRM
- CFMPs / SMPs
- Flood Maps
- Flood Zones
- Flood Hazard Mapping
- Flood Vulnerability Mapping
- NaFRA

## Modelling in Development Control

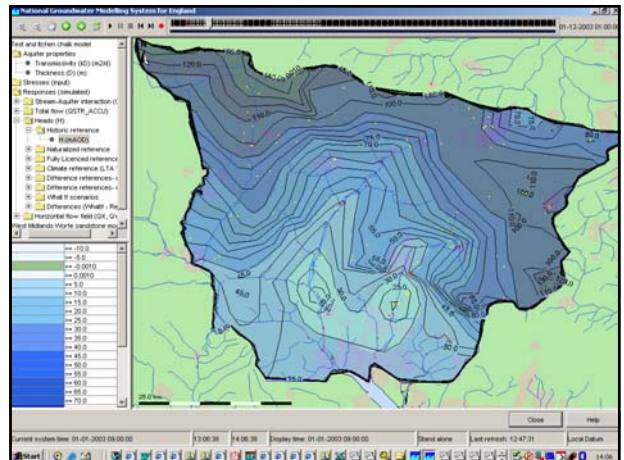
- Assist and QA Local Authority Strategic Flood Risk Assessments for PPS25
- Analysis of Flood Risk Assessments for PPS25

## Modelling in Asset System Management

- Feasibility / appraisal studies
- Design studies
- Maintenance (CES/AES)
- Performance specifications (PAMS)

## NFFS

- National Flood Forecasting System
- Recently followed by the National Groundwater Modelling System
- Customised version of Delft – FEWS
- Shell software, sharing and manipulating data
- Linking results from many different 'standalone' models



## MDSF2

- Modelling and Decision Support Framework 2
- Decision support system for a risk-based approach
- Catchment, estuary and coastal flood management planning
- 'Open-MI style build'
- Modular
- Internal and external modelling
- Platform independent where possible

## Policy Drivers

- OST Foresight Future Flooding
- Making Space for Water
  - Strategic Inland Overview
  - Integrated Urban Drainage
  - Other sources of flooding
  - Expanding flood warnings
- EU Floods Directive
- Integrated Catchment Science (including WFD)
- Summer floods

## Hydrological Modelling

- Hydrology Strategy
  - develop models that link catchment, channel and floodplain processes over wider geographical areas
  - integrate how we look at water and sediment
  - strengthen the links between our hydrological and water quality models
    - in channels, floodplains and estuaries
- Water Resources IT Strategy
  - systems and processes integrated where possible
  - need to converge data and systems first
- Continuous simulation / flow regime approaches

## FRM Modelling Strategy

- Why an FRM Modelling Strategy?
  - To provide a consistent policy on the application of modelling across FRM
  - To focus modelling work using the risk based approach
  - To view our models and datasets as assets
  - To co-ordinate our investment in modelling
  - To identify current and future needs
  - To identify risks to delivery

## FRM Modelling Strategy (2)

We will:

- Reduce the uncertainty associated with modelling outputs according to risk;
- Only use software that has been demonstrated as fit for our purpose;
- Co-ordinate model reuse for multiple purposes;
- Maintain our modelling data and outputs as valuable assets

## FRM Modelling Strategy (3)

We will:

- Improve the performance and efficiency of our modelling;
- Have a consistent suite of modelling tools that are centrally supported for use;
- Ensure that software developed for us is maintained to the benefit of the wider FRM community where possible;
- Support international standards in data and software

## The future?

- Multiple users – internal and external partners
- Multiple models – not just traditional hydrology/hydraulic
- Rationalisation - need to converge data, models and systems
- Common data & models
- Integrated data & models
- Cross-functional modelling
  - Generic modelling strategy?
- Commercial, public and bespoke software
  - Source code availability
  - IPR

## Open MI & the Environment Agency

- Business need?
- Proof of concept/demonstration scenarios
  - Fit-for-purpose
- Compatibility with strategies
- Compatibility with systems & software
- Future-proofing
  - Maintenance/upgrades
  - Modularity
  - Backwards/forwards compatibility

## Summary

- Modelling for FRM supports our decision making
- Models
  - are increasing in complexity
  - need to be reduced in number
- Integration required
  - at the input and output data level?
  - at the parameter/state level?
- Transparency required at all levels
- Pilot cases useful
- Link to business need

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