The Incident Management Forecasting System (IMFS) for England

Providing a better service from end-to-end

Stefan Laeger, Environment Agency

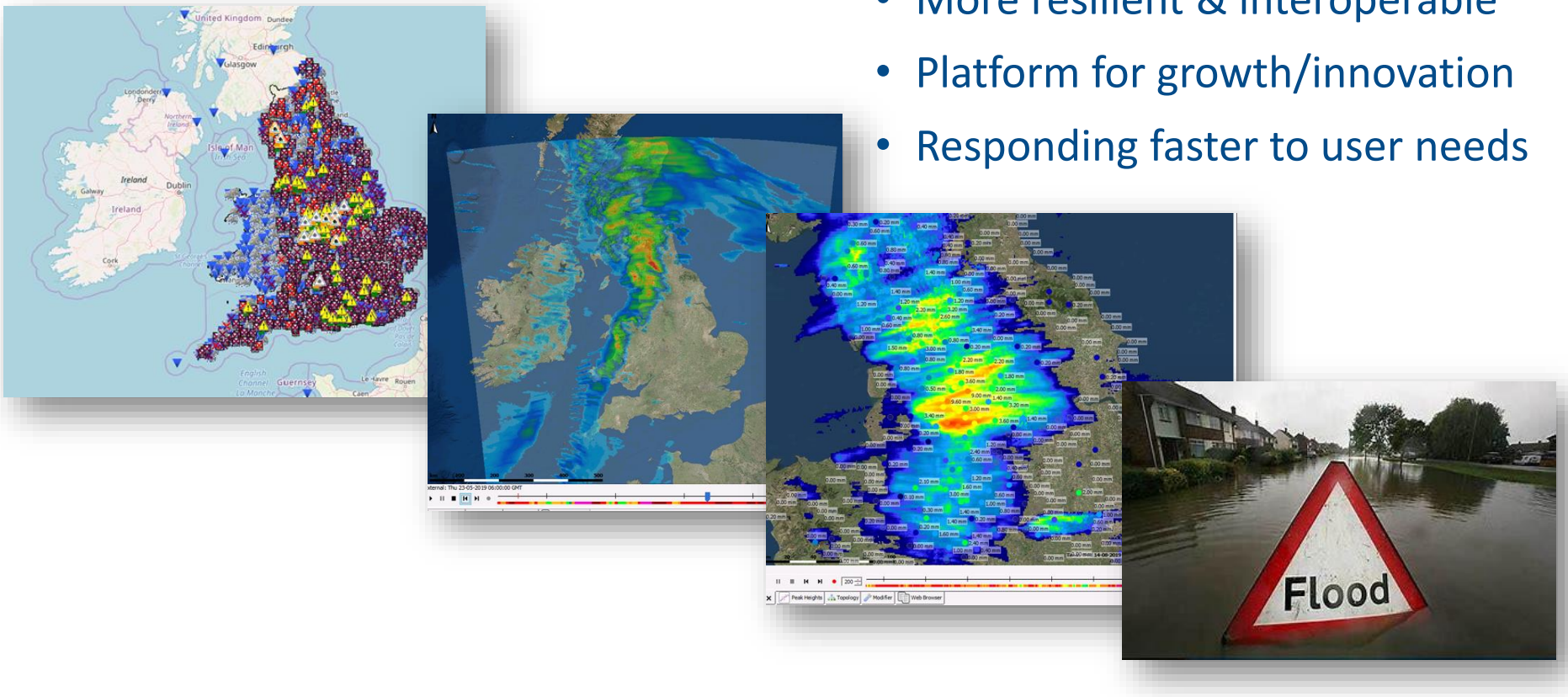
Aims for today

- why the Forecasting Service needed to change,
- What our Incident Management Forecasting System is about
- Wow It will help delivering a ‘new look’ consistent, efficient improved Forecasting Service end-to-end

Leading the way in forecast led incident management

Our new Incident Management Forecasting System (IMFS) makes sure we are resilient and ready to respond to flood incidents in England

- More resilient & interoperable
- Platform for growth/innovation
- Responding faster to user needs

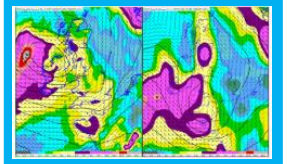


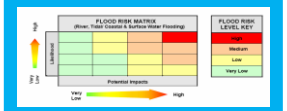
Leading the way in forecast led incident management

Met Office

FLOODFORECASTINGCENTRE

a working partnership between Environment Agency | Met Office





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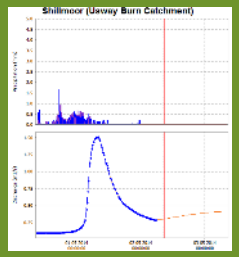

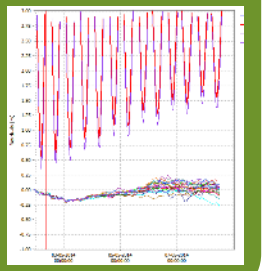

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Outcomes and Benefits

- **Increased efficiency and resilience**
  - 8 into 1' national system - increased interoperability
  - Step change how system is configured/maintained (6500hrs!)
  - Streamlining our stock of legacy models
- **Synergies across the business**
  - Inclusion of Bathing Water
  - Single source for FIM threshold information
- **Improving our service and user experience**
  - Common FF training and exercising
  - Making it easier to forecast BE/RWCS
  - Easier access to historic info and performanc
- **Platform for growth**
  - Scalable - cloud based
  - Ready for ensemble forecasting to make better use of MO info
  - Easier to make future improvements/synergies

Environment Agency

The big picture

- Good delivery and superb team effort - 6 prototypes delivered, 750 legacy models converted
- Ways of working streamlined, interoperability increased, well received ‘show and tell’ sessions
- Ensuring the business this ready and we maintain resilience of and accessibility to the cloud
- Balancing continued delivery with operational FF duties
- Fwd look: final prototype development,
  End to end testing, training/roll out in Spring 2020

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Flood incident management plan 2015–2020

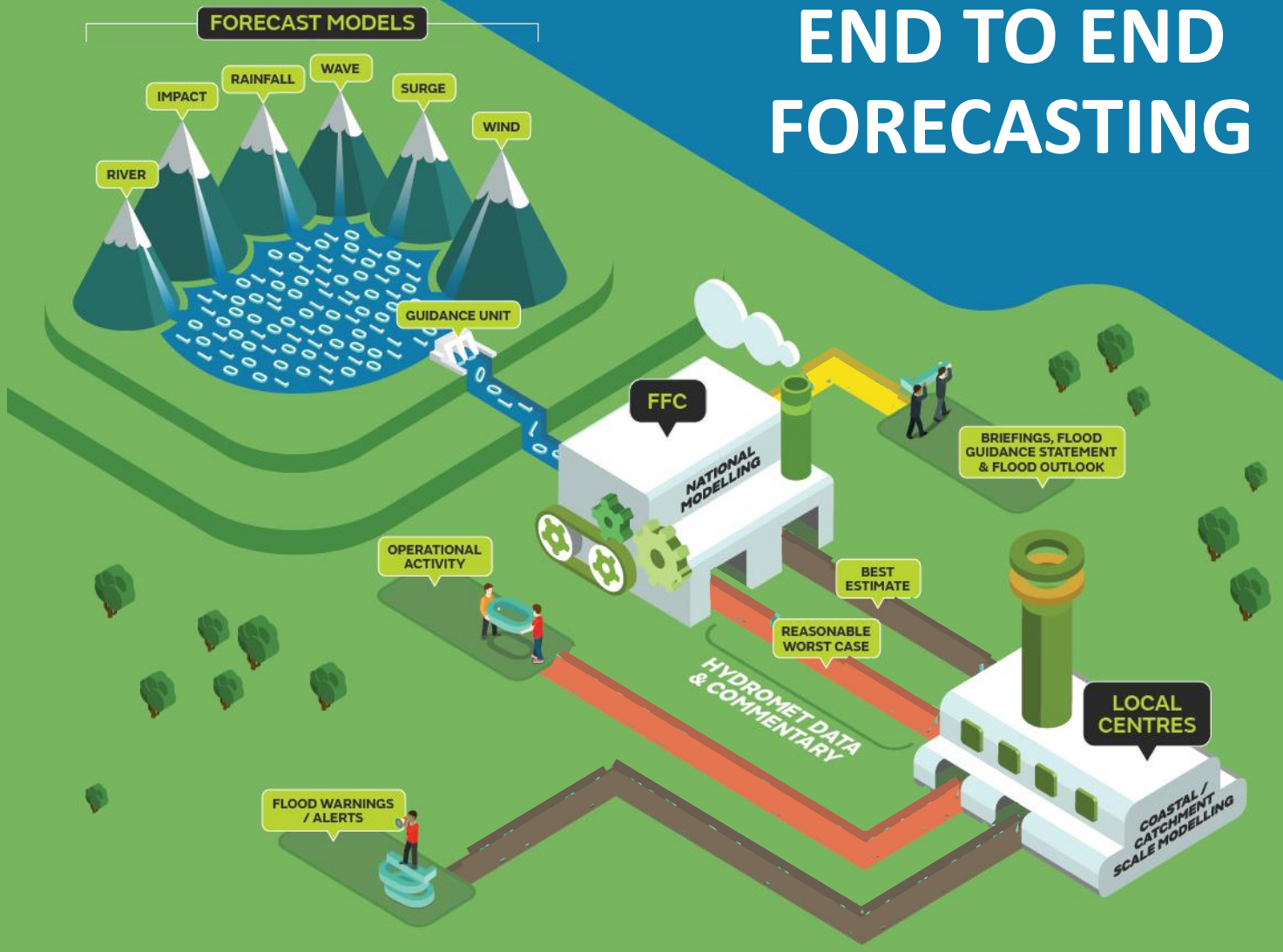
END TO END FORECASTING

Met Office run their weather forecast models for Hydromets at the Flood Forecasting Centre (FFC).

FFC Hydromets create a Best Estimate and Reasonable Worst Case scenario (if required) for EA MFDOs.

EA MFDOs create local flood forecasts to share with national and area customers.

'Decision makers' respond or plan a risk based response to flood forecast.

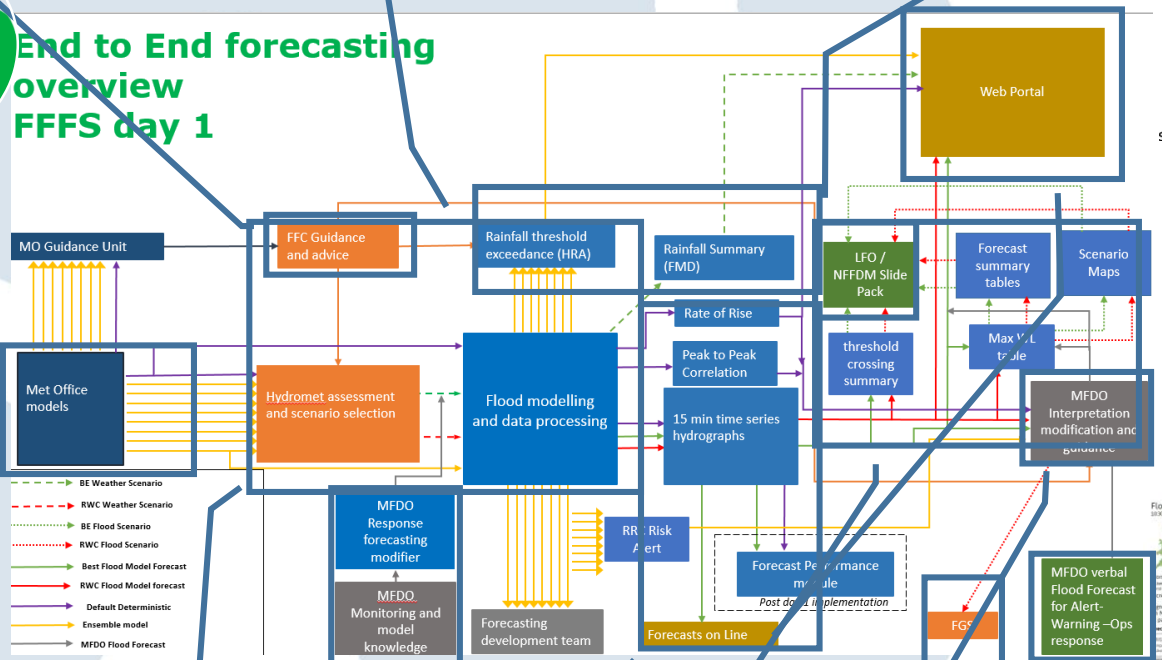


The Forecasting Service end-to-end

FLOODFORECASTINGCENTRE
a working partnership between Environment Agency | Met Office

The FFC then provide expert interpretation and create Be and a RWC scenario if required

It is now that the automatic rainfall products are available on the web portal



Using MEDO consultancy, the outputs

Next process is creation of products.

Using the Hydrometeorological tools, flood model outputs and

Guidance and viewing summary products, decision

data MFDO make any automatically based on the forecast

modifications

FGS reply and LFO content

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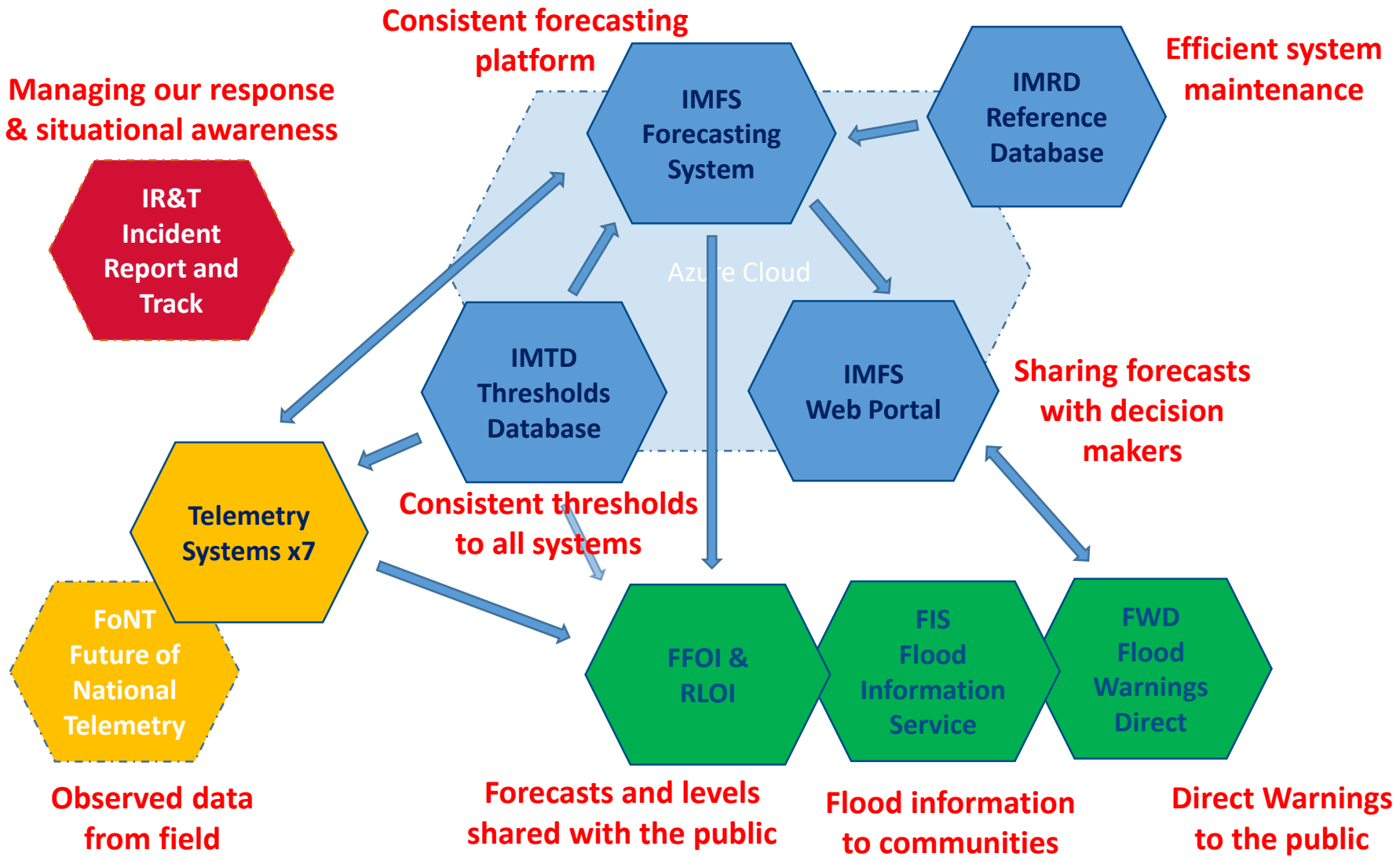
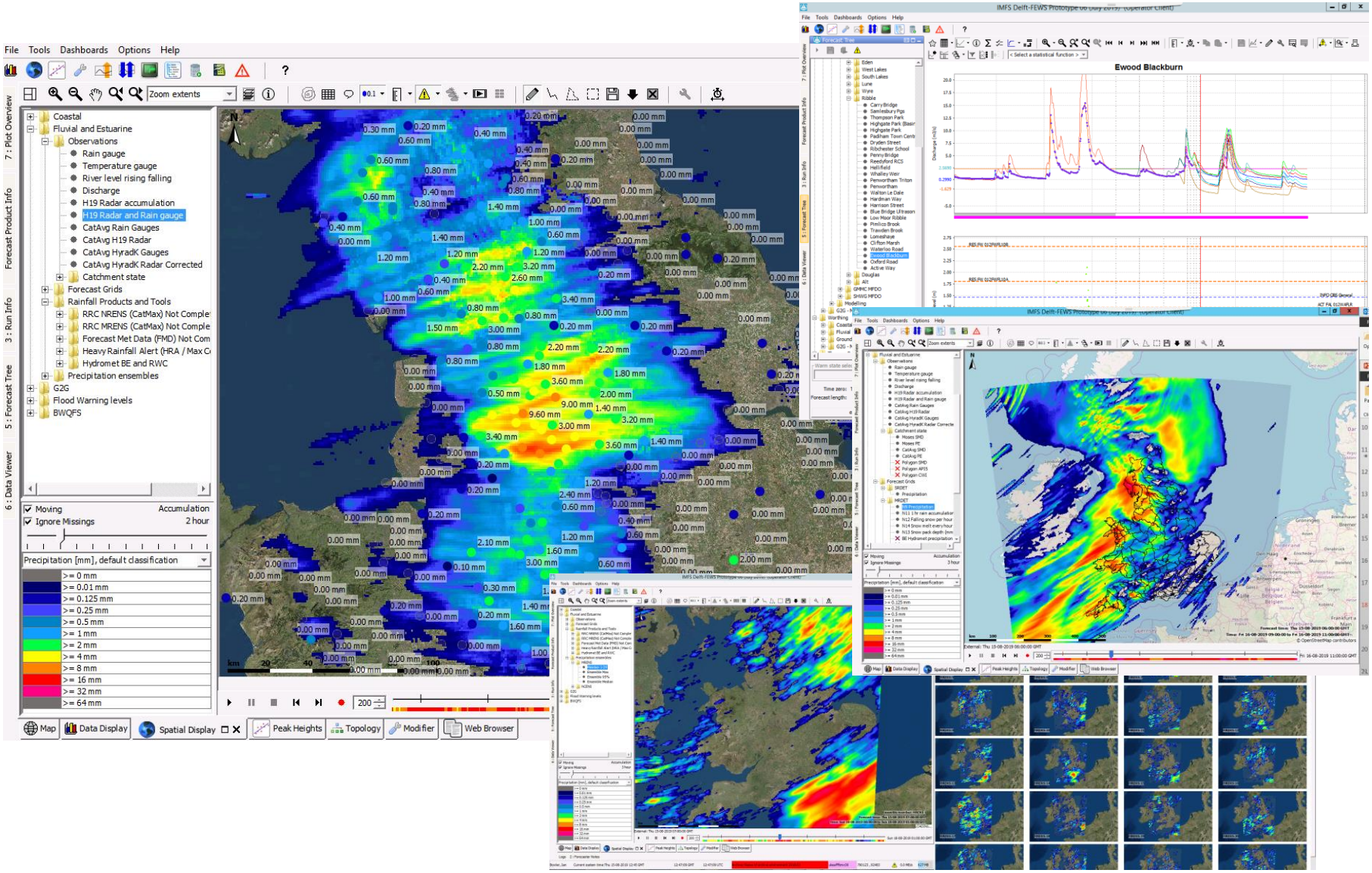
IMFS Explained – Systems linked

So how does IMFS fit together and how do the related systems deliver the Incident Management Service?



IMFS Explained – IMFS highlights

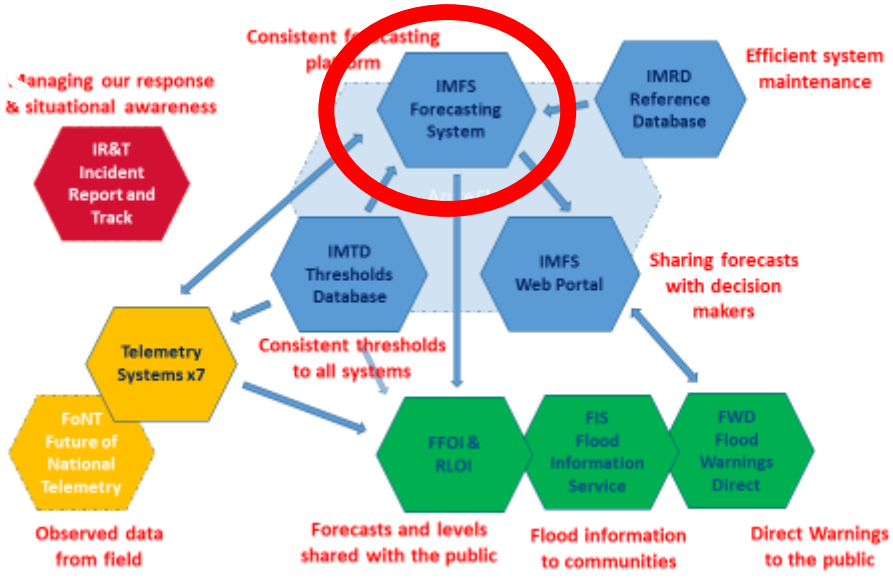
Incident Management Forecasting System – Core Engine



IMFS Explained – IMFS highlights

Who are the users?

All MFDOs and Hydromets



What does it do?

Displays Met Office model data

Where FFC create BE and RWC

Where fluvial models and coastal flood forecast processing occurs and outputs displayed

Why is it better?

All forecasters using one system, consistent data and tools. More efficient to maintain, develop and train users on.

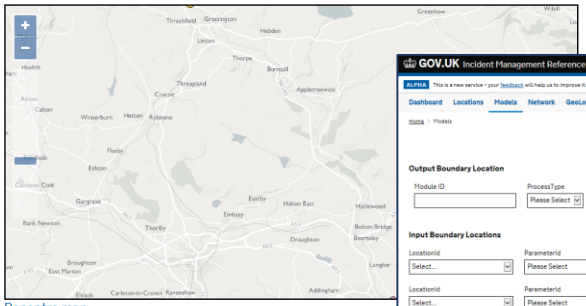
IMFS Explained – IMRD highlights

Incident Management Reference Database and GUI

Addingham FMP

addghm_73

Model Type	FMP
Sub Basin	Wharfe
Basin	Ouse
Comments	Added with Converged Models



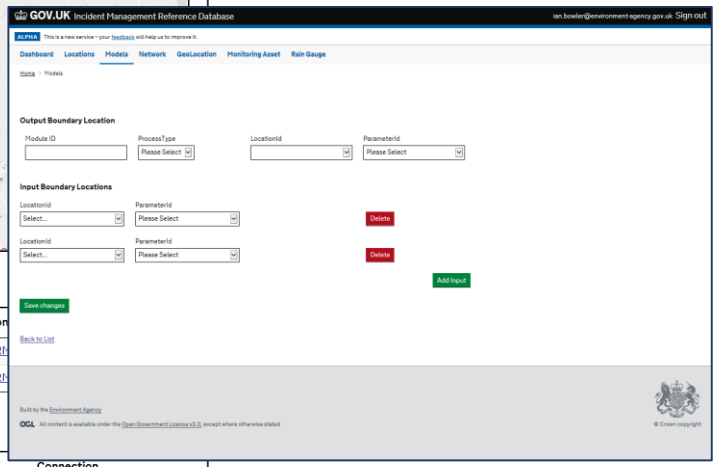
Recentre map

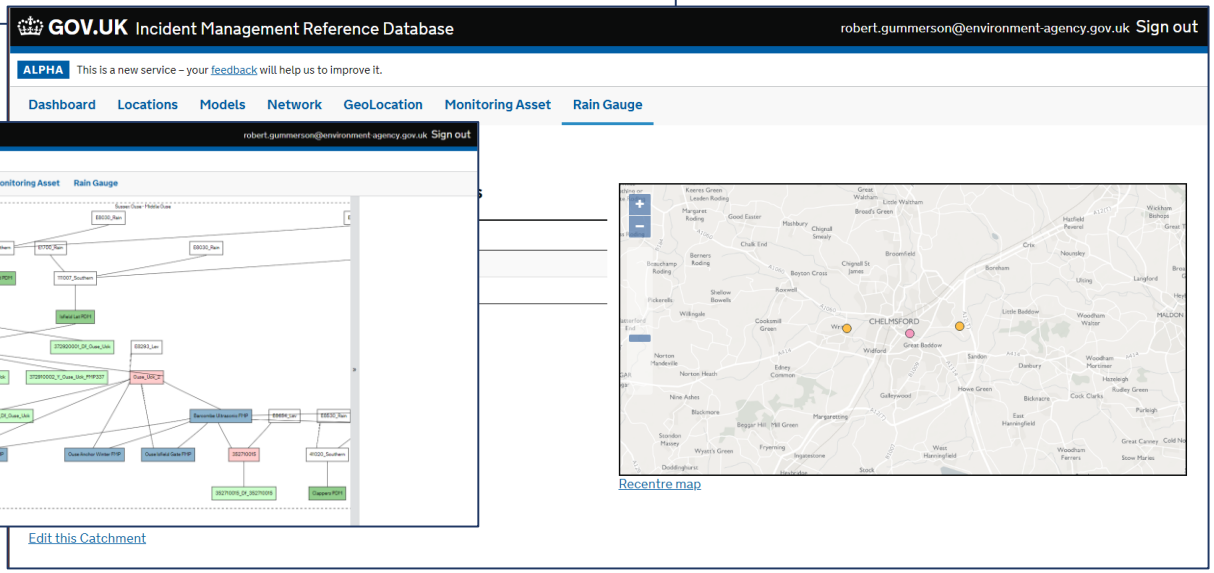
Inputs

Location	Parameter	ExternalID	InitialValue	Con
F1906_SC_bINFLW02_AddinghamFMP	Q.fcast.sim	bINFLW02	0.0	ARI
Netherside Hall	Q.fcast.sim	bINFLW01	0.01	ARI

Outputs

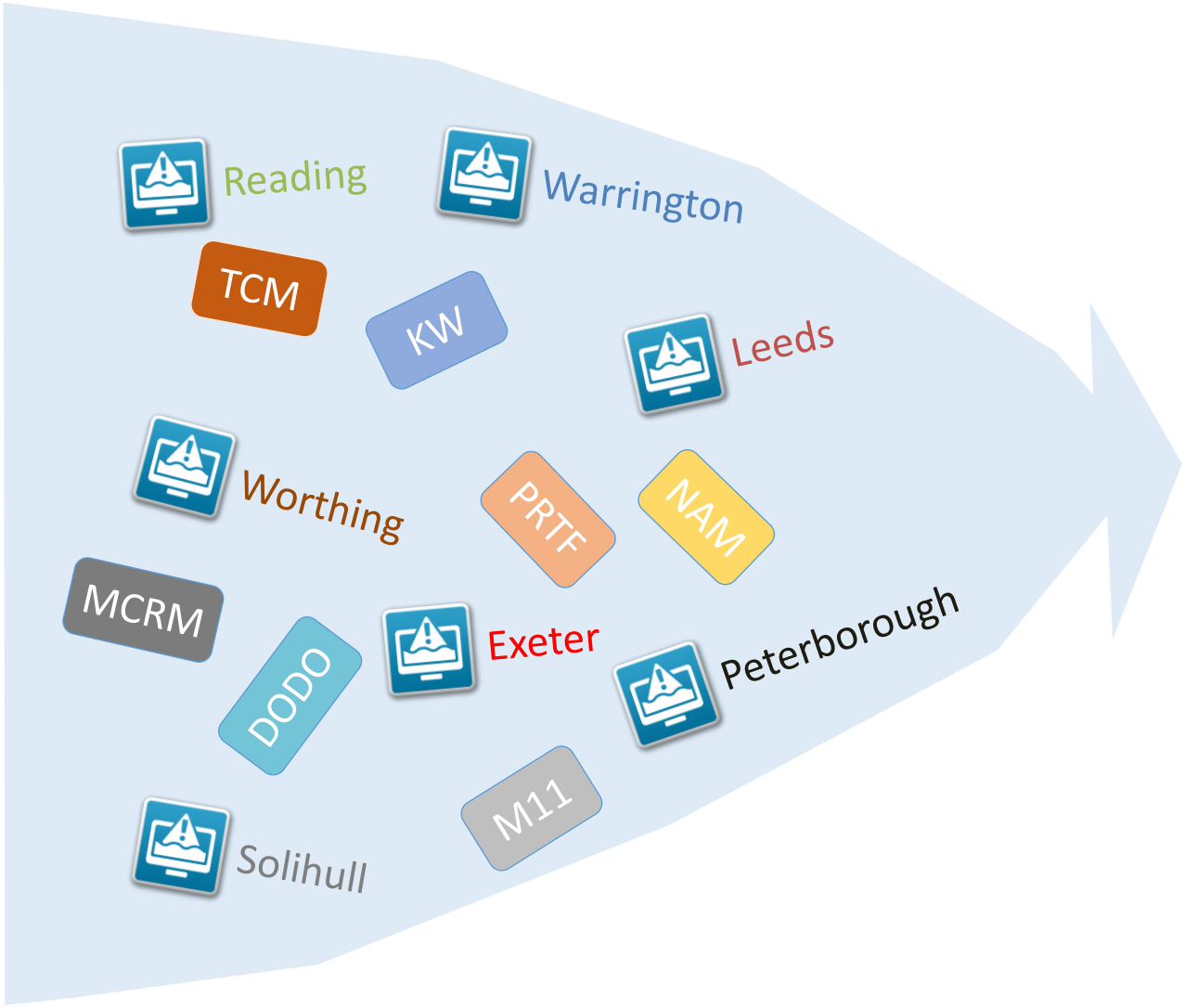
Location	Parameter	ExternalID	InitialValue	Connection
Addingham	Q.fcast.sim	bRCH_09e	0.01	ARMA(F1903)





IMFS Explained – IMRD highlights

A massive change!



Incident
Management
Forecasting
System

England

PDM

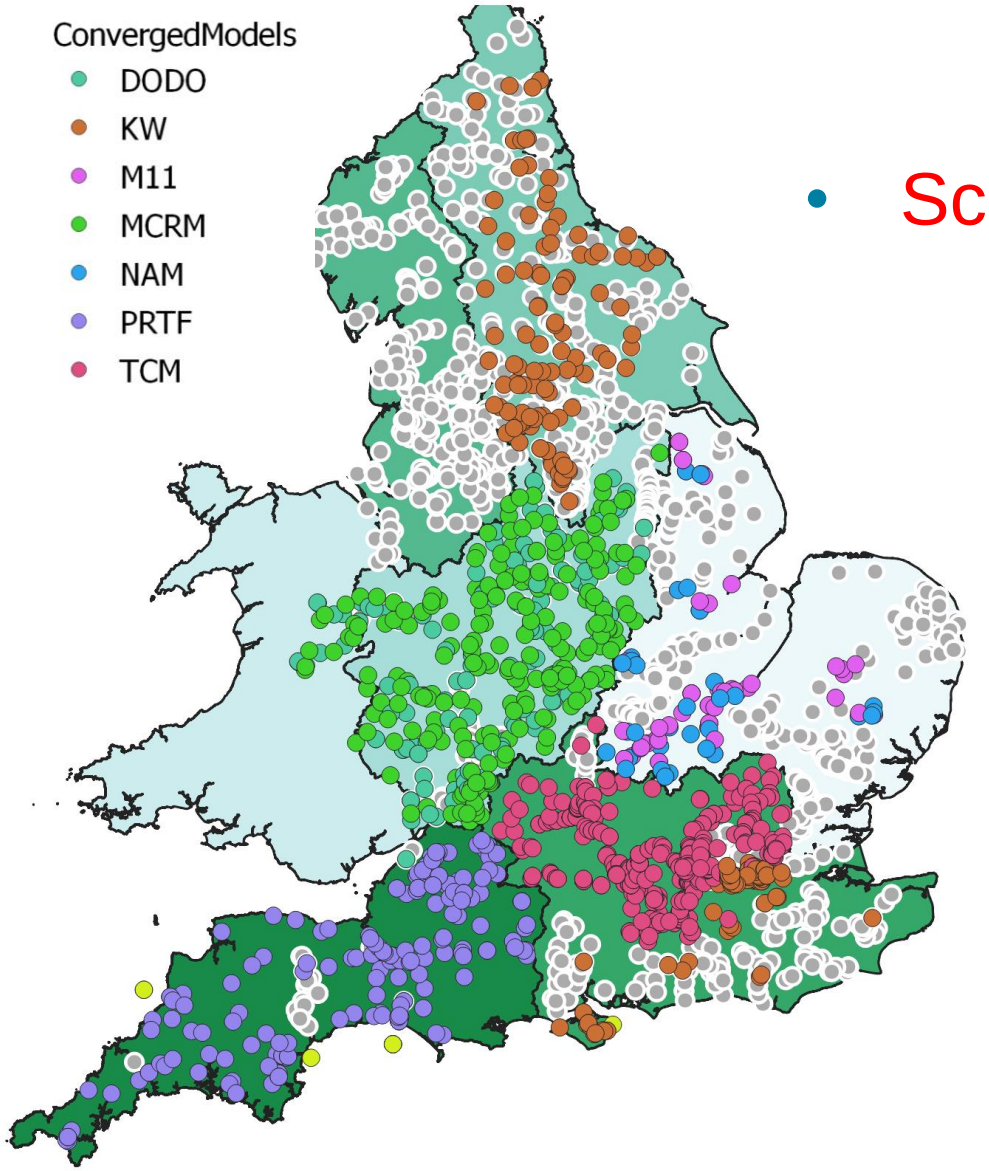
Microsoft Azure

FMP

Consistent working practices

IMFS Explained – IMRD highlights

Challenges



- Scale: >800 models
  - Modelling efficiency
  - Client review process
  - Visualisation of results
  - Comparison with existing

IMFS Explained – IMRD highlights

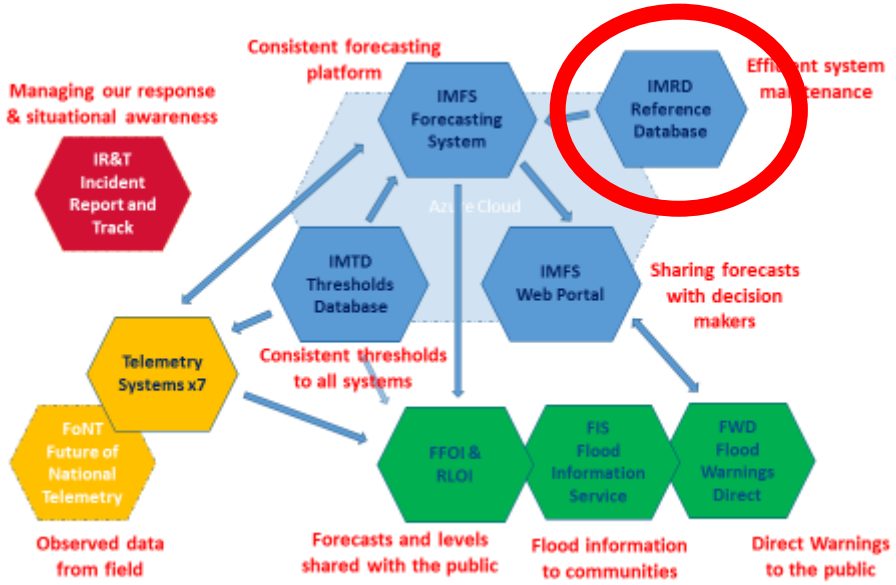
Who are the users?

Digital Services

What does it do?

Is the brains of the forecasting system

Holds all the data and information needed to run the forecasting system



Why is it better?

Replaces 8 inconsistent sets of NFFS configuration

Enables national consistency, efficient maintenance and fast system development

IMFS Explained – IMTD highlights

Incident Management Thresholds Database and GUI

GOV.UK Incident Management Thresholds Database

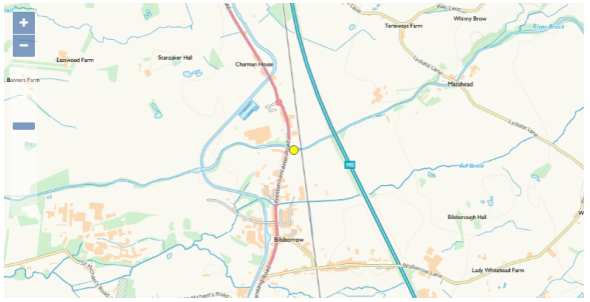
ALPHA This is a new service – your feedback will help us to improve it.

Dashboard Locations Thresholds Multivariate Thresholds Admin

Home > Thresholds > Details > A6 Brock Upstream

Threshold details

Location	A6 Brock Upstream
Value	1.3 mALD
Comment	
Depth Duration	
Direction	Up
Active	Yes



OPS Code	Date Observed	Target Area	Comment
		012WAFUW	

Select an output location: 064FWC9A Winchelsea, Winchelsea Beach and Pett Level

Select a threshold category: All categories

Target Area 064FWC9A Winchelsea, Winchelsea Beach and Pett Level — Edit

Location	Parameter	Qualifier	≥	<
RYE Astro	Tidal	Hi.merged	5.9	
RYE HARBOUR	Wind	Force		4
RYE HARBOUR	Wind	Direction	70	250

Target Area 064FWC9A Winchelsea, Winchelsea Beach and Pett Level — Edit

Location	Parameter	Qualifier	≥	<
RYE Astro	Tidal	Hi.merged	5.6	5.9
RYE HARBOUR	Wind	Force		4
RYE HARBOUR	Wind	Direction	70	250

Target Area 064FWC9A Winchelsea, Winchelsea Beach and Pett Level — Edit

Location information

Name	A6 Brock Upstream
River	River Brock
Description	Fluvial Gauge (Wyre)
Easting/Northing	351210, 440550
Lat/Long	
Catchment	
WISKI IDs	720215
Telemetry ID	720215
RLOI IDs	5022

Thresholds

Search:

Name	Direction	Value	Comments	Parameter	Responses
null	Up	1.3 mALD		Water Level, Stage	1
null	Up	1.1 mALD		Water Level, Stage	1

Showing 1 to 2 of 2 entries

More actions

Add a new threshold at this location

IMFS Explained – IMTD highlights

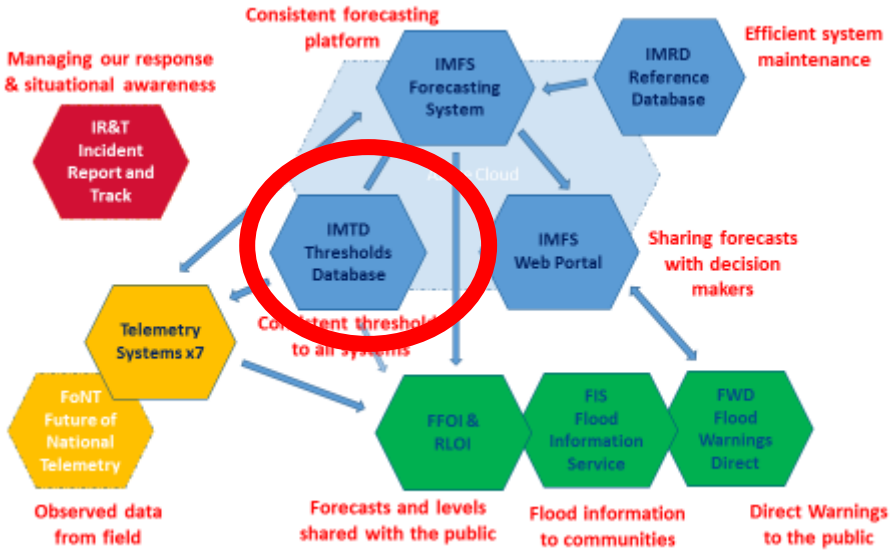
Who are the users?

Area Threshold Editors

Forecasting Threshold Editors

Telemetry Power Users

FFOI/RLOI Power users



What does it do?

Single nation store of all operational Flood related thresholds

Why is it better?

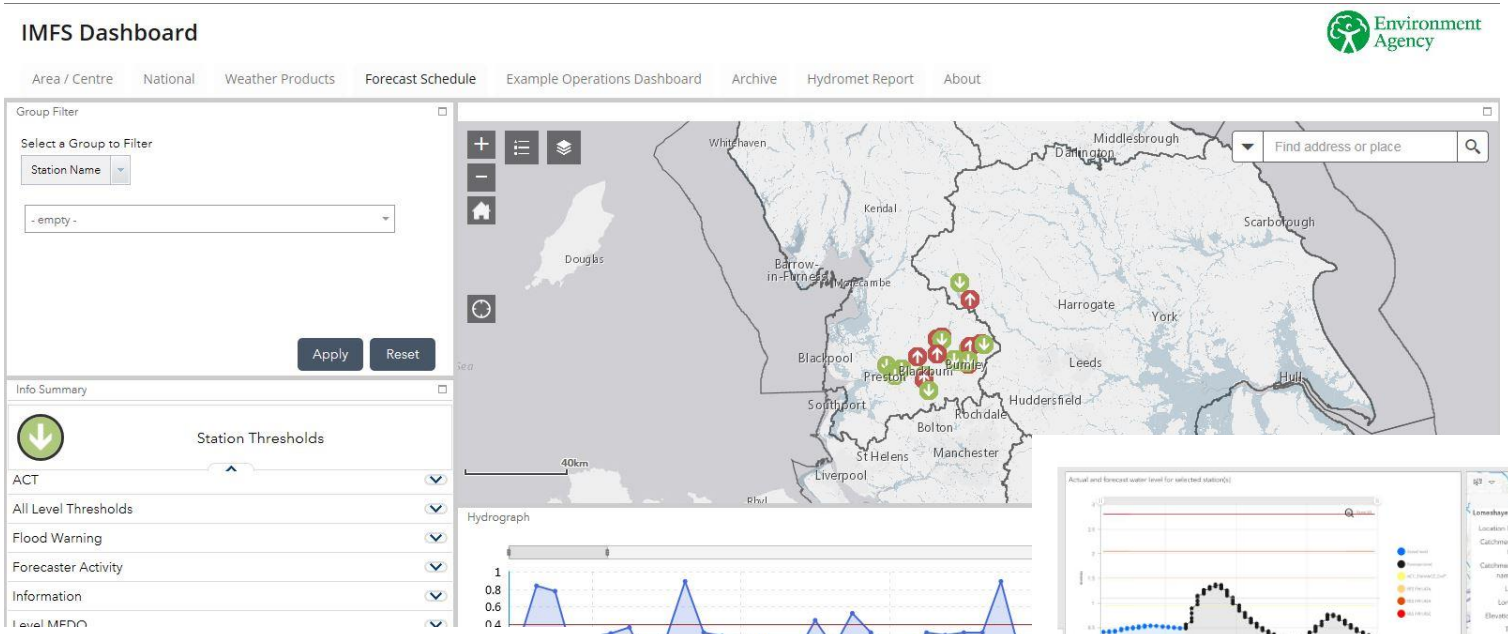
Update multiple systems efficiently

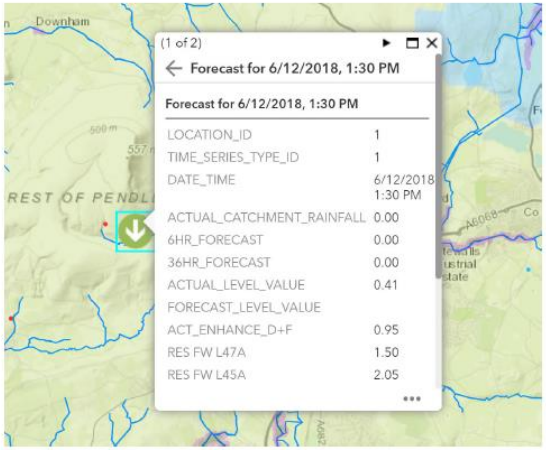
Clarity on what the operational threshold is

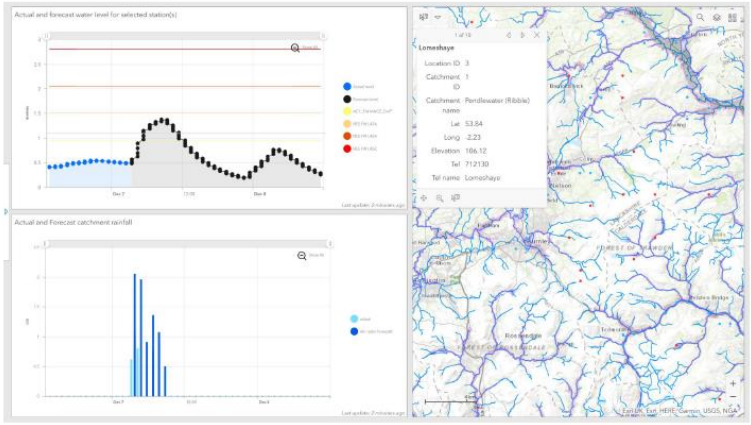
Consistent approach to threshold storage and management

IMFS Explained – Web Portal highlights

Incident Management Forecasting System – Web Portal







esri UK Understanding our world.

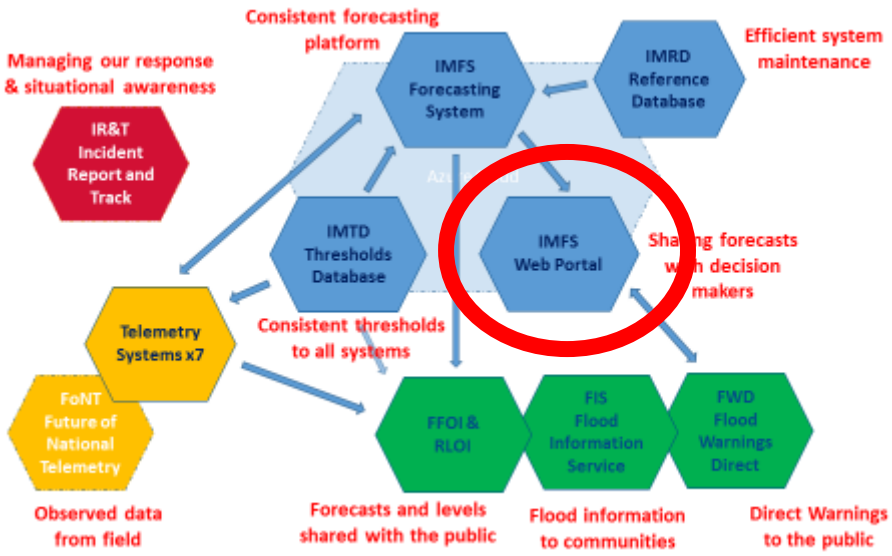
IMFS Explained – Web Portal highlights

Who are the users?

Area Duty roles – FWDO

FIDO, ABC, ADM

National Duty Roles – NFFDM, NDM, NBC



What does it do?

Shop window of the forecasting service

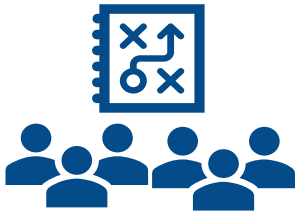
Hydrographs, FFC products, commentary

Why is it better?

National standard with more data, more easily accessible and easier to interpret and use to aid decision making

IMFS Explained

The IMFS Project is not just about building 4 new systems



New ways of working – approach, language, tools, data and how we present our forecasts

Updated procedures with more nationally consistent content

Common national training for MFDOs and all IMFS elements supported by training

Clear launch and handover process to the long term owners of IMFS

IMFS Journey
Key developments on the path to IMFS Day 1

1. Sept 19 – Milestone 1 – All models RTFS models configured and running on IMFS
2. End Nov 19 – Milestone 2 - IMTD ready for operational use
3. Nov 19 – Milestone 3 - Final IMFS Prototype – All functionality for core engine delivered
4. End Jan 2020 – Milestone 4 - Reference Database ready for operational use
5. End Nov 19 – Milestone 5 – Webportal MVP ready for end to end testing
6. End Feb 2020 – Milestone 6 - End to End system integration and testing complete
7. End of Feb 2020 – Start of parallel running
8. Feb 2020 – Training of Forecasters and Webportal users
9. Mid April 2020 – Day 1! – IMFS is the primary forecasting system

IMFS Explained – International Collaboration

- Memorandum of Understanding with Australia's Bureau of Meteorology
- 4-8 March spent with Deltares and Simon Pierotti (Senior Hydrologist) from BoM (top left)
- Synergies and collaborative system/service development including training, exercising and business change

- UK FEWS User Days held in Cardiff in July (bottom right)
- Sharing technical system development and looking for synergies
- Setting longer-term objectives for future sharing on system and service improvements

What's next for IMFS?

Day 1 is only the beginning – there is a backlog of **exciting possibilities**

- Fluvial / Coastal Scenario maps - automated

  This would see the maps published on the web portal – with MFDO commentary and input

- Performance standards fully delivered –

  Potentially hugely powerful. Automated model performance assessment tool assisting MFDOs to understand model performance characteristics

- LFO/NFFDM Slide Pack automation/replacements

- Coastal Real Time Strategy solution

  National consistent coastal forecasting solution will be implemented

- MFDO Action lists and prompts

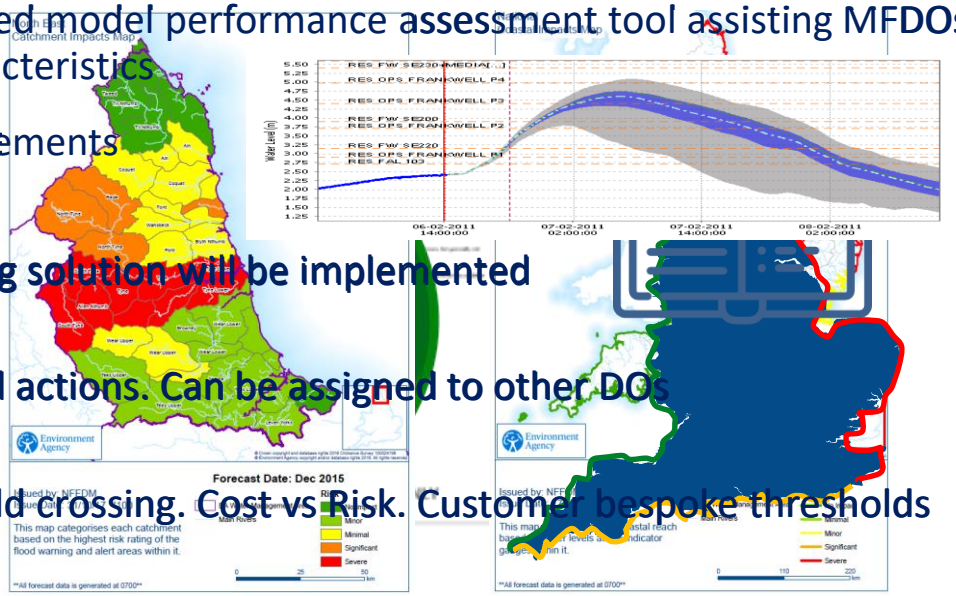
  Automatically generated prompts and actions. Can be assigned to other DOs

- Probabilistic forecasting

  World of fun! % likelihood of threshold crossing. Cost vs Risk. Customer bespoke thresholds

- And, and, and…

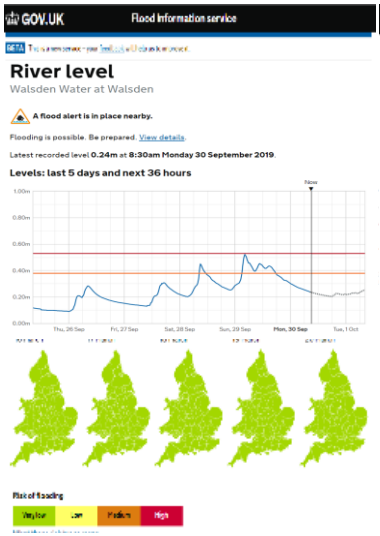
  There is a world of possibilities and developments available. Impact forecasting, HSR next steps, automation of Flood Alerts (!), Webcam and CCTV feeds, Forecast alerting (FoNT) etc

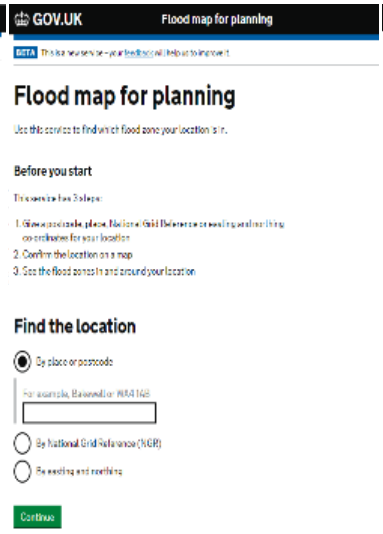


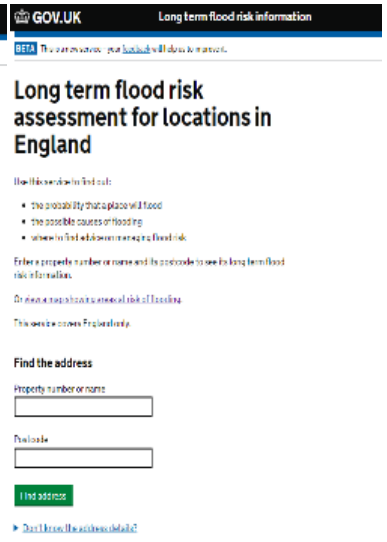
Key milestones - summary

Approval of BCUR/new contractor	Complete (Oct 18)!
Prototypes 0, 1, 2, 3, 4, 5 and 6	Complete!
Trialing of shadow system Full end to end testing	early Dec 2019 Jan 2020 onwards
Training of users	Jan – April 2020
Switch over to new system/Day 1	end April 2020 (BE) End July 2020 (RWCS)

Maximising the **benefits of FF &** Giving power to the **people**







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