UK Flood Hydrology Roadmap Survey

This online survey was carried out in April 2019. The results are presented in the format delivered by the survey system. The names of individuals and organisation names have been anonymised to protect their identity. Information that has been changed is contained in square brackets [ ].

A list of abbreviations is available at the end of the document. These have been inferred after the survey and may not be completely accurate.

1. The Flood Hydrology Road Map will cover flood hydrology for both forecasting and flood estimation.

Which is your primary interest?

		Response Percent	Response Total
1	Forecasting	13.60%	17
2	Flood Estimation	56.00%	70
3	Both	30.40%	38

Analysis							
	Mean:	2.17	Std. Deviation:	0.64	Satisfaction Rate:	58.4	answered 125
	Variance:	0.41	Std. Error:	0.06			skipped 0

2. The Flood Hydrology Road Map will cover four main inland flood sources: Groundwater, Surface water and sewers, Reservoirs and Fluvial systems.

We will make links to the coast and water resources work where we can.

What are your primary and secondary interests or areas of expertise?

	Primary interest	Secondary interest	Little interest or expertise	Response Total
Groundwater forecasting	10.4% (13)	24.8% (31)	64.8% (81)	125
Groundwater flood estimation	11.2% (14)	40.8% (51)	48.0% (60)	125
Surface water and sewer forecasting	20.0% (25)	33.6% (42)	46.4% (58)	125
Surface water and sewer flood estimation	32.0% (40)	45.6% (57)	22.4% (28)	125
Reservoir forecasting	8.8% (11)	39.2% (49)	52.0% (65)	125
Reservoir flood estimation	30.4% (38)	37.6% (47)	32.0% (40)	125
Fluvial forecasting	46.4% (58)	33.6% (42)	20.0% (25)	125
Fluvial flood estimation	75.2% (94)	20.0% (25)	4.8% (6)	125

2. The Flood Hydrology Road Map will cover four main inland flood sources: Groundwater, Surface water and sewers, Reservoirs and Fluvial systems.

We will make links to the coast and water resources work where we can.

What are your primary and secondary interests or areas of expertise?

	Primary interest	Secondary interest	Little interest or expertise	Response Total
			answered	125
			skipped	0

Other: (please specify) (17)

1	29/04/2019 19:23 PM ID: 115203101	Snowmelt flood estimation
2	30/04/2019 12:40 PM ID: 115261724	How flood hydrology is affected by geomorphological changes (changes to width, depth, roughness of channels & floodplains)
3	30/04/2019 13:07 PM ID: 115265228	Soil health and effect on flood water retention
4	01/05/2019 20:32 PM ID: 115443184	Flood history especially flash floods
5	02/05/2019 12:26 PM ID: 115501184	Canal flood forecasting
6	10/05/2019 12:52 PM ID: 115383239	Coastal forecasting (primary) and estimation (secondary)
7	13/05/2019 10:48 AM ID: 116422927	Flood warning thresholds
8	15/05/2019 12:27 PM ID: 116674043	[removed to protect the identity of an individual]. Hydrology outputs are key to good decisions.
9	17/05/2019 16:45 PM ID: 116772689	Integrated catchment management
10	17/05/2019 17:11 PM ID: 116970244	Monitoring floods
11	18/05/2019 18:55 PM ID: 117057658	Hydrologic modelling
12	18/05/2019 22:02 PM ID: 116681882	Flood event data
13	19/05/2019 21:22 PM ID: 115953502	Rainfall analysis - design and observed
14	19/05/2019 23:56 PM ID: 117116149	I have experience in the above topics but my primary interest is now in drought severity assessment from rainfall data
15	22/05/2019 12:29 PM ID: 117376373	Combined sources - including tidal
16	23/05/2019 16:48 PM ID: 117496746	Coastal Forecasting as well,
17	25/05/2019 01:08 AM ID: 117458964	Flood impact forecasting

Matrix Charts

Groundwater forecasting		Response Percent	Response Total
1	Primary interest	10.4%	13
2	Secondary interest	24.8%	31
3	Little interest or expertise	64.8%	81

Analysis							answered	125
	Mean:	2.54	Std. Deviation:	0.68	Satisfaction Rate:	77.2		
	Variance:	0.46	Std. Error:	0.06				

Groundwater flood estimation		Response Percent	Response Total
1	Primary interest	11.2%	14
2	Secondary interest	40.8%	51
3	Little interest or expertise	48.0%	60

Analysis							answered	125
	Mean:	2.37	Std. Deviation:	0.68	Satisfaction Rate:	68.4		
	Variance:	0.46	Std. Error:	0.06				

Surface water and sewer forecasting		Response Percent	Response Total
1	Primary interest	20.0%	25
2	Secondary interest	33.6%	42
3	Little interest or expertise	46.4%	58

Analysis							answered	125
	Mean:	2.26	Std. Deviation:	0.77	Satisfaction Rate:	63.2		
	Variance:	0.59	Std. Error:	0.07				

Surface water and sewer flood estimation		Response Percent	Response Total
1	Primary interest	32.0%	40
2	Secondary interest	45.6%	57
3	Little interest or expertise	22.4%	28

Analysis							answered	125
	Mean:	1.9	Std. Deviation:	0.73	Satisfaction Rate:	45.2		
	Variance:	0.53	Std. Error:	0.07				

Reservoir forecasting			Response Percent	Response Total
1	Primary interest		8.8%	11
2	Secondary interest		39.2%	49
3	Little interest or expertise		52.0%	65
Analysis	Mean: 2.43 | Std. Deviation: 0.65 | Satisfaction Rate: 71.6 Variance: 0.42 | Std. Error: 0.06		answered	125

Reservoir flood estimation			Response Percent	Response Total
1	Primary interest		30.4%	38
2	Secondary interest		37.6%	47
3	Little interest or expertise		32.0%	40
Analysis	Mean: 2.02 | Std. Deviation: 0.79 | Satisfaction Rate: 50.8 Variance: 0.62 | Std. Error: 0.07		answered	125

Fluvial forecasting			Response Percent	Response Total
1	Primary interest		46.4%	58
2	Secondary interest		33.6%	42
3	Little interest or expertise		20.0%	25
Analysis	Mean: 1.74 | Std. Deviation: 0.77 | Satisfaction Rate: 36.8 Variance: 0.59 | Std. Error: 0.07		answered	125

Fluvial flood estimation			Response Percent	Response Total
1	Primary interest		75.2%	94
2	Secondary interest		20.0%	25
3	Little interest or expertise		4.8%	6
Analysis	Mean: 1.3 | Std. Deviation: 0.55 | Satisfaction Rate: 14.8 Variance: 0.3 | Std. Error: 0.05		answered	125

3. What do you think about this draft UK vision for flood hydrology?

In 25 years, through collaboration, society will have the best hydrological information and understanding to manage the impacts of flooding, from all sources, at all scales, in a changing world. Flood hydrology will be aligned with best available and continuously improving whole system process understanding, underpinned by excellent data and evidence to quantify uncertainty & other characteristics and its sources, tailored to each location and different time scales. Methods will be applied in a consistent, sustainable and open way to enable robust decision-making. We recognise that leadership, championing and partnership are key to delivery of this vision.

Is there anything missing? Tell us what you think in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	78

1	29/04/2019 16:06 PM ID: 115180310	"We recognise that leadership, championing, Education and partnership are key to delivery of this vision."
2	29/04/2019 16:09 PM ID: 115180750	Given the huge amount of useful data that can be collated via new sources (the internet, social media, drone data) I think there should be a aim to actively engage with these sources not previously available.
3	29/04/2019 16:29 PM ID: 115183952	I don't think this is achievable - "The best hydrological information and understanding" implies long reliable gauged data in all locations, which won't be possible.
4	29/04/2019 16:31 PM ID: 115182364	Develop a National consortium to ensure adoption of consistent techniques between [organisation names(s) removed] and dissemination of information (so that hydrologists are informed on the release of new data and methods, rather than by osmosis).
5	29/04/2019 16:44 PM ID: 115183749	Could this be more succinct or broken down further, at the moment it feels a bit wordy and lacks punch How can a method be applied in a sustainable way? Whilst we need best available/excellent data, should this also bring in the need to be proportionate when it comes to decision making? We don't always need the best available data or the most detailed models to be able to make the right investment decision.
6	29/04/2019 19:23 PM ID: 115203101	Is this a shared UK vision? Scotland and Northern Ireland do not appear to be explicit finders or have representatives.
7	29/04/2019 20:22 PM ID: 115206676	Available software packages must support the relevant hydrological models, which between them should be able to represent all relevant sources of flow and interaction between sources
8	30/04/2019 09:38 AM ID: 115241585	I don't understand the 25 year horizon. It's rather long and in a way as knowledge moves forward (and in particular the ever changing computing) it seems rather we are chasing the goal forever as the goalposts are changing forever.
9	30/04/2019 10:34 AM ID: 115245631	Mention of a central suppository of flood data (to help ensure methods are consistent) might be good - e.g. the one from FFIR?
10	30/04/2019 11:47 AM ID: 115259106	Seems to include everything - not sure about the '& other characteristics' part - seems completely loose - not quite sure what that means.
11	30/04/2019 12:40 PM ID: 115261724	Knowing about hydrology alone isn't enough to manage the impacts of flooding. Flooding is a landscape process: water flows over, through and under the land. The shape, layout, slope and roughness of the land fundamentally controls flooding - how fast the water flows, where it goes, how much water can be accommodated. The landscape also responds to flooding via erosion and deposition - geomorphic processes. The vision misses all this. It needs to mention the landscape and the processes that shape it, and that thereby control flood risk.
12	30/04/2019 13:07 PM ID: 115265228	Hydrology will become an integral part of a sustainable agriculture, forestry, horticulture and land management system

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
13	30/04/2019 14:28 PM ID: 115249000	Access to datasets - digital free access to all practitioners and the public?		
14	30/04/2019 19:22 PM ID: 115320893	It's ambitious but a bit vague.		
15	01/05/2019 15:47 PM ID: 115414133	I don't think there is anything missing.		
16	01/05/2019 18:13 PM ID: 115431558	The first bullet point seems a bit inconsistent with the second. There is a limit to how much we can improve our base hydrological information with the funding that we have. It's also questionable whether we need the 'best' or just, 'good enough'. The first point seems unrealistic, whereas the second point mentions 'best available' which seems a bit more realistic. It's not entirely clear what applying a method in a 'sustainable' way would involve.		
17	01/05/2019 20:32 PM ID: 115443184	That is a fair description		
18	02/05/2019 12:41 PM ID: 115501839	Seems complete enough		
19	02/05/2019 14:48 PM ID: 115198816	Evidence-based decision making; open scenario thinking before decisions are made.		
20	03/05/2019 09:57 AM ID: 115578165	nothing to add		
21	03/05/2019 10:52 AM ID: 115580983	Sounds good, especially the bit about consistency.		
22	07/05/2019 11:58 AM ID: 115871782	The UK's leading role in hydrology is underpinned by data. Good data management, achieved through single ownership and management, should be defined in this vision. I would replace "aligned with... whole process understanding," with "complemented with... whole process understanding". And mention "underpinned by excellent data" before the other things.		
23	08/05/2019 09:46 AM ID: 115999807	Should include a general push for improved understanding of the statistical underpinnings of the above methods, to ensure that the methods used are appropriate in the first place.		
24	08/05/2019 16:34 PM ID: 116056900	Missing Comment on training and/or improving public knowledge. Promotion of flood hydrology as a profession that is well respected. Comment on proposed text Second bullet point above is too long and sentences too complicated. Difficult to read and you have forgotten the start before you get to the end.		
25	08/05/2019 17:58 PM ID: 116061289	Use "transparent". I know you have open but I don't think [method removed to protect organisation(s) identity] is transparent and I would very much like this. I also think rainfall estimation and data should be free and "available for all". It currently is not. Maybe this is what you meant by open? If the intent is to provide another paid for service then I wouldn't be supportive.		

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
26	08/05/2019 20:56 PM ID: 115775975	realistically I think 'will have the best hydrological information' will not happen and I would change this to 'will have substantially better information' although I agree with the second bullet, the first sentence of the second bullet needs to be written in clearer English		
27	09/05/2019 15:19 PM ID: 116159498	"Changing world" is rather vague. Does it mean climate change, which should be explicitly mentioned, or a developing world, or both?		
28	09/05/2019 16:49 PM ID: 116171071	top bullet is v good		
29	10/05/2019 12:52 PM ID: 115383239	No this is an acceptable high level vision. I am glad to see UK is the basis as hydrology needs to be something still managed and delivered to UK standards (and international) rather than become subject to devolved approaches (inconsistency) across the UK nations (E, S, W & NI). Rainfall, rivers and GW do not respect political borders.		
30	10/05/2019 15:32 PM ID: 116268906	Something around probabilistic forecasting? '...underpinned by excellent data and evidence to quantify uncertainty using a probabilistic approach' or something similar?		
31	13/05/2019 10:48 AM ID: 116422927	I think the vision is a good one. However, I would question how realistic it is, particularly with regards to 'excellent data and evidence'. Having been in the industry for over 10 years it is apparent that there is a lack of investment in flow monitoring and recording / gauging stations, and in the development of accurate rating equations, due to the lack of funding.		
32	13/05/2019 13:37 PM ID: 116449651	I am not sure that in 25 years time we will have the best hydrological information for impacts of flood from all sources and all scales. We would need to start implementing monitoring/data collection immediately to be confident to meet this statement.		
33	13/05/2019 15:07 PM ID: 116463005	Something about cost effectiveness might be good, e.g. "with methods appropriate to the level of analysis"		
34	13/05/2019 16:08 PM ID: 116472899	Real measured accurate data with known uncertainty parameters is key to the above		
35	14/05/2019 10:44 AM ID: 116552099	*		
36	14/05/2019 10:52 AM ID: 116548266	Make sure it is aspirational and ambitious!		
37	14/05/2019 12:28 PM ID: 116569052	Aligning this with permitting regulations and enforcement to ensure the work is applied		
38	14/05/2019 13:08 PM ID: 116573674	Although covered by "a changing world" it would be good to specifically reference climate change		
39	14/05/2019 13:59 PM ID: 116581156	First sentence of second bullet does not read too well. I might rephrase: Flood hydrology will be aligned with the best available and continuously improved understanding of hydrological system processes,		

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			Response Percent	Response Total
40	14/05/2019 16:48 PM ID: 116603459	Hydrological information should be communicable to all so that we can easily explain, for example, flooding impacts, to non-experts		
41	14/05/2019 17:22 PM ID: 116606375	You do not define what you mean by Flood hydrology so it is difficult to determine what you mean. Flooding as opposed to flood hydrology describes a range of processes that influence society and ecosystems and link more strongly to other research and strategic activity. I'd like to see the definition to be able to answer this question. My fear is it's all about flows of water and misses out the fact it includes a wider range of fluxes and associated biophysical and socio-ecological factors.		
42	15/05/2019 12:27 PM ID: 116674043	Reporting must clearly identify assumptions and their rational while outputs should be provided with tolerances to enable users to better understand the impact of uncertainties.		
43	15/05/2019 22:53 PM ID: 116749371	Great vision & wholly agree. How are we measuring / benchmarking what we mean by "best" information - best internationally / nationally? Does it need to be the best, or just robust enough for our decision making? Same goes for "excellent data" - do we know what this looks like?		
44	16/05/2019 10:27 AM ID: 116787849	We need to start with open data. [organisation names(s) removed] does not have the resource to do all this and will need to rely on the hydrology community. The first step to doing this is to increase the data available online.		
45	16/05/2019 10:51 AM ID: 116792107	It's good. I like the reference to uncertainty, and all scales I wonder whether in the future we should split things into "sources" - perhaps it would be better to recognise there is a continuum.		
46	16/05/2019 11:10 AM ID: 116793030	Through collaboration with who? I'd specify "UK society" in the first bullet. Can we mitigate and manage the impacts, rather than just managing them? It would be good to say something with regard to being proactive, rather than reactive - can we increase "resilience" (keyword!).		
47	16/05/2019 11:27 AM ID: 116788544	I think it's an excellent summary overall for the UK vision for flood hydrology. However, I think there should be more emphasis on the changing world i.e. climate change, urbanisation i.e. looking at trends in observed datasets (non stationarity analysis) and applying these trends into the future to determine flood risk to aid future planning. I know that a lot of work on this has already started in Cumbria and the NW of England in general. But it would make sense to incorporate this work within future guidelines. Maybe this is included later and the vision obviously has to be concise.		
48	16/05/2019 12:22 PM ID: 116806561	The aims are good. The first sentence in the 2nd bullet point is a bit of a mouthful and takes a few readings to understand. This could be simplified or broken down into more points.		
49	16/05/2019 12:37 PM ID: 116804203	Funding?		
50	16/05/2019 14:30 PM ID: 116829098	"Underpinned by excellent data and evidence to quantify uncertainty & other characteristics"		

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			Response Percent	Response Total
		Other characteristics is a little vague here and I think it would be useful to be more specific.		
51	16/05/2019 16:14 PM ID: 116013085	On a technical level: How good is "best" and "Excellent"? We need to know how good is going to be good enough without wasting resource on unneeded precision or accuracy. Is it worth explicitly mentioning that hydrological science and general computational / technological advances need to advance hand-in-hand? Technological advances may begin to change flood hydrology beyond recognition in the coming decades. As a peripheral comment: The second paragraph is difficult to read, it needs more punctuation as there are some ambiguities present.		
52	16/05/2019 17:21 PM ID: 116851056	I think there should be something about openness and availability of data in there. [organisation names(s) removed] has taken great strides to make its data free of charge but there is still work to be done to make data free to users, [method removed to protect organisation(s) identity], Making data free and open source will open it up to a wider user-base, which in turn will drive innovation.		
53	17/05/2019 12:25 PM ID: 116931781	25 years seems like a long time. We need answers much sooner than that.		
54	17/05/2019 13:13 PM ID: 116938744	The use of the word "best" is loose in this current wording; it implies a comparison, but it's not clear what it's being compared with. "The world"? The vision makes no distinction between practice and science; there will always be a gap between best available science, and the adopted practice, and the second bullet could be refined by acknowledging that gap. I feel that "communication" should be mentioned somewhere in this vision; most of the errors that I see in practice are down to poor communication of guidance; poor uptake of latest practice is often down to poor communication.		
55	17/05/2019 13:28 PM ID: 116938355	There needs to be joined up approach between [organisation names(s) removed] as flooding should be seen as integrated resulting from various sources.		
56	17/05/2019 14:13 PM ID: 116948761	Focus on manging the impacts about flooding seems strange. What about the sources, for example? We can't control the rain but we can influence some sources. Buzzwords: what is championing, for instance? Why deliver a vision rather than achieve it, or realise it, for instance?		
57	17/05/2019 16:45 PM ID: 116772689	The vision should mention that the Roadmap should provide research that informs the implementation of policy, in particular the Flood and Coastal Erosion Risk Management (FCERM) Strategy and associated policies. It should also mentioned that the Roadmap intends to be a guiding framework for hydrology research (and not just for [organisation names(s) removed]). The introduction to the Roadmap should explain how it relates to relevant strategies/plans being developed.		

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			Response Percent	Response Total
58	17/05/2019 17:11 PM ID: 116970244	The Flood Hydrology community will collaborate widely to ensure the need for robust and timely hydrological drives innovation and delivers the best possible monitoring solutions. (Maybe this is captured in next section!)		
59	18/05/2019 13:37 PM ID: 117028508	It's hard to disagree with anything written, but it's a bit fluffy and vague unless underpinned by a programme of investment. No one is going to argue against partnerships (of and for whom?) but they and mustn't be allowed to take the place of proper investment in R&D and implementation.		
60	18/05/2019 17:03 PM ID: 115187747	Does it cover dam failure flooding, perhaps better described as structure failure since there are various sources (dams, embankments etc.) than can cause flooding. Does your aspiration cover that source? Seems to target process understanding - does this description include the estimation based on statistical techniques and use of empirical information.		
61	18/05/2019 18:55 PM ID: 117057658	Rather than "to quantify uncertainty & other characteristics and its sources" I would probably say "to quantify and attribute uncertainty". I think "other characteristics" is confusing. I was at the meeting when the vision was formulated and I am confused what other characteristics means! I also find "We recognise that leadership, championing and partnership are key to delivery of this vision." unhelpful and would not include it. This issue is already covered in the first bullet point. I am not sure what "sustainable" application of methods means. Maybe "reproducible" would be more important.		
62	18/05/2019 22:02 PM ID: 116681882	Historical context e.g. long term change		
63	18/05/2019 22:58 PM ID: 117056440	Should there be something about ensuring that decision makers are asking the right questions so that for example the inevitable uncertainties are taken into account in the decisions. Maybe this means taking more of an interest in steering policy and looking at what questions need to be answered and how they might be e.g. effect of urbanisation and land use change on flow and quality regimes of watercourses, effectiveness of runoff control, etc. Also maybe there should be something on improving ways of communicating flood risk and changes in flood risk.		
64	19/05/2019 07:17 AM ID: 117075485	Link to meteorology Advance technology e.g. modelling		
65	19/05/2019 13:30 PM ID: 116804060	The second statement/paragraph is entirely meaningless; if the term flood hydrology is removed from the beginning it could be a statement from almost any business. "The best hydrological information and understanding" is an odd statement; given that whatever hydrological information and understanding we have will be all there is, and will therefore have no comparison. What society? Similarly it could be argued to be a success in two years if comparing with the current situation - because information and understanding will inevitably increase and can therefore be stated as the best we've had so far. With semantic issues such as these, after 25 years it will not be possible to state whether or not we've succeeded in achieving the "vision".		

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
		What about something simple like "In comparison to 2019 standards we will have reduced the uncertainty in flood estimation and flood forecasting by a third" (or some plausible figure). This then allows us to start by assessing the current standard and take it from there. Everything else about data and the way we work (including modelling approaches) is the method to get to our vision.		
66	19/05/2019 20:35 PM ID: 116800339	Time scale seems about right Add statistical understanding of the data The final sentence would be better as another bullet point		
67	19/05/2019 21:22 PM ID: 115953502	I don't find this question easy to answer since neither vision is particularly helpful		
68	19/05/2019 23:56 PM ID: 117116149	Flood hydrology deals with extremes. The second bullet point above is a fiction. Remotely sensed data, physical understanding and (when done well) modelling can help to elaborate and interpret what we know, learn and infer from gauged and historical observation. The vision puts the cart before the horse.		
69	20/05/2019 09:27 AM ID: 117133175	Why do we need to wait 25 years for this to happen? How do we ensure we have the best information when climate, temperature, prioritises, data, computing, measurement abilities will continue to change?		
70	22/05/2019 12:29 PM ID: 117376373	Perhaps it would be good to have a statement up front on our ambition to raise the profile and standing of flood hydrology and the profession in general. These visions are technical and around quality of our outputs for good decisions but it also needs the right support and frameworks to make it all happen. Perhaps there is room for a third bullet point on this.		
71	23/05/2019 11:39 AM ID: 117474750	The second paragraph is quite long and a bit difficult to follow. Otherwise it all sounds good.		
72	23/05/2019 13:12 PM ID: 117486576	The vision is fine. It’s hard to read as the sentences in the second bullet point are too long. In the first bullet point it implies that we will manage all impacts from flooding - I don't think that's the case, in some situations it might not be appropriate to manage impacts but we should be learning to live with them better.		
73	23/05/2019 16:48 PM ID: 117496746	Bullet point 1: "... will have the best hydrological information..." Best compared to what? to now? Is the vision for all the UK and what will the UK look like in 25 years time? Bullet point 2: Seems long, particularly the first sentence.		
74	24/05/2019 12:44 PM ID: 117505743	An individual scientist, given the right working environment, can innovate methods and lines of enquiry that result in breakthroughs in understanding and improved solutions/tools in the realm of flood hydrology. This can complement collaborative partnership working. Recognising the role of the individual - be it in relation to personal innovation, leadership or coordination - is important.		
75	24/05/2019 13:52 PM ID: 117364703	I have reservations about 'the best hydrological information' - we probably have this already, it just isn't 'good enough'. While it doesn't need to be perfect, it needs to be good enough to allow us *confidently* to manage the impacts of flooding, from all sources, at all scales, in a changing world.		

3. What do you think about this draft UK vision for flood hydrology?

In 25 years, through collaboration, society will have the best hydrological information and understanding to manage the impacts of flooding, from all sources, at all scales, in a changing world. Flood hydrology will be aligned with best available and continuously improving whole system process understanding, underpinned by excellent data and evidence to quantify uncertainty & other characteristics and its sources, tailored to each location and different time scales. Methods will be applied in a consistent, sustainable and open way to enable robust decision-making. We recognise that leadership, championing and partnership are key to delivery of this vision.

Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
		I think this issue about confidence is really important - our information and understanding need to be *good enough* to make decisions rather than just debate the uncertainty. But the rest of the draft vision is good and positive!		
76	25/05/2019 01:08 AM ID: 117458964	Always a challenge to create these vision statements via committee as the meeting in Birmingham proved! Some suggestions below. First bullet: Has all the right ingredients but potential for it to be misinterpreted. Currently reads as "society" (aka the general public) will be mainly responsible for "managing the impacts of flooding" which I'm not sure is what the public would expect - I would have thought they think [organisation names(s) removed] would be taking the lead and some responsibility of businesses/industry. Also implies that there is a focus on only managing the "impacts of flooding" (symptoms) not the "flooding" (cause) itself. A suggested edit "In 25 years, through collaboration, government, industry and society will have the best hydrological information and understanding available for managing flooding, from all sources, at all scales, that takes account of flood impacts and the changing world we live in." Second bullet: Suggest "Flood hydrology" is something like "Flood hydrology practice and policy", otherwise it is a little circular saying the "science" will be aligned to the "best science".		
77	28/05/2019 17:34 PM ID: 116980263	I think as a vision it could be snappier - especially the 2nd bullet point. Although this will also depend on the audience. If it's for the general public then it needs to use much simpler language which everyone can understand.		
78	28/05/2019 21:37 PM ID: 117847148	Flexibility in approach perhaps.		

answered	78
skipped	47

4. What do you think of this draft UK vision for ways of working in flood hydrology?

Flood hydrology is recognised as an important discipline in the UK. We have a collaborative, representative central group with a unifying overview as a lead voice for flood hydrology, to create more effective and efficient ways of working. We work together with skilled teams in the right places across the UK flood industry with clear communication and guidance. We engage internationally and work in a way that takes advantage of scientific and technological developments and availability of information and encourages innovation.

Is there anything missing? Tell us what you think in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	65

1	29/04/2019 15:39 PM ID: 115171574	In the past, having a primary research group [organisation names(s) removed] has not always worked in the industry's best interests. Competition is important to drive standards.
2	29/04/2019 16:06 PM ID: 115180310	Education of approving bodies through CPD
3	29/04/2019 16:09 PM ID: 115180750	Collaborative delivery alongside other professionals, such as hydraulic modellers, rather than hydrologists in isolation
4	29/04/2019 16:20 PM ID: 115181559	Sounds very research oriented. Sounds like universities will tell practitioners what to do? How will practical experience count?
5	29/04/2019 16:29 PM ID: 115183952	Good - not clear who "we" is - [organisation names(s) removed] or a separate organisation / group?
6	29/04/2019 16:31 PM ID: 115182364	This is required as [organisation names(s) removed] are inconsistent in their methods and approach. These are fine aims but the standards in [organisation names(s) removed] have fallen in recent years.
7	29/04/2019 16:44 PM ID: 115183749	Could this be more explicit to state we share data, best practices etc. freely and openly?
8	30/04/2019 10:34 AM ID: 115245631	Who make up the central group? Could a reference be given to this group?
9	30/04/2019 11:47 AM ID: 115259106	An ongoing checking process that shows whether the vision is being met.
10	30/04/2019 12:40 PM ID: 115261724	Sounds good. Mentions collaborative central group - which is good. I think this should have a multi-disciplinary input from relevant other disciplines. It's good to include the UK flood industry and international colleagues too.
11	30/04/2019 13:07 PM ID: 115265228	Need to add agriculture, forestry, horticulture, land management and building industry as that is where most of the water is coming from into our urban areas as well as from new development
12	30/04/2019 13:49 PM ID: 115277401	UK flood hydrology is very self-centred and driven by a few individuals with significant influence on governmental bodies. This does not support having a skilled workforce with creativity and desire to think out of the box. We are at risk of losing a complete generation of hydrologists, whose single merit is to follow and very prescribed procedure. Little international innovation is considered
13	30/04/2019 14:28 PM ID: 115249000	Education and Qualifications?? Training up future practitioners!
14	01/05/2019 15:47 PM ID: 115414133	Nothing missing that I can think of.
15	01/05/2019 18:13 PM ID: 115431558	No
16	01/05/2019 20:32 PM ID: 115443184	OK

4. What do you think of this draft UK vision for ways of working in flood hydrology?

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
17	02/05/2019 09:35 AM ID: 115471184	Uncertainty analysis - clear communication of the uncertainties within each method, and a way to quantify these [method removed to protect organisation(s) identity] cannot currently quote uncertainty limits.		
18	02/05/2019 12:26 PM ID: 115501184	Should there be something about training?		
19	02/05/2019 12:41 PM ID: 115501839	Good but possibly not clear about role of academic colleagues along with "UK flood industry"?		
20	02/05/2019 14:48 PM ID: 115198816	Not sure who "we" are. There seem to a be a plethora of different views and, sometimes, opposing, techniques used in the flood hydrology practice (agencies, consultants, academia), with little open debate on the pros and cons.		
21	03/05/2019 09:57 AM ID: 115578165	I would take issue with" clear communication and guidance" often guidance is opaque and confused. Innovation is often restricted by lack of resource, and support from management. Much, much more could be achieved with the right support.		
22	07/05/2019 11:57 AM ID: 115881621	Current guidance is started to be questioned as we see evidence of probable maximum floods being exceeded.		
23	07/05/2019 11:58 AM ID: 115871782	Perhaps add "we co-ordinate the work of skilled teams across the industry".		
24	08/05/2019 09:46 AM ID: 115999807	We respect the intellectual property of the constituent groups involved in the work.		
25	08/05/2019 16:34 PM ID: 116056900	Who is being promoted as the 'central group' in the first bullet point? Difficult to work out what the second bullet point is trying to say Third bullet point is clear		
26	08/05/2019 17:58 PM ID: 116061289	We work together with clear and consistent objectives and align these with industry and government bodies to achieve mutual goals and present coherent and reliable information to stakeholder and the public		
27	08/05/2019 20:56 PM ID: 115775975	The term 'central group' is too vague - can this be defined.		
28	09/05/2019 15:19 PM ID: 116159498	there should be complete transparency of data which should be freely and readily available		
29	09/05/2019 16:49 PM ID: 116171071	make more concise		
30	10/05/2019 12:52 PM ID: 115383239	This project may have established a way to work together but do we really have a sustainable governance for a UK hydrology partnership and is it visible enough to funders, government and politicians. The road map needs to think about what needs to be put in place. Not sure the current landscape is effective at promoting hydrology - [organisation names(s) removed] often feels more aligned to the academic research end of the spectrum and not very visible or connected to decision makers, operational end of the spectrum or government - how do we change this. The vision is right but not sure we have the mechanisms in place outside of the roadmap project to sustain it?		

4. What do you think of this draft UK vision for ways of working in flood hydrology?

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
31	13/05/2019 13:37 PM ID: 116449651	I think these are good an achievable ambitions		
32	13/05/2019 15:07 PM ID: 116463005	Looks good		
33	14/05/2019 10:44 AM ID: 116552099	as general statements include all that I would expect		
34	14/05/2019 16:48 PM ID: 116603459	Do you engage with the users of flood hydrology information?		
35	14/05/2019 17:22 PM ID: 116606375	Definition - that defines whether the groups are appropriate What's your end result? This all seems too narrowly focussed to me. Society wants more complex understanding of floods and flooding - this reads like a bunch of hydrologists with narrow views of the broader process...if I'm honest.		
36	15/05/2019 14:46 PM ID: 116697459	Whilst technological and scientific advances aid in advancing our understanding, practical application of methods for users need to be achievable and economically viable for sustainable development in the future.		
37	15/05/2019 22:53 PM ID: 116749371	Can we be clearer about who is in that central group? Will it include users of the data / decision makers to meet the user needs, not just industry / research needs? Something about regular review of user needs / wider research to steer the framework. Something about making the guidance / outputs accessible and easy to use. Something about measuring benefits of what is delivered so we know when the framework vision is met.		
38	16/05/2019 11:10 AM ID: 116793030	Too many "ands" in the last bullet!		
39	16/05/2019 11:27 AM ID: 116788544	Again, another excellent summary. I think it would also be worth including improved communication with insurance companies, particularly where properties at risk of flooding have invested in Property Flood Resilience and Resistance measures, to reduce the risk of water ingress / flood damages. With the use of FloodRe, insurance companies should be forced to reduce flood insurance premiums where PFR has been installed on a property; all products should be BSI KiteMark and the installation should be signed off by flood specialists. Also, there needs to be more information exchanged between [organisation names(s) removed], particularly when consultants are working on behalf of [organisation names(s) removed]. Currently, most [organisation names(s) removed] tend to be very protective of their data and this results in assumptions being made and increased uncertainty in flood risk.		
40	16/05/2019 12:22 PM ID: 116806561	We understand where and how our information is used and provide users with supporting information to help decision making		
41	16/05/2019 15:47 PM ID: 116840164	There is no explicit statement here about engagement with societies		
42	17/05/2019 13:28 PM ID: 116938355	How flood hydrology is communicated to non-technical people is important so that they understand the concepts and limitations.		

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
43	17/05/2019 16:45 PM ID: 116772689	We work together with those implementing the revised FCERM Strategy. Capitalise on world-leading UK higher education research on catchment management to export related hydrology expertise overseas. Representative central group needs defining/clarifying.		
44	17/05/2019 17:11 PM ID: 116970244	We engage closely with academia and the research community to bring real societal and environmental benefit to their research.		
45	18/05/2019 13:37 PM ID: 117028508	"Skilled teams in the right places". Again hard to argue against this but how will you establish what skills are needed and determine which teams have those skills and are in the right places (what are the wrong places?!). How will you incentivise the research and academic community to participate?		
46	18/05/2019 17:03 PM ID: 115187747	This is [organisation names(s) removed] group. But it says it is to be the lead voice for flood hydrology across the UK. Should this central ([organisation names(s) removed]) group be the lead for all UK hydrology? I'm a little concerned that it sounds like this ([organisation names(s) removed]) group is positioning itself as the custodian of flood hydrology for the entire UK. I think this needs to make it quite clear if the group will evenly champion the flood issues across Wales, Scotland, Northern Ireland and England. Or will the vision deliver a two level road map where England follows A roads and the rest are put on the B roads. This document has [organisation names(s) removed] on it.... Time will tell whether such a group is representative. Are the leading voices in this initiative [organisation names(s) removed]? Are there leading voices from [organisation names(s) removed]?		
47	18/05/2019 18:55 PM ID: 117057658	I think it would be good to specifically mention close collaboration with UK academia and research institutions, who are some of the world leaders in this area. I see creating and strengthening this connection as a key need.		
48	18/05/2019 22:58 PM ID: 117056440	Maybe in the international engagement we should also look at policies on flood warning, development control, density of telemetry sites		
49	19/05/2019 07:17 AM ID: 117075485	linking historical data to forecasting		
50	19/05/2019 13:30 PM ID: 116804060	Again, the second two statements are meaningless. Take out the word "flood" from the first of the two, and both could be from any industry.		
51	19/05/2019 20:35 PM ID: 116800339	First sentence OK. Second sentence better as another bullet point - I'm not sure what it means & how the central group would differ from [organisation names(s) removed]		
52	19/05/2019 21:22 PM ID: 115953502	I disagree. I don't think that hydrology is recognised as an important discipline. It has been devalued in recent years. We used to have a centre of excellence in hydrology with a strong focus on applied hydrology - it had its faults, but it produced valuable guidance for practitioners and was internationally recognised. It seems that this "vision" aspires to what we have let slip through our fingers!		
53	19/05/2019 23:56 PM ID: 117116149	Integrated scientific research and collaborative working are all very well. It is how research is actually applied that counts. Inflated egos and generic methods contribute to push-button flood hydrology where the user is meeting the requirements of client, procedural and software systems rather than actually thinking about flood hydrology. This way of working is a backwards step for flood hydrology. Important factors relating to extreme floods are consequently		

4. What do you think of this draft UK vision for ways of working in flood hydrology?

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
		neglected. A model-based approach can never respect all the information available. It needs engagement, flexibility and thought, and the recognition that catchments (especially those at UK scale) are very varied and poorly served by generic methods. This criticism can apply to ways of working in flood forecasting (i.e. not just in flood estimation). Fortunately feedback from events is rather more direct in forecasting applications and there can be greater scope to learn.		
54	20/05/2019 09:27 AM ID: 117133175	What about engaging with young people to enter this field? How do we grow the knowledge and talent long term?		
55	21/05/2019 10:47 AM ID: 117265485	There needs to clear vision for linking the urban and rural and to meet the combined urbanisation and climate change challenge the UK faces		
56	21/05/2019 14:16 PM ID: 117272078	Good		
57	22/05/2019 07:17 AM ID: 117351653	I would add to the ways of working that not only is advantage taken of scientific and technological developments, but also that these are contributed to. This should be a clear bi-directional process. Maybe also rather than work, it should say "work with partners".		
58	22/05/2019 12:29 PM ID: 117376373	Is there something around how this flood hydrology community fits in to the wider industry? I think the debate needs to be had around hydrology drifting from a traditional civil engineering home to a more geography based home in the last 20 years or so and all the issues around that. This won't be resolved here but it is the reason for some of the difficulties perhaps about where the discipline sits and professional standing of hydrologists etc. Perhaps we should be more ambitious in this direction to help give the profession a stronger standing and focus. As a civil engineer observing this I have noticed this drift away from the profession during my career and I think it has struggled as a result. The central group is essential to put it back on course.		
59	23/05/2019 11:39 AM ID: 117474750	Sounds good.		
60	23/05/2019 16:48 PM ID: 117496746	Bullet point 1: I consider flood hydrology an important discipline but do the UK general public and or government(s) also consider it is? Bullet points 2 and 3 are good.		
61	24/05/2019 12:44 PM ID: 117505743	It is not very clear what "clear communication and guidance" relates to within the sentence context. Is this a two-way process between "we" ([organisation names(s) removed]) and the "skilled teams"? The "skilled teams" in some cases may relate to an individual expert. "A unifying overview as a lead voice for flood hydrology" - there are various lead voices, with [organisation names(s) removed] leading on the practitioner side (over England). On the flood hydrology science side, there are a range of leaders from industry and academia, often with different specialisms.		
62	25/05/2019 01:08 AM ID: 117458964	Second bullet - could have a coordinated web-portal for this guidance. Third bullet - emphasise that we also wish to share our knowledge and developments with others (not just bringing in international developments)		
63	28/05/2019 10:24 AM ID: 117779189	The key recognition in this statement is the requirement for collaborative working to look outside the UK for advancements and developments in understanding etc		

4. What do you think of this draft UK vision for ways of working in flood hydrology?

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
64	28/05/2019 17:34 PM ID: 116980263	Again, I think as a vision it needs to be snappier. Could the vision be a high level statement with bullet points supporting it below? The first bullet point could be broken down further?		
65	28/05/2019 21:37 PM ID: 117847148	Knowledge and experience exchange with other disciplines. Opportunities for wider engagement to hear the opinions/ ideas from outside the "central group". Better engagement/ utilisation of [organisation names(s) removed] networks/meetings to showcase examples, learning and ideas		
			answered	65
			skipped	60

5. Establish a Steering Group to own and champion delivery of the flood hydrology roadmap

The remit of the Steering Group would include ongoing ownership of the roadmap specifically, identifying funding opportunities, steering delivery of priority work areas, reporting on progress and periodic updates to priority work areas.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	4.03%	5
2	2	4.84%	6
3	3	21.77%	27
4	4	33.87%	42
5	5	35.48%	44

Analysis							
	Mean:	3.92	Std. Deviation:	1.06	Satisfaction Rate:	72.98	answered 124
	Variance:	1.12	Std. Error:	0.1			skipped 1

Comments (optional): (30)

1	29/04/2019 16:29 PM ID: 115183952	Must have the authority and manpower to issue guidance updates promptly
2	29/04/2019 19:23 PM ID: 115203101	Needs to include representatives from Northern Ireland, Scotland, Isle of Man and Channel Islands
3	30/04/2019 10:34 AM ID: 115245631	What role will the [organisation names(s) removed] play? Who will lead the Steering Group?
4	30/04/2019 12:40 PM ID: 115261724	Please include the [organisation names(s) removed] in discussions if you can!
5	30/04/2019 13:07 PM ID: 115265228	Steering Groups can be really useful though need clear objectives and be well Chaired to be effective
6	03/05/2019 13:35 PM ID: 115608108	Not just identifying funding opportunities - but championing flood hydrology with potential funders (e.g. [organisation names(s) removed])
7	08/05/2019 09:46 AM ID: 115999807	I particularly agree with the key funding searches.
8	08/05/2019 16:34 PM ID: 116056900	Hard to see how one steering group could deliver on all the aspirations of the roadmap? How would Steering Group be chosen?
9	08/05/2019 17:58 PM ID: 116061289	I don't really know what any of that means. Remit of steering group is to own a project and deliver. Yes. What is the project? Develop a vision, create a list of work areas, create a community etc. I think goals should be SMAART (specific, measurable, actionable, attributable, realistic and timed)
10	08/05/2019 20:56 PM ID: 115775975	an indication of what type of organisations this Steering Group would be sourced from would have helped people score
11	09/05/2019 16:49 PM ID: 116171071	Steering Group should be [organisation names(s) removed], rather than [organisation names(s) removed]
12	10/05/2019 12:52 PM ID: 115383239	See comments to previous question - this is as important if not more so than improving the technical methods underpinning UK hydrology
13	14/05/2019 17:22 PM ID: 116606375	You've not sold it to me. What's it really for? Why do you need this group?
14	15/05/2019 11:04 AM ID: 116661131	Important for prioritising R&D and driving it forward, need to remember that data collection will need championing too (the importance of good data requires

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Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
		highlighting to management within the measuring authorities, e.g. it is currently underfunded with [organisation names(s) removed])		
15	15/05/2019 22:53 PM ID: 116749371	We need the flood hydrology community to buy into the framework, own it and be the driving force behind delivering it. This is what will make delivery collaborative and efficient.		
16	16/05/2019 16:14 PM ID: 116013085	It would need to be agnostic to any/all commercial interests it would need very strict terms to ensure this was possible.		
17	17/05/2019 09:59 AM ID: 116899457	A single unifying group to steer the development is needed to remove the current disparate setup		
18	17/05/2019 16:45 PM ID: 116772689	Current steering group is quite narrow in composition - what about: [organisation names(s) removed], emergency response, social science (and other disciplines that need to be combined with hydrological science to make it useable), catchment management, policy, [organisation names(s) removed], perspectives?		
19	17/05/2019 17:11 PM ID: 116970244	Organisational change and poor development of experts at [organisation names(s) removed]. Creates churn, diminishes effectiveness.		
20	17/05/2019 17:26 PM ID: 116973448	Ideally the steering group would not only identify funding opportunities, but also foster the creation of new funds which should be invested towards further developing/defining the road map		
21	18/05/2019 17:03 PM ID: 115187747	What if a priority work area is mainly relevant to say Northern Ireland and not elsewhere. Will the Group champion this? Likewise for Scotland where hydro-climatic conditions in places differ to the rest.		
22	18/05/2019 22:58 PM ID: 117056440	I assume some group would be needed to make things happen		
23	19/05/2019 07:17 AM ID: 117075485	depends who is on the steering group		
24	19/05/2019 14:19 PM ID: 117082368	A steering group would need clear terms of reference and may benefit from some flexibility in how membership is determined and evolved over time given the 25 duration of the roadmap		
25	19/05/2019 21:22 PM ID: 115953502	I don't think a Steering Group is needed - unless it is a small, select group of respected experts.		
26	19/05/2019 23:56 PM ID: 117116149	The idea of a roadmap is not very relevant. Too grandiose. Does not offer grass-root regeneration of flood hydrology expertise amongst practitioners.		
27	23/05/2019 13:12 PM ID: 117486576	This shouldn’t be too many people so as not to feel exclusive to the rest of the community		
28	23/05/2019 16:48 PM ID: 117496746	Has the potential to be a '5' to ensure what is really needed is delivered and has the funding to do that.		
29	24/05/2019 12:44 PM ID: 117505743	I am being asked if this is highest priority without knowing yet what are the other ways of working.		
30	28/05/2019 21:37 PM ID: 117847148	Steering group needs to be a mix of public, private and academic sectors and members of the steering group should rotate in a phased manner (i.e. the whole steering group does not change at the same time) over 12-24 months to vary the input, with the exception of [organisation names(s) removed] members/roles.		

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	30

1	29/04/2019 15:39 PM ID: 115171574	Possible conflicts with other research steering groups
2	29/04/2019 20:22 PM ID: 115206676	Funding
3	30/04/2019 10:34 AM ID: 115245631	No
4	30/04/2019 13:07 PM ID: 115265228	Don't know
5	02/05/2019 09:35 AM ID: 115471184	Communication of methods and issuing of technical guidance being well behind advancing methodologies
6	02/05/2019 14:48 PM ID: 115198816	Stifled discussions, aggressive funding competition.
7	08/05/2019 09:46 AM ID: 115999807	Identifying a systematic way to share and peer review reports.
8	08/05/2019 17:58 PM ID: 116061289	Yes. It doesn’t have any meaning without context. Ownership of the roadmap? What is this? What are work areas?
9	08/05/2019 20:56 PM ID: 115775975	No but potentially lots of politics that would make it hard to implement
10	10/05/2019 12:52 PM ID: 115383239	Devolution of operational work in England, Wales, Scotland and NI. Lack of clear single UK sponsor/body for hydrology ([organisation names(s) removed] all touch on or cover it). Lack of UK R&D programme (the joint programme is England and Wales only)
11	13/05/2019 13:37 PM ID: 116449651	There should not be.
12	14/05/2019 17:22 PM ID: 116606375	Yep - defining what you mean and why you want to and how it dovetails into national flood strategy, 25 year Environment strategy etc.
13	15/05/2019 22:53 PM ID: 116749371	No. Learn from other research frameworks that do a similar thing to find effective processes.
14	16/05/2019 10:27 AM ID: 116787849	No
15	16/05/2019 11:33 AM ID: 116799369	Leadership and funding
16	16/05/2019 12:37 PM ID: 116804203	No
17	16/05/2019 15:47 PM ID: 116840164	Ensure not monopolised by specific organisations
18	16/05/2019 16:14 PM ID: 116013085	The current commercial nature of [method removed to protect organisation(s) identity] and similar packages bestow ownership on a single organisation.
19	16/05/2019 16:54 PM ID: 116849290	resource and time available from practitioners
20	17/05/2019 09:59 AM ID: 116899457	
21	17/05/2019 13:13 PM ID: 116938744	Are there any technical barriers to establishing a steering group? No.
22	17/05/2019 17:26 PM ID: 116973448	Time and focus of key people

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
23	18/05/2019 13:37 PM ID: 117028508	How will it be resourced and how will it deliver (budget, expertise etc.).		
24	18/05/2019 18:55 PM ID: 117057658	Time constraints and other commitments. Buy out for people to really contribute?		
25	19/05/2019 07:17 AM ID: 117075485	Who is selected, why , who benefits, how		
26	19/05/2019 14:33 PM ID: 117093851	No		
27	20/05/2019 08:43 AM ID: 116550453	not that I am aware of		
28	23/05/2019 16:48 PM ID: 117496746	Change within [organisation names(s) removed] could make this more difficult to achieve in the short term but may help longer term.		
29	24/05/2019 12:44 PM ID: 117505743	Not to my knowledge. Not sure what "technical barriers" are being thought of here. Also what is really meant by "happening now".		
30	30/05/2019 15:31 PM ID: 118027569	To cast the net to bring some new blood and skills into the steering group		
			answered	30
			skipped	95

6. Establish a UK flood hydrology scientific advisory group made up of professionals from across the community

The scientific advisory group could have a wide remit and could provide technical advice on flood hydrology to measuring authorities, practitioners and others. They may form specialist groups on specific topics such as monitoring.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	3.25%	4
2	2	4.88%	6
3	3	15.45%	19
4	4	37.40%	46
5	5	39.02%	48

Analysis							
	Mean:	4.04	Std. Deviation:	1.02	Satisfaction Rate:	76.02	answered 123
	Variance:	1.03	Std. Error:	0.09			skipped 2

Comments (optional): (39)

1	29/04/2019 16:20 PM ID: 115181559	Very important
2	29/04/2019 16:29 PM ID: 115183952	This overlaps considerably with the [organisation names(s) removed]
3	30/04/2019 12:40 PM ID: 115261724	The [organisation names(s) removed] would be happy to work with you to provide input. They already have a flood risk group with recognised experts in hydrological analysis and flood risk. There is a strong link to the [organisation names(s) removed] from [organisation names(s) removed].
4	30/04/2019 13:07 PM ID: 115265228	There are an impressive range of skills out there so good idea
5	30/04/2019 13:49 PM ID: 115277401	Any advisory group of this sort is likely to be dominated but the same research centres as now
6	02/05/2019 09:35 AM ID: 115471184	Would this be a free of charge service? The need to pay would limit the uptake.
7	03/05/2019 09:57 AM ID: 115578165	It must be properly technically driven
8	03/05/2019 10:52 AM ID: 115580983	Without providing funding for this, I don't think an external group would be able to influence how a measuring authority does it's work.
9	08/05/2019 16:34 PM ID: 116056900	This is a priority area.
10	08/05/2019 17:58 PM ID: 116061289	Provision of advice comes at a cost.
11	08/05/2019 20:56 PM ID: 115775975	This would be better done as a contract with technical advisors to the environment regulators
12	14/05/2019 17:22 PM ID: 116606375	OK but to do what?
13	15/05/2019 11:04 AM ID: 116661131	Important for prioritising R&D and driving it forward, need to remember that data collection will need championing too (the importance of good data requires highlighting to management within the measuring authorities, e.g. it is currently underfunded with [organisation names(s) removed])

6. Establish a UK flood hydrology scientific advisory group made up of professionals from across the community

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Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	15/05/2019 14:46 PM ID: 116697459	There needs to be less of a disconnect between the academic community, software providers and practitioners		
15	15/05/2019 22:53 PM ID: 116749371	This will be needed to keep the framework agile and responsive to wider research / industry progress - our eye to the future, as well as providing very specific technical knowledge.		
16	16/05/2019 15:47 PM ID: 116840164	Good, but needs to draw on wide range of expertise		
17	16/05/2019 16:14 PM ID: 116013085	It would need to be cross-sector, fairly wide and with flexible membership to ensure niche users are not forgotten.		
18	17/05/2019 09:59 AM ID: 116899457	Obtaining funding to collate and process the data will be key. Infrastructure owners have a vested interest in understanding if the significant sums of money spent is enough to ensure the risk to public safety is managed to acceptable levels		
19	17/05/2019 13:13 PM ID: 116938744	Provided "across the community" means "across the hydrology community" and not "across the scientific community"		
20	17/05/2019 13:28 PM ID: 116938355	Need a way to integrate the [organisation names(s) removed] guidance on hydrology with the flood hydrology roadmap		
21	17/05/2019 16:45 PM ID: 116772689	This should be combined with [organisation names(s) removed] and [organisation names(s) removed] work. We propose that [removed to protect the identity of an individual], [organisation names(s) removed] is a member of this advisory group.		
22	17/05/2019 17:11 PM ID: 116970244	Organisational change and poor development of experts at [organisation names(s) removed]. Creates churn, diminishes effectiveness		
23	17/05/2019 17:26 PM ID: 116973448	I think the various parts of understanding connected to flood hydrology are at present not really talking (for example flood forecasting and flood frequency estimation). Anything that starts/improves the discussion of scientists could be beneficial.		
24	18/05/2019 10:57 AM ID: 117023552	A few leading international flood hydrology scientists should be invited to join this advisory group, as well as other members from UK. For example [removed to protect the identity of individual(s)] from [organisation names(s) removed], [removed to protect the identity of individual(s)] from Australia.		
25	18/05/2019 17:03 PM ID: 115187747	Will this include people from the applied sector, the research sector, and the regulatory sector? Or will it be only [organisation names(s) removed] and research sector people?		
26	18/05/2019 18:55 PM ID: 117057658	I think creating a stronger connection to academia/research would be an excellent aim.		
27	18/05/2019 22:02 PM ID: 116681882	There exists already a [organisation names(s) removed], and including representatives from the user community and the Measuring Authorities in England, Scotland, Wales and Northern Ireland.		
28	19/05/2019 07:17 AM ID: 117075485	Depends how they are selected		
29	19/05/2019 14:19 PM ID: 117082368	Does the [organisation names(s) removed] have a role to play in setting this up and linking to associated specialist user groups in [organisation names(s) removed]? Again, flexibility in membership over time is valuable to enable new users to contribute		

6. Establish a UK flood hydrology scientific advisory group made up of professionals from across the community

The scientific advisory group could have a wide remit and could provide technical advice on flood hydrology to measuring authorities, practitioners and others. They may form specialist groups on specific topics such as monitoring.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
30	19/05/2019 20:35 PM ID: 116800339	How would this relate to the measuring authorities (an odd way of putting it) & Consultants' own experts?		
31	19/05/2019 21:22 PM ID: 115953502	What is a scientific advisory group?		
32	19/05/2019 23:56 PM ID: 117116149	This is somewhat relevant. It's good that measurement and monitoring are mentioned, and the idea of providing technical guidance is good. But a scientific advisory group drawn from "across the community" will likely end up with research and modelling "territory" being defended rather than real promotion of better thinking.		
33	22/05/2019 07:17 AM ID: 117351653	This should also include an international dimension; not only to ensure collaboration across the scientific field, but also to avoid lock-in through established organisational positions.		
34	22/05/2019 12:29 PM ID: 117376373	Worth looking to the setup of the British Dam Society for the role it plays in that profession (good example that covers all of WoW activities here). Works differently to [organisation names(s) removed] affiliated society in the same way. We could see what bits [organisation names(s) removed] do that [organisation names(s) removed] don't and explore filling the gaps.		
35	23/05/2019 13:12 PM ID: 117486576	This probably already occurs but something more centralised and visible would be useful		
36	23/05/2019 16:48 PM ID: 117496746	Having expertise focused in one group will be beneficial.		
37	24/05/2019 12:44 PM ID: 117505743	Seems slightly less of a priority than 5.		
38	28/05/2019 21:37 PM ID: 117847148	Steering group needs to be a mix of public, private and academic sectors and members of the group should rotate in a phased manner (i.e. the whole group does not change at the same time) over 12-24 months to vary the input.		
39	30/05/2019 15:31 PM ID: 118027569	To cast the net to bring some new blood and skills into the advisory group, to include people who know a lot about the short comings in the existing methods and brave enough to challenge the norm		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	29
1	30/04/2019 10:34 AM ID: 115245631	No		
2	30/04/2019 13:07 PM ID: 115265228	Resourcing in terms of funding for their input and technical e.g. apps could save a lot of repeat advice		
3	02/05/2019 14:48 PM ID: 115198816	Language (technical) barriers.		
4	03/05/2019 10:52 AM ID: 115580983	Funding.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
5	08/05/2019 09:46 AM ID: 115999807	Identifying a systematic way to share and peer review reports.		
6	08/05/2019 17:58 PM ID: 116061289	Collaboration and consistent views need to be documented. This takes time. [organisation names(s) removed] is from the 1980s this probably needs a revamp.		
7	10/05/2019 12:52 PM ID: 115383239	See comments above - need to consider how this interfaces with likes of [organisation names(s) removed] - but a welcome step. Who will it report to?		
8	13/05/2019 15:07 PM ID: 116463005	(Maybe not a technical barrier) Engaging with professionals from industry may be harder than for academics, because of timesheet pressure.		
9	13/05/2019 16:08 PM ID: 116472899	Accurate high flow measurement		
10	15/05/2019 22:53 PM ID: 116749371	Flood hydrology for different flood sources can be very different so having smaller specialist groups may work better than a larger advisory group.		
11	16/05/2019 10:27 AM ID: 116787849	No		
12	16/05/2019 12:37 PM ID: 116804203	No		
13	16/05/2019 16:54 PM ID: 116849290	Resource and time available from practitioners		
14	17/05/2019 09:59 AM ID: 116899457	Access to historic data to aid verification of hydraulic models, particularly for very large storms. The obtaining of and digitising of historic data will be challenging		
15	17/05/2019 13:13 PM ID: 116938744	No		
16	17/05/2019 17:11 PM ID: 116970244	'Technical'...? Probably as above.		
17	18/05/2019 18:55 PM ID: 117057658	Time commitments		
18	19/05/2019 07:17 AM ID: 117075485	Jealousies		
19	19/05/2019 14:19 PM ID: 117082368	Suggest raising at [organisation names(s) removed] as starting point		
20	19/05/2019 14:33 PM ID: 117093851	No		
21	19/05/2019 21:22 PM ID: 115953502	The makeup does not sound as if it is people's main activity. As a result, it will not get the priority compared with their main work.		
22	20/05/2019 08:43 AM ID: 116550453	Not sure		
23	22/05/2019 12:29 PM ID: 117376373	Maybe some conflict with [organisation names(s) removed] see above.		
24	23/05/2019 13:12 PM ID: 117486576	Time commitments / who would pay for the advice		
25	23/05/2019 16:48 PM ID: 117496746	As point 5: Change within [organisation names(s) removed] could make this more difficult to achieve in the short term but may help longer term.		
26	24/05/2019 12:44 PM ID: 117505743	Might follow on from setting up Steering Group.		
27	25/05/2019 01:08 AM ID: 117458964	Funding for some committee activities? Cannot continue to rely on in-kind support.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
28	30/05/2019 15:31 PM ID: 118027569	To ensure the group chosen is diverse.		
29	03/06/2019 09:19 AM ID: 118277211	My only comment on this, is that I feel it will need to be open with little or no charge otherwise I feel there will be little uptake.		
			answered	29
			skipped	96

7. Raise the profile of flood hydrology in the UK

Work to make the hydrological profession more valued and respected. This could include creating a range of promotional materials to communicate and visualise flood hydrology concepts and outputs with non-experts (including schools, the public and the media). These material could be used to attract funding and encourage graduates to a long-term career in hydrology.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	4.03%	5
2	2	12.10%	15
3	3	36.29%	45
4	4	29.03%	36
5	5	18.55%	23

Analysis							
	Mean:	3.46	Std. Deviation:	1.05	Satisfaction Rate:	61.49	answered 124
	Variance:	1.1	Std. Error:	0.09			skipped 1

Comments (optional): (36)

1	29/04/2019 16:20 PM ID: 115181559	This doesn't help professionals now do their job.
2	29/04/2019 16:29 PM ID: 115183952	Significant overlap with the work of [organisation names(s) removed].
3	30/04/2019 09:38 AM ID: 115241585	The problem is always the practitioners who do non-scientific work. It feels like they are always forgotten about. It is unhelpful if the scientific community forever just pushes its own goals. Scientific results inherently result in a result that states 'further research needed', which in the real world is unhelpful. Getting involvement with young persons and youngsters would be great! Hydrology needs to make clear that as an applied science it must be combined with e.g. engineering, ecology etc.
4	30/04/2019 10:34 AM ID: 115245631	Would this be done in partnership with [organisation names(s) removed].
5	30/04/2019 12:40 PM ID: 115261724	The [organisation names(s) removed], are doing similar things. [organisation names(s) removed] has recently produced information packs for schools for instance. We would be interested in working with you to create promotional materials that appeal to a wider audience.
6	30/04/2019 13:07 PM ID: 115265228	Could this be delivered through schools and Universities
7	30/04/2019 14:28 PM ID: 115249000	Need to be more proactive in education of hydrologists, to ensure courses are up to scratch and recognised where they are.
8	02/05/2019 09:35 AM ID: 115471184	Generally, it's not a well known discipline even within the industry so is sometimes hard to gain understanding and for hydrology to be included in any scope of works
9	02/05/2019 12:41 PM ID: 115501839	The public understandably have difficulty in perceiving severe or extreme flood events
10	02/05/2019 14:48 PM ID: 115198816	Placements for juniors form different disciplines; less consulting and more intrinsic forecasting tools and knowledge within government agencies.
11	03/05/2019 10:52 AM ID: 115580983	Not sure how promotional material would be useful in schools - maybe try and influence it as part of the geography curriculum at A level. This would probably be most suitable.

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Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	03/05/2019 13:35 PM ID: 115608108	There are already a lot of promotional materials available. Promotion does need sustained effort but the scientific and technical efforts should attract a significantly higher proportion of the budget.		
13	08/05/2019 09:46 AM ID: 115999807	Actually identifying realistic audiences to target is crucial.		
14	08/05/2019 16:34 PM ID: 116056900	I would suggest more promotion within the UK engineering industry rather than with public. Target to make Hydrology a chartered profession and for universities to run more hydrology-focused courses.		
15	08/05/2019 17:58 PM ID: 116061289	There are plenty of examples of this internationally. UK is lagging. Don’t re-invent the wheel. Just copy.		
16	10/05/2019 12:52 PM ID: 115383239	Important but not as important as 5 and 7, hence the lower score.		
17	14/05/2019 10:52 AM ID: 116548266	Make sure communication about the limitation of hydrology science is undertaken with non-technical audiences		
18	14/05/2019 17:22 PM ID: 116606375	OK but I am just not sure this is correct. The world is changing and partitioning people into a seemingly narrow field is not really what the nation needs in terms of new graduates etc.		
19	16/05/2019 12:37 PM ID: 116804203	I think more important to raise the profile within the industry first - there is a vast amount of money being spent on flood alleviation and adaptation but only a fraction of this seems to go on the hydrology despite this being the fundamental evidence that the schemes are based on. Senior managers and budget holders need to better understand the importance of getting the best hydrological understanding we can to improve confidence in scheme designs now and into the future		
20	16/05/2019 15:47 PM ID: 116840164	Greater linkage to [organisation names(s) removed].		
21	16/05/2019 16:14 PM ID: 116013085	It is and will always remain a niche underpinning part of the whole flood risk management picture. I think end-users & the public could be confused if this FCERM component (and others) was overly-widely emphasised.		
22	16/05/2019 17:21 PM ID: 116851056	Climate change and flood risk are high profile at the moment so perhaps a lower priority.		
23	17/05/2019 16:45 PM ID: 116772689	#10 is more important.		
24	17/05/2019 17:11 PM ID: 116970244	Yes, yes, yes. Who wouldn't want to develop and use great tech to measure floods...?! (OK, and forecast and stuff too...)		
25	18/05/2019 13:37 PM ID: 117028508	I don’t think this is the proper role of [organisation names(s) removed]. It is a good idea but is the remit of [organisation names(s) removed]. A very good example of where [organisation names(s) removed] can work in partnership with those institutions so that flood money can be spent preventing and responding to floods!		
26	18/05/2019 17:03 PM ID: 115187747	A good idea.		
27	18/05/2019 18:55 PM ID: 117057658	I think the profile is already quite high		

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Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	28	19/05/2019 14:19 PM ID: 117082368	Members of the professional bodies ([organisation names(s) removed]) have a role to play in promoting the profession both within their host professional organisations and externally, in conjunction with universities and FE/HE colleges (linked to outreach that already takes place in schools/colleges). Getting the right the media exposure usually needs consistent messages (e.g. consider how [organisation names(s) removed] has focussed on its message of making a difference to society in recent years)	
	29	19/05/2019 21:22 PM ID: 115953502	I think this is long overdue. The general understanding of the general public in relation to flooding is poor - we all have a responsibility to do something about this. Some core materials would help.	
	30	19/05/2019 23:56 PM ID: 117116149	This might help. But don't expect anyone to be interested in flashy models and displays. Case studies and storylines that illustrate the fascination that a career in flood hydrology might offer could help. But only if the "profession" is committed to a more thoughtful way of doing flood hydrology. The software-driven companies won't buy into this.	
	31	21/05/2019 13:45 PM ID: 117286332	Can we work with STEM Ambassadors and encourage more flood hydrologists to participate in school events etc?	
	32	22/05/2019 07:17 AM ID: 117351653	I would recommend a wider approach be taken, not just concentrating on flood hydrology; but rather promoting conscience in hydrology across the board (including also e.g. drought, the role of groundwater, etc.)	
	33	22/05/2019 12:29 PM ID: 117376373	See previous.	
	34	23/05/2019 16:48 PM ID: 117496746	Yes - vital.	
	35	24/05/2019 12:44 PM ID: 117505743	I think the hydrology profession is valued and respected already and an attractive profession to enter as a career. Awareness of the environment and climate change impact on flood risk is understood by children and adults alike. But promoting flood hydrology as a career option is a good aim.	
	36	25/05/2019 01:08 AM ID: 117458964	Could be linked to other initiatives/organisations. [organisation names(s) removed]?	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	18
	1	29/04/2019 16:20 PM ID: 115181559	Flood hydrology is a science but is managed like engineering	
	2	30/04/2019 13:07 PM ID: 115265228	Probably resources	
	3	03/05/2019 10:52 AM ID: 115580983	It would be difficult to promote 'how it is done' nationally when we are currently not consistent across the UK in how we deliver flood hydrology.	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
4	08/05/2019 17:58 PM ID: 116061289	No		
5	10/05/2019 12:52 PM ID: 115383239	Lack of graduate and postgraduate opportunities especially MSc in hydrology or placements in UK operating authorities. Needs to look at both academic and professional links - e.g. linking degree study to placements in agencies/consultants delivering hydrology		
6	15/05/2019 14:46 PM ID: 116697459	Hydrologists are competing against a large number of other specialisms that are also aiming to promote their disciplines		
7	16/05/2019 10:27 AM ID: 116787849	No		
8	16/05/2019 12:37 PM ID: 116804203	No		
9	17/05/2019 13:13 PM ID: 116938744	No		
10	17/05/2019 17:11 PM ID: 116970244	Ohh, the record is stuck. As above. (Sorry, but this NEEDS to be addressed)		
11	18/05/2019 17:03 PM ID: 115187747	Will the applied sector be involved? Be a good idea since they interface with people and clients on applied hydrological activities in communities. They may be offer a more applied understanding and be more approachable than some of the rather more esoteric concepts handled by some researchers.		
12	19/05/2019 14:19 PM ID: 117082368	A joined up approach to school/college outreach working with university/HE/FE college departments that deliver typical courses aligned to flood hydrology (see above comment) should be more effective than independent approaches.		
13	19/05/2019 14:33 PM ID: 117093851	No		
14	19/05/2019 21:22 PM ID: 115953502	No.		
15	20/05/2019 08:43 AM ID: 116550453	Not sure		
16	22/05/2019 12:29 PM ID: 117376373	See previous		
17	23/05/2019 16:48 PM ID: 117496746	Money.		
18	24/05/2019 12:44 PM ID: 117505743	Flood hydrology is not well served by the university demarcation of science, engineering and mathematics. Physics and maths is at the heart of the subject, but not available as a specialist subject in either discipline.		
			answered	18
			skipped	107

8. Build international partnerships to foster greater transfer of knowledge and best practice

Improve and build upon current partnerships. Identify and establish new international relationships to encourage knowledge exchange, diverse learning opportunities, and skills transfer.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	4.03%	5
2	2	16.94%	21
3	3	28.23%	35
4	4	36.29%	45
5	5	14.52%	18

Analysis							
	Mean:	3.4	Std. Deviation:	1.05	Satisfaction Rate:	60.08	answered 124
	Variance:	1.11	Std. Error:	0.09			skipped 1

Comments (optional): (32)

1	29/04/2019 16:06 PM ID: 115180310	Great. CPD and competence certification for those in Approving roles - I'm thinking [organisation names(s) removed]
2	29/04/2019 16:20 PM ID: 115181559	Not that important. Universities already collaborate internationally.
3	30/04/2019 10:34 AM ID: 115245631	Many existing partnerships exist with [organisation names(s) removed] at the [organisation names(s) removed]. Good to build form existing relationships.
4	30/04/2019 12:40 PM ID: 115261724	Again [organisation names(s) removed] is doing the same for our discipline. We recently partnered with universities, international colleagues and [organisation names(s) removed] to organise and run networking and CPD events. We would be interested in working alongside you to share knowledge between hydrology and geomorphology disciplines, perhaps to co-badge / run events.
5	30/04/2019 13:07 PM ID: 115265228	Depends on how easily this knowledge translates e.g. Tropical to Temperate
6	30/04/2019 13:49 PM ID: 115277401	This is absolutely needed as it is seldom done nowadays
7	02/05/2019 12:26 PM ID: 115501184	Webinars/remote participation would be good to facilitate attendance at events
8	02/05/2019 12:41 PM ID: 115501839	UK practitioners often advise on overseas flood hydrology. Good if UK maintains its lead as well as exchanging knowledge and skills
9	03/05/2019 09:57 AM ID: 115578165	useful, but often difficult because of internal politics
10	03/05/2019 10:52 AM ID: 115580983	I think it's really worth knowing what they do in other countries with similar climates and geology to our own,
11	03/05/2019 13:35 PM ID: 115608108	Could take a similar approach to operational meteorology where common forecasting software and systems are shared with other countries (as long as there is more than one consortium to maintain diversity of development)
12	07/05/2019 11:58 AM ID: 115871782	I think if UK hydrology science is working well, this step will happen naturally through academia without the need for the steering group to focus effort on this. This needs to go through [organisation names(s) removed] to be efficient and effective.
13	08/05/2019 17:58 PM ID: 116061289	First should catch up

8. Build international partnerships to foster greater transfer of knowledge and best practice

Improve and build upon current partnerships. Identify and establish new international relationships to encourage knowledge exchange, diverse learning opportunities, and skills transfer.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	10/05/2019 12:52 PM ID: 115383239	Academic communities already seem well connected and I think our UK hydrology academia have these links and we could expect the UK road map steering group and advisor groups to have UK academic reps on them who maintain close international links on behalf of the wider community?		
15	15/05/2019 14:46 PM ID: 116697459	Whilst potentially important for academia, this is less applicable for practitioners. Whilst we can foster ideas from other areas of the world, the spatial and temporal scale of application can be positive or negative (e.g. whilst looking at methods etc, what questions are we trying to answer and is the information transferable e.g. application of methods from arid or monsoonal climates may not be transferable to UK flood hydrology, therefore partnering should be focussed on locations with similar issues).		
16	16/05/2019 15:47 PM ID: 116840164	It is unclear how this would be achieved and the statement suggests that it currently isn't being achieved		
17	16/05/2019 16:14 PM ID: 116013085	International knowledge & transfer will become increasingly important in this arena.		
18	16/05/2019 17:21 PM ID: 116851056	This is important but as it was happening already, I've given it a lower priority.		
19	17/05/2019 09:59 AM ID: 116899457	Opening the industry to wider places can only enhance the UK 's capabilities		
20	17/05/2019 16:45 PM ID: 116772689	More important to build on existing partnerships established and operating in the UK that could support the implementation of the Roadmap, e.g. [organisation names(s) removed]		
21	17/05/2019 17:11 PM ID: 116970244	Partnerships can be useful, but informal networks of passionate experts can get an awful lot done, given some breathing space.		
22	18/05/2019 13:37 PM ID: 117028508	True but costly. Perhaps another area for partnerships with engineering firms and universities		
23	18/05/2019 17:03 PM ID: 115187747	Good idea		
24	18/05/2019 18:55 PM ID: 117057658	This is helpful, certainly with other institutions such as [organisation names(s) removed] who are pushing the envelope		
25	19/05/2019 07:17 AM ID: 117075485	British technology falling behind		
26	19/05/2019 14:19 PM ID: 117082368	Consider having 'associate' members from reciprocal international professional bodies linked to the proposed UK flood hydrology scientific advisory group; make use of conference steering groups/events		
27	19/05/2019 23:56 PM ID: 117116149	Not all that relevant. UK flood hydrology is rather different. We have small rivers and a wide range of wetness, soils and underlying geology, and, of course, very marked effects from urbanisation.		
28	22/05/2019 12:29 PM ID: 117376373	See previous.		
29	23/05/2019 16:48 PM ID: 117496746	Of course there are benefits to this but there are a lot of issues to address 'at home' and plenty of 'local' experience - accessing this is probably a higher priority.		
30	23/05/2019 18:04 PM ID: 117519248	Several mechanisms exist but tend to be geared to the academic sector.		

8. Build international partnerships to foster greater transfer of knowledge and best practice

Improve and build upon current partnerships. Identify and establish new international relationships to encourage knowledge exchange, diverse learning opportunities, and skills transfer.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	31	24/05/2019 12:44 PM ID: 117505743	International information exchange can be established in a number of ways, for example by attending workshops and conferences on topics of specific or general interest. Partnerships, with practitioner and R&D partners, can help with exchange of knowledge and best practice.	
	32	25/05/2019 01:08 AM ID: 117458964	Cannot do this without 5 and 6 so lower priority for now.	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	24
	1	29/04/2019 16:06 PM ID: 115180310	None	
	2	29/04/2019 16:29 PM ID: 115183952	Leaving the EU	
	3	30/04/2019 09:38 AM ID: 115241585	Brexit? Increased worldwide increase in nationalism? Lazy language learning in UK schools.	
	4	30/04/2019 13:07 PM ID: 115265228	As comments above	
	5	30/04/2019 14:28 PM ID: 115249000	Different hydrological climates and data, needs to be focused on UK needs	
	6	02/05/2019 12:26 PM ID: 115501184	Use of technology to facilitate this, [organisation names(s) removed] in particular not very good at this type of inclusion	
	7	02/05/2019 14:48 PM ID: 115198816	Brexit.	
	8	03/05/2019 10:52 AM ID: 115580983	No. Just time and someone to lead this. This would make a good PhD project.	
	9	08/05/2019 17:58 PM ID: 116061289	No	
	10	09/05/2019 16:49 PM ID: 116171071	No, it is happening and we should do more	
	11	10/05/2019 12:52 PM ID: 115383239	In terms of operational tools procurement can be - we use [organisation names(s) removed] for flood forecasting which is open software and community led but a lot of hydrological systems have to go through commercial procurement which limits shared learning and development by a wider community	
	12	15/05/2019 14:46 PM ID: 116697459	Language, data sharing, temporal and spatial scales	
	13	15/05/2019 22:53 PM ID: 116749371	No - this is happening already.	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
14	16/05/2019 10:27 AM ID: 116787849	No		
15	16/05/2019 12:37 PM ID: 116804203	No		
16	16/05/2019 16:14 PM ID: 116013085	Policy, public sector spend-caps and image consciousness may skew international representation to views of members more able to travel rather than the absolute needs of flood hydrology.		
17	17/05/2019 17:11 PM ID: 116970244	Finding the breathing space. Recognising that working internationally is not about travel, but needs to be the default for leads		
18	19/05/2019 14:33 PM ID: 117093851	No		
19	20/05/2019 08:43 AM ID: 116550453	No		
20	22/05/2019 12:29 PM ID: 117376373	See previous		
21	23/05/2019 16:48 PM ID: 117496746	Resources - money / time. Avoiding CO2 generation due to additional travel (though Webex etc can help reduce this).		
22	23/05/2019 18:04 PM ID: 117519248	Costs of participation to industry.		
23	24/05/2019 12:44 PM ID: 117505743	Is this not happening already as an ongoing activity?		
24	25/05/2019 01:08 AM ID: 117458964	Funding available. Identifying appropriate international organisations to engage with. Is it Science or Policy/Practitioner focussed?		
			answered	24
			skipped	101

9. Improve the transfer of scientific advances in flood hydrology in to practice

Increase the impact of UK Research and Innovation funded programmes and projects through improved translation of science in to practice. This work area should encourage practitioners to share information with researchers abut current practice, current needs, what does and doesn't work well, and examples where new methods and techniques have been applied in practice.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.81%	1
2	2	3.25%	4
3	3	10.57%	13
4	4	32.52%	40
5	5	52.85%	65

Analysis							
	Mean:	4.33	Std. Deviation:	0.85	Satisfaction Rate:	83.33	answered 123
	Variance:	0.73	Std. Error:	0.08			skipped 2

Comments (optional): (41)

1	29/04/2019 16:20 PM ID: 115181559	Vital
2	29/04/2019 16:29 PM ID: 115183952	Need to be mindful of the impact of frequent incremental change on long term projects and reservoir management, it brings a requirement for constant reworking.
3	30/04/2019 12:40 PM ID: 115261724	[organisation names(s) removed] is very interested in applying the science. We are currently doing this through workshops but would be happy to explore opportunities to partner with you on topics of common interest.
4	30/04/2019 13:49 PM ID: 115277401	Applied research is fundamental. Practitioners are still using methods from 50 years ago
5	01/05/2019 18:13 PM ID: 115431558	I see this as a significant priority. I'm aware of a significant amount of potentially useful academic work which doesn't seem to see much use or be translated into anything useful for application.
6	02/05/2019 09:35 AM ID: 115471184	[organisation names(s) removed] - Lots of research being completed but no new accepted guidance has been released since 2017, and even this is very similar to 2015. I am reluctant to use a method until it has been approved by [organisation names(s) removed].
7	02/05/2019 14:48 PM ID: 115198816	Actually value interdisciplinary research
8	03/05/2019 10:52 AM ID: 115580983	Essential. If has to work in practice
9	03/05/2019 13:35 PM ID: 115608108	This should be extended to sharing of software and systems (e.g. porting them onto platforms usable by researchers). This allows researchers to compare their approaches with operational systems, and also to make direct developments in the operational software. This smooths the path between research and operations, allowing much faster adoption of new techniques.
10	07/05/2019 11:58 AM ID: 115871782	And encourage and enable researchers to share their work. I think this could be achieved by, instead, encouraging researchers to do more effective desk studies and literature reviews.
11	08/05/2019 09:46 AM ID: 115999807	Mutual respect of intellectual property is important, whilst still sharing methodology where possible.

9. Improve the transfer of scientific advances in flood hydrology in to practice

Increase the impact of UK Research and Innovation funded programmes and projects through improved translation of science in to practice. This work area should encourage practitioners to share information with researchers abut current practice, current needs, what does and doesn't work well, and examples where new methods and techniques have been applied in practice.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	08/05/2019 16:34 PM ID: 116056900	Critical area. Much academic research is not on areas of need for practitioners. Also good research needs to more rapidly make its way to industry practice.		
13	08/05/2019 17:58 PM ID: 116061289	Doesn't have to be [organisation names(s) removed] funded programmes. Open source of all information should be a priority		
14	09/05/2019 16:49 PM ID: 116171071	Bridge the gap between science & ops/practice		
15	13/05/2019 10:48 AM ID: 116422927	This should be of high priority as I currently feel to implementation of research and innovation into practice is lacking. For example, [method removed to protect organisation(s) identity] is currently being used on many modelling and mapping studies and yet it has not been through any peer review and there is a lack of transparency over parts of the calculations.		
16	13/05/2019 13:37 PM ID: 116449651	The theory of this is great and something I champion, in practise it is often the case the research is very site specific and difficult to transfer to general application.		
17	13/05/2019 15:07 PM ID: 116463005	Very important		
18	14/05/2019 17:22 PM ID: 116606375	But only if it can answer the questions about what it is for and why it is needed.		
19	15/05/2019 11:04 AM ID: 116661131	Need to speed up the translation of R&D into guidance. I'd like to see a Scientific Advisory Group (described in 6 above) producing [organisation names(s) removed] and for them to be updated much more regularly (e.g. annually).		
20	15/05/2019 14:46 PM ID: 116697459	Transfer from research to useable software needs to be much quicker. Small catchment hydrology project has still no delivered the promised software. Licence issues have been raised with software providers but there is little impetus to change due to being sole providers e.g. [method removed to protect organisation(s) identity] licencing is not compatible with modern computing methods of running models over a network / cloud computing.		
21	15/05/2019 22:53 PM ID: 116749371	This is a high priority and a good basis for the Framework to be the transition between academic research and practitioners.		
22	16/05/2019 12:37 PM ID: 116804203	I think we are generally pretty good at this already but certainly scope to improve it and ensure practical implementation of methods is a fundamental part of any research programmes		
23	16/05/2019 15:47 PM ID: 116840164	Improved linkage to University's beyond individual networks, and to multiple institutions		
24	16/05/2019 16:14 PM ID: 116013085	There is a risk that continuously changing flood hydrology methods will reduce political confidence, or see recommended design/build standards fluctuating - causing instability in markets... It's easy to reduce a mandated flood water storage volume - but not as easy to increase.		
25	16/05/2019 16:54 PM ID: 116849290	[organisation names(s) removed] usually behind in adoption of latest software and approaches		
26	17/05/2019 14:13 PM ID: 116948761	How about identifying some past projects that have been translated well into practice and others that haven't, and seeing what we can learn from comparing them?		

9. Improve the transfer of scientific advances in flood hydrology in to practice

Increase the impact of UK Research and Innovation funded programmes and projects through improved translation of science in to practice. This work area should encourage practitioners to share information with researchers abut current practice, current needs, what does and doesn't work well, and examples where new methods and techniques have been applied in practice.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
27	17/05/2019 16:45 PM ID: 116772689	This could be reworded to explicitly state the need for [organisation names(s) removed] to be co-designed between scientists/research councils and stakeholders. The current wording emphasises one-way flows of information rather than emphasising the importance of co-production between academics/scientists/researchers and practitioners/policy makers when translating science into practice. This is the only mention of [organisation names(s) removed] in the Roadmap which is disappointing.		
28	17/05/2019 17:11 PM ID: 116970244	Hey, it's all important! Sharing knowledge is the best way to create new knowledge and spark innovation.		
29	17/05/2019 17:26 PM ID: 116973448	Probably the work area should also encourage researchers to listen more to practitioners and try to solve real problems.		
30	18/05/2019 13:37 PM ID: 117028508	This is the proper role of [organisation names(s) removed]. To complete the pipeline from basic R and D to practical application. That in itself is a mammoth task and where the lion's share of [organisation names(s) removed] funding in this area should go (in my view).		
31	18/05/2019 17:03 PM ID: 115187747	Essential if it's going to maximise usefulness - but needs the applied sector to step up and feed into the discussions		
32	18/05/2019 18:55 PM ID: 117057658	Currently way too slow.		
33	18/05/2019 22:02 PM ID: 116681882	Secure and sustained funding is needed for continued development and dissemination of the [method removed to protect organisation(s) identity] methods.		
34	19/05/2019 14:19 PM ID: 117082368	[organisation names(s) removed] already requires recipients of research funds to demonstrate impact and share output data		
35	19/05/2019 20:35 PM ID: 116800339	Some Academics (there are exceptions) have little interest or knowledge of the actual practice of flood hydrology		
36	19/05/2019 21:22 PM ID: 115953502	I tried to do applied hydrology research in the 1990s within an academic environment. It was a lonely place to be. Academia was not well disposed to applied research and industrial sponsors for such work were thin on the ground.		
37	19/05/2019 23:56 PM ID: 117116149	This is highly relevant except that the title is wrong. The need is for the scientific research to address the problems that are practically relevant. The researchers won't sit through presentations that tell them they've been pushing their pet theories, methods and approaches when they ought to have been thinking about (and demonstrating) applications.		
38	22/05/2019 12:29 PM ID: 117376373	See previous		
39	23/05/2019 13:12 PM ID: 117486576	Very important		
40	23/05/2019 16:48 PM ID: 117496746	Essential to deliver improvements at a fast pace.		
41	24/05/2019 12:44 PM ID: 117505743	Dissemination of [organisation names(s) removed] needs to be improved. Greater two-way communication on needs and opportunities would be good. Not sure why this focuses on [organisation names(s) removed].		

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	27

1	29/04/2019 16:20 PM ID: 115181559	Science has to first understand the needs of practitioners otherwise outputs are pointless.
2	29/04/2019 16:23 PM ID: 115180583	The findings of government funded research should be published so that methods can be replicated and implemented. The current situation with [method and organisation names(s) removed] is very bad since it has created a monopoly…..and an unauditable black box that cannot be checked. That model of funding research should never be repeated
3	30/04/2019 09:38 AM ID: 115241585	Scientific folks have no real grasp of real work world issues it seems. See comments further up.
4	30/04/2019 13:07 PM ID: 115265228	Resources
5	03/05/2019 10:52 AM ID: 115580983	No
6	03/05/2019 13:35 PM ID: 115608108	Access to [method removed to protect organisation(s) identity] for researchers outside [organisation names(s) removed] is impossible.
7	07/05/2019 11:58 AM ID: 115871782	This may need an improved route / publication for peer reviewed science to be published in this field.
8	08/05/2019 16:34 PM ID: 116056900	Non-involvement of practitioners in academic and public funded research
9	08/05/2019 17:58 PM ID: 116061289	Not really though it hasn't managed to happen yet.
10	10/05/2019 12:52 PM ID: 115383239	Often feels that operational/practitioner needs do not driver research programmes enough and/or too much R&D stays on the shelf and is never usable operationally in the real world. Much better transfer needed, or focus on what R&D we do (less but of high quality/relevant to practitioner?)
11	13/05/2019 13:37 PM ID: 116449651	There shouldn't be for any centrally funded work - it should be encouraged.
12	13/05/2019 15:07 PM ID: 116463005	How are these results disseminated? If it's in closed access journals, then this is a problem. We also need to make sure we turn science into guidance that can be picked up by practitioners.
13	14/05/2019 10:52 AM ID: 116548266	Making technological advances progress to software. Making software more available
14	15/05/2019 14:46 PM ID: 116697459	Innovation is currently being limited by software providers as equations are not open source. Typical responses are that if there is a demand for software development then it will be considered, however, existing software cannot be used e.g. [method removed to protect organisation(s) identity].
15	15/05/2019 22:53 PM ID: 116749371	Already happening on other frameworks. However - if consistency is a key vision for the framework this may be more difficult to achieve as more techniques are available and applied.
16	16/05/2019 10:27 AM ID: 116787849	No
17	16/05/2019 12:37 PM ID: 116804203	No
18	16/05/2019 16:54 PM ID: 116849290	training required to enable rapid implementation
19	18/05/2019 18:55 PM ID: 117057658	There is no mechanism for this to happen. Specific knowledge exchange funding would be needed.

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
20	19/05/2019 14:19 PM ID: 117082368	Costs for practitioner organisations can be an issue (cost of time out to attend training/events). Aligning R&D dissemination to CPD events under umbrella of professional bodies may help raise importance of this activity		
21	19/05/2019 14:33 PM ID: 117093851	No		
22	19/05/2019 21:22 PM ID: 115953502	Yes. Universities seek cutting edge research - industry seeks quick fixes. The appetite for applied research is low, I am afraid.		
23	23/05/2019 13:12 PM ID: 117486576	Again funding - [organisation names(s) removed] funding isn't currently able to support this type of work. Also need to consider the recognition/award systems for researchers engaging in impact work (it is undervalued and shouldn't be!)		
24	23/05/2019 16:48 PM ID: 117496746	Potential issues with IPR? Working with third party commercial companies?		
25	23/05/2019 18:04 PM ID: 117519248	Innovation funding mechanisms (e.g. KTPs) often focus on individual projects and/or bilateral partnerships		
26	24/05/2019 12:44 PM ID: 117505743	Are there constraints on publication within [organisation names(s) removed] that lead to this situation?		
27	25/05/2019 01:08 AM ID: 117458964	[organisation names(s) removed] can sometimes support the translation work and implementation. However, there is other funding/projects that can have bigger funding and impacts (e.g. NaFRA2, Future Flood Forecasting Service, new national procurement frameworks), so coordinating across those activities is required.		
			answered	27
			skipped	98

10. Increase integration across the flood hydrology community

Encourage more integrated relationships across the flood hydrology community. This could include ways to enable skill and knowledge sharing between different industry groups (e.g. regulators, consultants, academics, water companies and developers) and technical disciplines (e.g. high flow and low flood specialists, meteorologists and geomorphologists).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.61%	2
2	2	5.65%	7
3	3	16.94%	21
4	4	45.97%	57
5	5	29.84%	37

Analysis							
	Mean:	3.97	Std. Deviation:	0.92	Satisfaction Rate:	74.19	answered 124
	Variance:	0.84	Std. Error:	0.08			skipped 1

Comments (optional): (27)

1	29/04/2019 16:20 PM ID: 115181559	Most practitioners multi-task anyway.
2	30/04/2019 10:34 AM ID: 115245631	Arguably [organisation names(s) removed] could be doing this (or are doing this). It might be best to do this as [organisation names(s) removed] to make use of that network
3	30/04/2019 12:40 PM ID: 115261724	Again [organisation names(s) removed] aims to create more integrated working relationships between regulators, academia and consultancies. We recently partnered with universities, international colleagues and [organisation names(s) removed] to organise and run networking and CPD events for a range of industry people. We would be interested in working alongside you to share knowledge between hydrology and geomorphology disciplines, perhaps to co-badge / run events
4	30/04/2019 13:07 PM ID: 115265228	There are big opportunities here many farmers foresters land managers do not understand hydrology
5	01/05/2019 18:13 PM ID: 115431558	We often tend to isolate aspects of our work which are not isolated in practice and so this seems like a good idea.
6	02/05/2019 09:35 AM ID: 115471184	Would be hugely beneficial in terms of knowledge sharing
7	02/05/2019 12:26 PM ID: 115501184	Could there be secondment opportunities?
8	03/05/2019 10:52 AM ID: 115580983	Essential
9	08/05/2019 09:46 AM ID: 115999807	Particularly statistical understanding and modelling understanding.
10	08/05/2019 17:58 PM ID: 116061289	People should be doing this already
11	14/05/2019 17:22 PM ID: 116606375	OK much more like it but include ecologists and social scientists.
12	15/05/2019 11:04 AM ID: 116661131	I hope/expect that this would follow from having a Scientific Advisory Group.

10. Increase integration across the flood hydrology community

Encourage more integrated relationships across the flood hydrology community. This could include ways to enable skill and knowledge sharing between different industry groups (e.g. regulators, consultants, academics, water companies and developers) and technical disciplines (e.g. high flow and low flood specialists, meteorologists and geomorphologists).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
13	15/05/2019 22:53 PM ID: 116749371	This could be achieved within the steering group or scientific advisory group.		
14	16/05/2019 14:30 PM ID: 116829098	I think there is a lot of integration already (although always could be improved!)		
15	17/05/2019 17:26 PM ID: 116973448	This could involve making [organisation names(s) removed] meetings more attractive to a wider community - at present [organisation names(s) removed] seems to be not very attractive, while it should be the obvious entity doing the work suggested here.		
16	18/05/2019 13:37 PM ID: 117028508	Ok but not an important area for [organisation names(s) removed] to fund. Can be done via others		
17	19/05/2019 07:17 AM ID: 117075485	Already have meetings, but where's the bright ones		
18	19/05/2019 14:19 PM ID: 117082368	Existing user groups (e.g. aligned to professional bodies) could be encouraged to hold more joint cross-discipline CPD events (target of n per year, say) as these can be effective		
19	19/05/2019 21:22 PM ID: 115953502	Some integration would be helpful - but it is not a big issue and there are mechanisms for this already		
20	19/05/2019 23:56 PM ID: 117116149	This is quite relevant. But researchers won't prioritise their involvement, and dialogues may not be sufficiently "give and take". Liable to be a talking shop at best.		
21	21/05/2019 13:45 PM ID: 117286332	I would include [organisation names(s) removed] into this group as well.		
22	22/05/2019 12:29 PM ID: 117376373	See previous.		
23	23/05/2019 13:12 PM ID: 117486576	Also across other communities e.g. meteorology and social sciences		
24	23/05/2019 16:48 PM ID: 117496746	Yes - needed to deliver and ensure a balanced and thought through, sustainable approach.		
25	24/05/2019 12:44 PM ID: 117505743	This needs to be done where most needed. Reservoir management for water supply and flood alleviation is one example.		
26	25/05/2019 01:08 AM ID: 117458964	Supporting placements/exchanges between different organisations/academics/industry could be beneficial.		
27	28/05/2019 17:34 PM ID: 116980263	Specifically within [organisation names(s) removed], there doesn't seem to be much sharing between different parts of the business at the moment and this should be a priority to improve.		

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	16

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	29/04/2019 16:23 PM ID: 115180583	Communication on new methods and techniques is currently poor. E.g. when a new method comes out, how is it publicised? Why are [organisation names(s) removed] not published online? What forums are there for professional hydrologists to discuss the issues they face?		
2	30/04/2019 13:07 PM ID: 115265228	Would need to go via [organisation names(s) removed] and be incorporated into Agricultural Environment Schemes		
3	02/05/2019 09:35 AM ID: 115471184	Not technical - but could be difficult working with other consultants (i.e. our competitors)		
4	02/05/2019 12:26 PM ID: 115501184	HR barriers?		
5	03/05/2019 09:57 AM ID: 115578165	Difficult to engage with specialists when there is little encouragement for specialists to stay in post. Rewards and promotion in [organisation names(s) removed] are not given for technical excellence.		
6	03/05/2019 10:52 AM ID: 115580983	Consultants are reluctant to take on advice at present. There are some poor skills amongst practitioners of flood estimation out there.		
7	07/05/2019 11:58 AM ID: 115871782	This has happened better in the past when ownership of the technical processes was more aligned. The physical barrier is that this meet politics. Would the steering group encourage big changes to the industry e.g. river management and water supply to be managed by single entities?		
8	08/05/2019 17:58 PM ID: 116061289	No		
9	10/05/2019 12:52 PM ID: 115383239	Organisational HR polices/rules especially within public sector with headcounts and/or commercial sector where profitability is a driver		
10	14/05/2019 17:22 PM ID: 116606375	Yes - we're all partitioning into groups [organisation names(s) removed]. You ned to break these down to really get at the transdisciplinary science needed to serve society		
11	15/05/2019 14:46 PM ID: 116697459	There shouldn't be		
12	16/05/2019 10:27 AM ID: 116787849	No		
13	16/05/2019 12:37 PM ID: 116804203	No		
14	19/05/2019 14:33 PM ID: 117093851	No		
15	22/05/2019 12:29 PM ID: 117376373	See previous		
16	23/05/2019 18:04 PM ID: 117519248			
			answered	16
			skipped	109

11. Review and define roles and institutional responsibilities in UK flood hydrology

Carry out a review of current and future roles required to deliver effective flood hydrology in UK. This should include a skills gaps analysis for key roles.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	3.28%	4
2	2	15.57%	19
3	3	36.07%	44
4	4	29.51%	36
5	5	15.57%	19

Analysis							
	Mean:	3.39	Std. Deviation:	1.03	Satisfaction Rate:	59.63	answered 122
	Variance:	1.06	Std. Error:	0.09			skipped 3

Comments (optional): (20)

1	30/04/2019 10:34 AM ID: 115245631	Seems very useful. Again, can this involve [organisation names(s) removed]?
2	01/05/2019 20:32 PM ID: 115443184	Responsibility for surface water flooding needs better clarity
3	02/05/2019 12:26 PM ID: 115501184	Salary?
4	03/05/2019 13:35 PM ID: 115608108	Poorly defined institutional responsibility has been highlighted as an issue in key reports in the past. The situation still needs to be properly addressed.
5	07/05/2019 11:58 AM ID: 115871782	Yes I agree it is important, although I think it will find that things work OK at the moment (or at least in the way envisioned in the roadmap).
6	08/05/2019 20:56 PM ID: 115775975	this is essential - especially in the area of groundwater flooding
7	10/05/2019 12:52 PM ID: 115383239	There are areas of overlap and clear division of responsibilities between Universities, [organisation names(s) removed], consultants would be welcome
8	14/05/2019 10:52 AM ID: 116548266	One of the current limitations
9	14/05/2019 11:33 AM ID: 116559539	There is a need for [organisation names(s) removed] across [organisation names(s) removed]. To link in with [organisation names(s) removed] - this is imperative in getting better knowledge and confidence in flood estimation.
10	14/05/2019 17:22 PM ID: 116606375	Sounds like a club - why not focus on how to define and communicate what you are first.
11	16/05/2019 16:14 PM ID: 116013085	I'm not overly aware of how it works at the moment in this context - I think a review needs to establish if there are any issues or gaps to inform future planning.
12	18/05/2019 13:37 PM ID: 117028508	I presume this means internally to [organisation names(s) removed]? If not then it is overreach and you'd be better of redirecting spend to the core of your programme
13	18/05/2019 17:03 PM ID: 115187747	Sounds like the group may push people down one line to meet their own selfish requirements.
14	18/05/2019 18:55 PM ID: 117057658	Others know this much better than me
15	19/05/2019 20:35 PM ID: 116800339	Hopefully quick, so we can move onto 12

11. Review and define roles and institutional responsibilities in UK flood hydrology

Carry out a review of current and future roles required to deliver effective flood hydrology in UK. This should include a skills gaps analysis for key roles.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
16	19/05/2019 21:22 PM ID: 115953502	Yes. As per previous comment, I think that "hydrology" as a discipline has been downgraded in recent decades. If it is important, we should expect to see it feature in teaching, in the names of departments and job titles.		
17	19/05/2019 23:56 PM ID: 117116149	Not quite sure what is intended by this, and who would do the work. But it might be as good as some of the other options put forward.		
18	22/05/2019 12:29 PM ID: 117376373	See previous		
19	23/05/2019 16:48 PM ID: 117496746	Has merit as long as this is done at the same time as other work, rather than instead of that work.		
20	24/05/2019 12:44 PM ID: 117505743	[organisation names(s) removed] role in flood hydrology might form a useful case study for this.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	11
1	02/05/2019 14:48 PM ID: 115198816	Agencies are too politically driven and not independent enough from the political hype of the day.		
2	08/05/2019 17:58 PM ID: 116061289	No		
3	16/05/2019 10:27 AM ID: 116787849	No		
4	16/05/2019 10:51 AM ID: 116792107	No, but many institutional barriers		
5	16/05/2019 12:37 PM ID: 116804203	No		
6	17/05/2019 13:28 PM ID: 116938355	Currently [organisation names(s) removed] have certain remits when it comes to the different sources if flooding. There needs to be an integrated approach to flooding and a common purpose for all the bodies.		
7	19/05/2019 07:17 AM ID: 117075485	Who		
8	19/05/2019 14:33 PM ID: 117093851	No		
9	19/05/2019 21:22 PM ID: 115953502	Not technical barriers.		
10	22/05/2019 12:29 PM ID: 117376373	See previous		
11	23/05/2019 13:12 PM ID: 117486576	The skills gaps are largely communication and maths/science. This is already known		
			answered	11
			skipped	114

12. Improve hydrological skill and capacity in the UK

This work area should aim to address any skills gaps identified in the work area above. It could also cover a range of activities, including measures for encouraging more investment in hydrology education and training, establishing cross-community work placement schemes to enable skill sharing.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.00%	0
2	2	8.20%	10
3	3	29.51%	36
4	4	36.07%	44
5	5	26.23%	32

Analysis							
	Mean:	3.8	Std. Deviation:	0.92	Satisfaction Rate:	70.08	answered 122
	Variance:	0.85	Std. Error:	0.08			skipped 3

Comments (optional): (22)

1	29/04/2019 15:39 PM ID: 115171574	Very significant skill gaps have emerged in the UK
2	29/04/2019 16:29 PM ID: 115183952	Already a number of hydrological focussed masters courses
3	29/04/2019 19:23 PM ID: 115203101	Decline in funded places on postgraduate hydrology courses
4	30/04/2019 12:40 PM ID: 115261724	This is very important. It is also important that hydrologists have a range of skills and understanding - e.g. of how geomorphological processes may affect flood risk and hydrology either at a site or across a catchment.
5	01/05/2019 18:13 PM ID: 115431558	Training opportunities are quite varied, but sporadic
6	03/05/2019 10:52 AM ID: 115580983	Consultants need to train staff better on flood estimation. It often seems to be carried out by inexperienced entry grade graduates who have only been taught the basics.
7	07/05/2019 11:58 AM ID: 115871782	Should be coordinated by a national research body and funded by industry. Funding should be drawn from industry by compulsory means.
8	08/05/2019 09:46 AM ID: 115999807	Statistical understanding is key
9	08/05/2019 17:58 PM ID: 116061289	There should be a manual. This should be a priority.
10	08/05/2019 20:56 PM ID: 115775975	This is a challenging area and needs to be well-funded if it is to be effective
11	13/05/2019 16:08 PM ID: 116472899	Career progression tends to be an impediment to retaining highly skilled staff
12	14/05/2019 17:22 PM ID: 116606375	Yes but see points above about being too narrowly focused
13	17/05/2019 16:45 PM ID: 116772689	Resources will need to be dedicated to university masters programmes and to CPD modules
14	17/05/2019 17:11 PM ID: 116970244	Technical development pathways to ensure we have the skills we need! (Sigh. Again!)

12. Improve hydrological skill and capacity in the UK

This work area should aim to address any skills gaps identified in the work area above. It could also cover a range of activities, including measures for encouraging more investment in hydrology education and training, establishing cross-community work placement schemes to enable skill sharing.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
15	18/05/2019 13:37 PM ID: 117028508	Fine to advocate for it (and placement schemes would be good value for money) but skills provision can be delivered by universities and CPD		
16	18/05/2019 18:55 PM ID: 117057658	Linking training across industry/government/academia would be great		
17	19/05/2019 14:19 PM ID: 117082368	Could be valuable for advising universities/colleges (e.g. via professional body accreditation guidance) on the range of skills that could be developed at this level		
18	19/05/2019 21:22 PM ID: 115953502	This fits with my "vision".		
19	19/05/2019 23:56 PM ID: 117116149	Not sure what is envisaged. Rather vague.		
20	22/05/2019 12:29 PM ID: 117376373	See previous		
21	23/05/2019 16:48 PM ID: 117496746	Needed to deliver long term improvements.		
22	25/05/2019 01:08 AM ID: 117458964	More accredited training/courses/university degrees?		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	12
1	03/05/2019 10:52 AM ID: 115580983	Consultants need to train staff		
2	07/05/2019 11:58 AM ID: 115871782	To be successful this needs to think big, So it needs government buy-in.		
3	08/05/2019 17:58 PM ID: 116061289	No		
4	10/05/2019 12:52 PM ID: 115383239	See above - more MSc opportunities needed. More numerate graduates needed - too many study environmental science or geography without a strong maths capability which limits their capability in hydrological work. May need more focus on this at undergraduate level especially for students who may need more development in their maths if not gained at A level.		
5	14/05/2019 10:52 AM ID: 116548266	Recognising current expertise		
6	16/05/2019 10:27 AM ID: 116787849	No		
7	16/05/2019 12:37 PM ID: 116804203	No		
8	19/05/2019 14:33 PM ID: 117093851	No		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
9	19/05/2019 21:22 PM ID: 115953502	No		
10	22/05/2019 12:29 PM ID: 117376373	See previous		
11	23/05/2019 18:04 PM ID: 117519248	As usual, financing training at various levels. Also provision of industry-focussed PG/MSc level education.		
12	24/05/2019 12:44 PM ID: 117505743	Time pressures and different priorities can be a barrier to work placement.		
			answered	12
			skipped	113

13. Develop, maintain and publish clear guidance on 'industry standard' methods and tools for flood hydrology

Technical guidance for practitioners should cover methods for all sources of flooding over a range of spatial and temporal scales. Guidance should be peer-reviewed and have sign-off from an appropriate group (e.g. the proposed Flood Hydrology scientific advisory group). Guidance should be reviewed and updated annually as a minimum to take account on new and updated methods and user feedback.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	3.25%	4
2	2	4.07%	5
3	3	12.20%	15
4	4	31.71%	39
5	5	48.78%	60

Analysis							
	Mean:	4.19	Std. Deviation:	1.01	Satisfaction Rate:	79.67	answered 123
	Variance:	1.03	Std. Error:	0.09			skipped 2

Comments (optional): (38)

1	29/04/2019 15:39 PM ID: 115171574	Clear need for updated guidance for extreme flood estimation, for example for reservoir safety assessments.
2	29/04/2019 16:20 PM ID: 115181559	Vital
3	29/04/2019 16:23 PM ID: 115180583	This guidance must be available online.
4	29/04/2019 16:29 PM ID: 115183952	Yes yes yes please!
5	29/04/2019 20:22 PM ID: 115206676	Guidance should not be reliant on the use of proprietary software
6	30/04/2019 10:34 AM ID: 115245631	Very useful. Not a small job!
7	30/04/2019 12:40 PM ID: 115261724	This guidance should include a clear understanding of how physical changes to rivers and floodplains affect flood risk - whether those are natural (erosion / deposition) or anthropogenic (widening, straightening, etc.). Note that [organisation names(s) removed] is working with [organisation names(s) removed] on a project to address this issue right now. Contact [removed to protect the identity of individual(s)].
8	30/04/2019 13:49 PM ID: 115277401	Hydrology cannot and should not be standardised
9	02/05/2019 09:35 AM ID: 115471184	Annual update would be very well received, and the knowledge that the guidance is updated at the same time each year would give far more certainty and confidence when completing work, as you know when guidance will come out, rather than potentially having to update or re-do work when new guidance is released unexpectedly.
10	02/05/2019 12:41 PM ID: 115501839	It may be valuable to develop simplified methods (for initial assessment or screening studies) as well as fully rigorous ones?
11	03/05/2019 10:52 AM ID: 115580983	Essential if it includes all areas of the UK and not just cover what is best for one of the UK regions.

13. Develop, maintain and publish clear guidance on ‘industry standard’ methods and tools for flood hydrology

Technical guidance for practitioners should cover methods for all sources of flooding over a range of spatial and temporal scales. Guidance should be peer-reviewed and have sign-off from an appropriate group (e.g. the proposed Flood Hydrology scientific advisory group). Guidance should be reviewed and updated annually as a minimum to take account on new and updated methods and user feedback.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	07/05/2019 11:58 AM ID: 115871782	Yes it is important, but also I think it exists at present in an appropriate way.		
13	08/05/2019 17:58 PM ID: 116061289	There’s the manual. Do this asap		
14	10/05/2019 12:52 PM ID: 115383239	Critical for consistent application across regulators and the regulated, across the UK and between hydrological organisations		
15	13/05/2019 10:48 AM ID: 116422927	This is currently severely lacking. The FEH guidelines have not been updated for several years and there have been a number of changes. For example, [method removed to protect organisation(s) identity] is currently being used on many modelling and mapping studies and yet it has not been through any peer review and there is a lack of transparency over parts of the calculations.		
16	14/05/2019 10:52 AM ID: 116548266	Making this freely available		
17	15/05/2019 11:04 AM ID: 116661131	Totally agree. Regular updates are a must too.		
18	15/05/2019 14:46 PM ID: 116697459	This is very important, [organisation names(s) removed] are out of date when considering current software available + consultants using in-house software that is not industry standard.		
19	15/05/2019 22:53 PM ID: 116749371	Absolutely necessary. E.g. there are still instances of local use of FSR and outdates hydrology - current industry standards need to be better documented and communicated.		
20	16/05/2019 16:54 PM ID: 116849290	This would help as often a topic different consultants disagree on.		
21	16/05/2019 17:21 PM ID: 116851056	There is a lot of information out there at the moment but no clear steer on what to adopt and when. Clear guidance is essential.		
22	17/05/2019 17:26 PM ID: 116973448	Technical guidance should be easy to find and understand		
23	18/05/2019 13:37 PM ID: 117028508	Yes - the right thing for a regulator to be doing		
24	18/05/2019 17:03 PM ID: 115187747	Yeah - but don't just get it reviewed by the scientific community, also include the applied sector who can give valuable insight from the coal face as to what is useable. Issues of availability of input data (costs and whether businesses will stump up for it in a competitive environment), clever ideas when there is data at hand are fine but most sites have are ungauged and the suggestion of something really clever can tick the clever box but be of little practical use in the applied arena. However having an authoritative sign off does prevent a proliferation of sometimes spurious methods or "urban" myths. So it is helpful		
25	18/05/2019 18:55 PM ID: 117057658	Again, not my area		
26	18/05/2019 22:58 PM ID: 117056440	Useful, but possible danger of stifling innovation and alternative methods		
27	19/05/2019 14:19 PM ID: 117082368	Practitioners tend to seek consistent guidance, and education providers can be encouraged to align to guidelines		

13. Develop, maintain and publish clear guidance on 'industry standard' methods and tools for flood hydrology

Technical guidance for practitioners should cover methods for all sources of flooding over a range of spatial and temporal scales. Guidance should be peer-reviewed and have sign-off from an appropriate group (e.g. the proposed Flood Hydrology scientific advisory group). Guidance should be reviewed and updated annually as a minimum to take account on new and updated methods and user feedback.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	28	19/05/2019 20:35 PM ID: 116800339	What is wrong with the FEH Guidelines? I'm not saying it is perfect. Updating annually is a large task, especially if peer-reviewed. (How useful is peer-review really?) Too much power in the hands of the Scientific Advisory Group?	
	29	19/05/2019 23:56 PM ID: 117116149	This sounds to be aimed at standardisation. Clear guidance is good but forcing things too much will act against more thoughtful flood hydrology. That would be very bad. It is ludicrous to integrate guidance for surface-water or sewer flooding hydrology with that for fluvial flood hydrology. The observational data available to support the first two topics is typically very limited. The outputs are typically driven by generic modelling and are of limited value. Done well, fluvial flood estimation is much better supported by gauged and historical data. It would be a grave mistake to encourage planners and the construction industry to think that all (or none) of these types of flooding are well catered for.	
	30	22/05/2019 12:29 PM ID: 117376373	See previous	
	31	23/05/2019 11:39 AM ID: 117474750	I think more thorough, impartial peer review using a method more akin to publishing in peer review journals would be beneficial (not by companies or consultancies that might want contracts from you now or in future).	
	32	23/05/2019 13:12 PM ID: 117486576	I appreciate this is needed for consultants to produce consistent work but it makes it very hard to incorporate new science/methods if they have to go through a long drawn out approval process	
	33	23/05/2019 16:48 PM ID: 117496746	These standards would also need to be kept up to date as necessary.	
	34	23/05/2019 18:04 PM ID: 117519248	If skill and capacity are strengthened then guidance need not be overly prescriptive.	
	35	24/05/2019 12:44 PM ID: 117505743	Improving methods rather than establishing standards should be given priority.	
	36	24/05/2019 13:52 PM ID: 117364703	Without this, but with the other work areas, we risk every assessment being constantly open to challenge. This work area is critical to being able to say 'yes we have done the assessment well enough for the current purpose, now let's move on and use it to make some decisions'	
	37	25/05/2019 01:08 AM ID: 117458964	Important to consolidate, e.g. FEH methods.	
	38	28/05/2019 21:37 PM ID: 117847148	I like the concept of frequent update/ review but I'm concerned that technical guidance can result in constriction of new ideas/ methods in practice	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	14
	1	29/04/2019 19:23 PM ID: 115203101	Lack of UK wide technical guidance (what we have is predominantly for England)	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
2	30/04/2019 09:38 AM ID: 115241585	Standards should include also back to basics approaches - not just relying on computers - we are likely to lose skills if we don't maintain the basics and this includes hand calculations.		
3	30/04/2019 13:07 PM ID: 115265228	Challenging to do in terms of resourcing with ever changing science and regulations		
4	02/05/2019 14:48 PM ID: 115198816	Common sense and sanity checks should be encouraged alongside formal guidance.		
5	03/05/2019 10:52 AM ID: 115580983	Yes. Solutions for rivers in England are not always appropriate for rivers in Wales or Scotland.		
6	10/05/2019 12:52 PM ID: 115383239	Lack of clear governance and ownership - so links to need for steering group and advisory group (see above)		
7	16/05/2019 10:27 AM ID: 116787849	No		
8	16/05/2019 10:51 AM ID: 116792107	The success of the FEH is the main reason this hasn't happened. You could argue it has been too successful - has automated too much hydrology.		
9	16/05/2019 12:37 PM ID: 116804203	No		
10	19/05/2019 14:33 PM ID: 117093851	No		
11	22/05/2019 12:29 PM ID: 117376373	See previous		
12	23/05/2019 16:48 PM ID: 117496746	Overhead for keeping this type of documentation current with hyperlinks working correctly etc.		
13	25/05/2019 01:08 AM ID: 117458964	Funding.		
14	03/06/2019 09:19 AM ID: 118277211	No, I think the use of web-based guidance should be fully utilised.		
			answered	14
			skipped	111

14. The right IT infrastructure

Regulators and others to review their IT infrastructure needs to enable them to effectively carry out an intelligent client role in flood hydrology, ensure they can replicate results and access the latest software and techniques (e.g. machine learning). To include reviewing policies and software architectures (e.g. compliance with standards, use of cloud services, accessibility to virtual labs).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.67%	2
2	2	17.50%	21
3	3	33.33%	40
4	4	29.17%	35
5	5	18.33%	22

Analysis							
	Mean:	3.45	Std. Deviation:	1.03	Satisfaction Rate:	61.25	answered 120
	Variance:	1.06	Std. Error:	0.09			skipped 5

Comments (optional): (17)

1	29/04/2019 16:20 PM ID: 115181559	OK but a small consultancy might lag behind and the methods need to remain applicable and useable.
2	02/05/2019 09:35 AM ID: 115471184	This needs to be in the best interest of the industry and not purely with profit in mind.
3	03/05/2019 10:52 AM ID: 115580983	We see such bad flood hydrology as consultants don't always have the latest software or guidance and refuse to use calculation records so the results can be replicated.
4	03/05/2019 13:35 PM ID: 115608108	See comments above about making operational data and software available for researchers.
5	16/05/2019 16:14 PM ID: 116013085	Open source! There is a danger that in centralising the execution of methods, that one monopoly replaces another. Make all methods open and subject to OGL3 type licensing - to promote and encourage VAR innovation on top of a core flood estimation product.
6	17/05/2019 09:59 AM ID: 116899457	Such a specialist part of the market does not require everyone who uses the information to invest in the IT to process and interrogate it
7	18/05/2019 13:37 PM ID: 117028508	Yes - an essential feature (though pretty standard to require this so a worry of its not already in place)
8	18/05/2019 18:55 PM ID: 117057658	I think it is important to make evidence-based decisions on advancements
9	19/05/2019 13:30 PM ID: 116804060	Anyone with a modern day laptop can undertake flood hydrology and machine learning methods. It's not a particularly computer intensive field (in the modern sense). Unless full hydrodynamic modelling is included then yes it's intensive and the score is perhaps higher.
10	19/05/2019 14:19 PM ID: 117082368	Software and data access and related computer-aided methods are important for consistency of practice
11	19/05/2019 20:35 PM ID: 116800339	[organisation names(s) removed] Should there be an equivalent question for the software? Why mention machine learning here (rather than any other computer-intensive work)?
12	19/05/2019 21:22 PM ID: 115953502	IT is not a particular constraint to progress.

14. The right IT infrastructure

Regulators and others to review their IT infrastructure needs to enable them to effectively carry out an intelligent client role in flood hydrology, ensure they can replicate results and access the latest software and techniques (e.g. machine learning). To include reviewing policies and software architectures (e.g. compliance with standards, use of cloud services, accessibility to virtual labs).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	13	19/05/2019 23:56 PM ID: 117116149	An intelligent client role in flood hydrology (your words not mine) will be to encourage thought and (hence) experienced practitioners. This approach sounds to be the antithesis.	
	14	22/05/2019 07:17 AM ID: 117351653	While the IT infrastructure is of clear importance, I would think this will should not be overly managed, but given more freedom to evolve. This should be an enabling environment and not one dominated by regulators	
	15	23/05/2019 16:48 PM ID: 117496746	This is important but to achieve this will likely be expensive/complicated.	
	16	24/05/2019 12:44 PM ID: 117505743	Not convinced IT infrastructure needs to feature prominently within the roadmap for flood hydrology. It is clearly important in modelling/forecasting contexts. Machine learning is strange to highlight: process understanding and model representation of process would be a better focus for flood hydrology.	
	17	25/05/2019 01:08 AM ID: 117458964	Good to raise and think about. But maybe something for later in the process.	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	16
	1	30/04/2019 13:07 PM ID: 115265228	Too many companies vying for the work and not collaborating	
	2	02/05/2019 09:35 AM ID: 115471184	Profit is currently the focus rather than functionality and practicality	
	3	03/05/2019 09:57 AM ID: 115578165	The current restrictions to IT mean that we are often behind with developments and there is fear about what can be done with equipment	
	4	03/05/2019 10:52 AM ID: 115580983	Skill set of employees and keeping up with latest releases of software.	
	5	07/05/2019 11:58 AM ID: 115871782	I think this needs to be 'steering group to publish guidance' rather than 'regulators to investigate'.	
	6	10/05/2019 12:52 PM ID: 115383239	Cost, wider dependencies beyond hydrology. IT is constantly evolving and we will always be playing catch-up.	
	7	14/05/2019 10:52 AM ID: 116548266	Sharing between Regulators and Practitioners	
	8	15/05/2019 14:46 PM ID: 116697459	Data security	
	9	16/05/2019 10:27 AM ID: 116787849	No	
	10	16/05/2019 12:37 PM ID: 116804203	No	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
11	16/05/2019 16:14 PM ID: 116013085	Current IPR restrictions.		
12	19/05/2019 14:33 PM ID: 117093851	No		
13	23/05/2019 13:12 PM ID: 117486576	Many models in current use are not widely available for replication due to licencing constraints		
14	23/05/2019 16:48 PM ID: 117496746	Achieving integrated IT infrastructure across a range of businesses, governments and research institutions will likely run into a variety of security protocols / barriers defined by the individual organisations that are difficult to overcome without a 'sea change' in approaching collaborative working..		
15	23/05/2019 18:04 PM ID: 117519248	Governmental organisations' policies/practices on digital can be a constraint (although also have many benefits). The business model(s) for cloud IT in hydrology are not always clear.		
16	24/05/2019 12:44 PM ID: 117505743	Not clear what is meant by the intelligent client role in flood hydrology of the regulator, and its relation to IT infrastructure.		
			answered	16
			skipped	109

15. The commissioning process

Regulators to review their commissioning and quality review processes to ensure flood studies require high quality thorough flood hydrology investigations using latest research and guidance where appropriate.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.00%	0
2	2	14.05%	17
3	3	28.93%	35
4	4	38.84%	47
5	5	18.18%	22

Analysis							answered	121
	Mean:	3.61	Std. Deviation:	0.94	Satisfaction Rate:	65.29	skipped	4
	Variance:	0.88	Std. Error:	0.09				

Comments (optional): (26)

1	29/04/2019 16:29 PM ID: 115183952	Regulators must be willing to pay what it costs to do this work though.
2	29/04/2019 16:44 PM ID: 115183749	The need for proportionality of assessment needs to be included here
3	30/04/2019 13:07 PM ID: 115265228	Many NFM projects are based on good hydrological data many are based on no data which is not value for money
4	02/05/2019 09:35 AM ID: 115471184	It would need to be clear how to approach studies that cross over 2 possible sets of guidance (i.e. completed in accordance with 2019 guidance, submitted after 2020 guidance is released)
5	03/05/2019 09:57 AM ID: 115578165	It needs to be clear, concise and understandable
6	10/05/2019 12:52 PM ID: 115383239	Addressing the actions above will enable this to happen - frameworks largely in place just need updated consistent guidance to reference when commission work
7	15/05/2019 11:04 AM ID: 116661131	Why only 'Regulators', should be all commissioning studies. Also, need to promote use of flood history in flood estimation, and sharing of historical flood information ([organisation names(s) removed])
8	15/05/2019 14:46 PM ID: 116697459	Also realistic budgets to actually undertake the work and not use a least cost approach to procurement.
9	16/05/2019 12:37 PM ID: 116804203	I think we are weak on this at the moment - often just picking generic requirements from a tick list with little real thought about actual requirements for that study. I also think consultants can be quite lax in their interpretation and response to the scope, delivering what they think is required rather than what has actually been asked for.
10	17/05/2019 09:59 AM ID: 116899457	If guidance is published then the industry would be self-regulating
11	17/05/2019 14:13 PM ID: 116948761	There are some pretty shocking examples of flood studies so this should be high priority.
12	18/05/2019 13:37 PM ID: 117028508	Ditto
13	18/05/2019 17:03 PM ID: 115187747	Like the idea of thorough investigations, using good quality research and guidance. Latest research isn't always good? What if it's been hurriedly pushed out - but needs significant refinement later?

15. The commissioning process

Regulators to review their commissioning and quality review processes to ensure flood studies require high quality thorough flood hydrology investigations using latest research and guidance where appropriate.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	14	18/05/2019 18:55 PM ID: 117057658	Not my area	
	15	19/05/2019 13:30 PM ID: 116804060	Tricky, robust standards to which studies have to adhere and a self-regulating framework would reduce the need and resource for reviewing.	
	16	19/05/2019 14:19 PM ID: 117082368	And associated training	
	17	19/05/2019 14:33 PM ID: 117093851	Important to ensure the highest quality science underpins decisions and methods so procurement rules and commissioning should better balance technical and science quality at least equally with cost. There should be strict rules around re-negotiating contracts post award unless project scope is changed.	
	18	19/05/2019 20:35 PM ID: 116800339	Better if "Regulator" and Consultants work together	
	19	19/05/2019 23:56 PM ID: 117116149	Sounds relevant on paper	
	20	23/05/2019 13:12 PM ID: 117486576	Yes, there are a lot of cheap FRA type bodies that could be impacting the wider reputation of hydrology	
	21	23/05/2019 16:48 PM ID: 117496746	This would be standard procedure normally I would have thought?	
	22	23/05/2019 18:04 PM ID: 117519248	A key driver for quality, capacity building and innovation if matched by the necessary resourcing.	
	23	24/05/2019 12:44 PM ID: 117505743	Good to see this emphasis on quality.	
	24	25/05/2019 01:08 AM ID: 117458964	Links to ongoing FCERM projects (e.g. Update on using Flood Risk Information in Spatial Planning)	
	25	28/05/2019 21:37 PM ID: 117847148	This shouldn't be taken as black or white	
	26	30/05/2019 15:31 PM ID: 118027569	Ensure not to use the same organisations all the time. It is important to reach out to wider communities	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	10
	1	29/04/2019 19:23 PM ID: 115203101	Lack of truly risk-based approaches to review	
	2	30/04/2019 09:38 AM ID: 115241585	Research is not as important sometimes in the real world. Sometimes logical thinking can also give an answer - a link with ecology/geomorphology would help give clues too. Robust methods and persuasion methods are more important. Mathematical results can be manipulated to give a favourable results for developers etc. The planning system needs to be addressed.	
	3	30/04/2019 14:28 PM ID: 115249000	Limited experience of regulators	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
4	02/05/2019 09:35 AM ID: 115471184	Some inconsistencies when working in different regions		
5	03/05/2019 10:52 AM ID: 115580983	Cost.		
6	07/05/2019 11:58 AM ID: 115871782	Give the steering group power to make binding judgements in this regard, where regulators are not applying appropriate processes.		
7	16/05/2019 10:27 AM ID: 116787849	No		
8	16/05/2019 12:37 PM ID: 116804203	Technical knowledge of those developing project scopes and lack of capacity of those with the skills for the amount of work required to cover this gap		
9	19/05/2019 14:33 PM ID: 117093851	No		
10	30/05/2019 15:31 PM ID: 118027569	Should chose a team of experts from different organisations rather than from one or two organisations		
			answered	10
			skipped	115

16. Do you think there are any other key work areas related to how we work in flood hydrology?

Please tells us in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	27

1	29/04/2019 20:22 PM ID: 115206676	Significant effort required to bridge fundamental differences in approach between urban and fluvial hydrology
2	30/04/2019 10:34 AM ID: 115245631	Would be useful to know what involvement there has been to date with [organisation names(s) removed] and how this initiative can build from [organisation names(s) removed] activities
3	30/04/2019 12:40 PM ID: 115261724	Geomorphology, as you will gather from the comments above! Natural changes to channel morphology alter flood risk; this can be beneficial or unhelpful in terms of flood risk, but it will invariably happen, and there is an increasing focus on this from the geomorphology research and applied worlds (e.g. [removed to protect the identity of individual(s)]). Understanding these changes, and knowing how to manage them in a way that works with natural processes will ensure greatest chance of sustainable flood management. Water moves through the landscape. Know how your landscape works.
4	02/05/2019 09:35 AM ID: 115471184	How flood hydrology is integrated into hydraulic models. Very little guidance on this, and the method of inputting flows can have a huge influence on modelled flows and resultant levels.
5	02/05/2019 12:41 PM ID: 115501839	Published guidance and methodologies should not be too costly for small businesses to acquire.
6	02/05/2019 14:48 PM ID: 115198816	Bridging technical and policy issues and their intercommunication. Use serious gaming and edutainment.
7	07/05/2019 11:58 AM ID: 115871782	Small catchments for Flood Risk Assessments. Although this is a technical field, this is a field of science which (in practice) operates in parallel to the wider field, and is often practised by practitioners who are less experienced or less linked to the hydrological community.
8	08/05/2019 16:34 PM ID: 116056900	Review of data collection and monitoring. Very surprising that monitoring is not mentioned. Needs to be appreciation that this is cornerstone of all hydrological activities.
9	08/05/2019 20:56 PM ID: 115775975	Ensuring that monitoring networks are fit-for-purpose and data are collected and interpreted using stat-of-the-art technology
10	09/05/2019 09:29 AM ID: 115194390	Work areas related to how flood hydrologists work with other disciplines, e.g. geomorphology, hydraulic modelling.
11	10/05/2019 12:52 PM ID: 115383239	Need to consider the relationship with hydrometry and whether actions are needed here as hydrology fundamentally depends on good hydrometric networks, data standards and availability/accessibility of data - Road Map project may need a clearer boundary (or scope!) in relation to hydrometry.
12	14/05/2019 17:22 PM ID: 116606375	Well again without definitions of what you see yourselves as I'm at a loss to answer. Flood hydrology is very narrow and is influenced by many factors. In the real world design and implementation of flood and erosion risk management activity is multi-disciplinary. How will a narrow focus on the characteristics of flood flows really help?
13	15/05/2019 14:46 PM ID: 116697459	Access to hydrometric data and processing. A large amount of time is spent receiving inconsistent data from hydrometric authorities with no explanation on quality flags etc. A move towards providing quality assured data prior to practitioners utilising for hydrological analysis would save time and budget dealing with data quality issues.
14	15/05/2019 22:53 PM ID: 116749371	Agree ways of working for data sharing - ideally it would all be open data and widely shared.

16. Do you think there are any other key work areas related to how we work in flood hydrology?

Please tells us in the box below:

			Response Percent	Response Total
15	16/05/2019 12:37 PM ID: 116804203	I would like to see the separation of low and high flow hydrology (and to some extent hydrometry) reduced, so we are developing hydrologists who understand the full hydrological cycle and the monitoring data their analysis is based on		
16	17/05/2019 17:11 PM ID: 116970244	Climate change will bring greater challenges globally. With potentially very major consequences. The community has a responsibility to develop and share best practice for wider good, not just its own. Often, this may bring benefit overseas first, but this will drive development to suit our much smaller rivers (satellite sensing etc.) We must avoid parochialism and recognise wider benefit from our science does not mean no benefit to us. We are all in this climate change adventure together.		
17	18/05/2019 17:03 PM ID: 115187747	Can't remember if it's been covered in the above (I've been jumping in and out of this survey) but is there sufficient emphasis on flood hydrometry and the data collected? It ain't easy and we should be making the most of what has been painstakingly recorded by the gauging authorities. This is the building block upon which everything else sits. For example UK hydrology ignores loads of good data with its concentration on annual max series in flood estimation. Looking forward the road map should be considering the future of high flow monitoring to place UK flood hydrology in a better place to do our work - especially as what has occurred in the past isn't necessarily going to be the best guide to the future.		
18	18/05/2019 22:58 PM ID: 117056440	Ensuring that uncertainties are recognised and managed appropriately in the final application of the results		
19	19/05/2019 07:17 AM ID: 117075485	What incentives are there to improving technology e.g. modelling		
20	19/05/2019 11:58 AM ID: 117068304	See my comments to Question 51		
21	19/05/2019 20:35 PM ID: 116800339	Ways of working should link with other technical subjects - especially river hydraulics, floodplain modelling, GIS, hydrometry (partly covered later in this questionnaire), fluvial geomorphology, sewer\urban modelling		
22	19/05/2019 23:56 PM ID: 117116149	Computerisation and free access to all meteorological data. Why are we still asking for this?		
23	23/05/2019 11:39 AM ID: 117474750	None spring to mind.		
24	23/05/2019 13:12 PM ID: 117486576	Integrating with and learning from other communities e.g. through joint working with [organisation names(s) removed]. Many of the skills gap areas may be the same across other environmental science disciplines		
25	23/05/2019 16:48 PM ID: 117496746	Considering if Climate Change can bring any potential benefits for how we work in flood hydrology?		
26	24/05/2019 12:44 PM ID: 117505743	Enough to comment on!		
27	30/05/2019 15:31 PM ID: 118027569	To have the hydrometric staff well trained. Let them take more ownership and responsibility. Make the hydrometric data as an open source. If the tools are developed using public funding then the tools should be made freely available		
			answered	27
			skipped	98

17. What do you think of this draft UK vision for methods in flood hydrology?

Our flexible joined-up methods deal with combined sources of flood risk. Methods are open access and transparent, robust, up-to-date, and reproducible with join up between meteorological and hydrological methods and between forecasting and planning. Our approach to forecasting and long-term planning is catchment-based and more realistic. It allows investigation of natural flood management and other measures. Our methods allow us to use all the information we have available for the application and we have a consistent, centralised, and accessible toolkit for flood forecasting and planning (data, methods, and outputs) which is peer reviewed and regularly updated. Uncertainty is calculated and used in decision-making as standard.

Is there anything missing? Tell us what you think in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	49

1	29/04/2019 16:09 PM ID: 115180750	Mention climate change?
2	29/04/2019 16:20 PM ID: 115181559	Should you specifically mention natural flood management when dealing with such a broad vision. To me, that is like endorsing it when it is still reasonably unproved in relation to mitigation of large floods.
3	29/04/2019 16:29 PM ID: 115183952	Good
4	30/04/2019 10:34 AM ID: 115245631	Looks good. Bullet 2 - "more realistic" - more realistic than what? Maybe remove "and more realistic" Will this supersede [organisation names(s) removed]. Maybe a comment on how it relates to these / what was done previously
5	30/04/2019 12:40 PM ID: 115261724	A catchment based approach is good. You need to account for natural processes, particularly geomorphological and ecological processes, in your thinking. The national geomorphology team are working on tools that might help. Plus we could learn from you - think of this as a way to spread your influence!
6	30/04/2019 13:07 PM ID: 115265228	All seems good - there needs to be quicker clarification e.g. that the Pontbren study was based on three 12 x 12 metre plots so organisations and journalists quoting 67 times better infiltration rates and 30% reduction in flood peak were incorrectly extrapolating this up to catchment scale.
7	30/04/2019 14:28 PM ID: 115249000	Taking into account the anticipated effects of climate change?
8	30/04/2019 19:22 PM ID: 115320893	It's vague.
9	01/05/2019 15:47 PM ID: 115414133	Nothing missing that I can think of.
10	01/05/2019 18:13 PM ID: 115431558	No
11	02/05/2019 09:35 AM ID: 115471184	How to translate catchment based (strategic) to more site-specific
12	02/05/2019 14:48 PM ID: 115198816	Integrate the use of sanity checks and common sense as well.
13	03/05/2019 10:52 AM ID: 115580983	Not sure about the second sentence - how does forecasting fit in with natural flood risk management. I think the methods should include a statement about how you are going to collect data to prove the effectiveness of natural flood risk management before investing money in it.
14	03/05/2019 13:35 PM ID: 115608108	How will local knowledge and features be incorporated into the centralised toolkit?

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
15	07/05/2019 11:58 AM ID: 115871782	When you say 'forecasting and planning' do you mean town planning / spatial planning? Or is this meaning hydrology for flood mapping (so, meaning 'long term planning').		
16	08/05/2019 16:34 PM ID: 116056900	Good vision for methods to be open access. I would agree but may be objected to by [organisation names(s) removed]. Overall good points Would be good to see some link back to data , i.e., methods based on best available science and calibrated against good quality field data		
17	08/05/2019 20:56 PM ID: 115775975	this appears to cover everything but is poorly worded throughout using imprecise terms		
18	09/05/2019 15:19 PM ID: 116159498	No		
19	10/05/2019 12:52 PM ID: 115383239	No		
20	10/05/2019 15:32 PM ID: 116268906	More emphasis to expectations here - forecasting to a catchment scale - we should communicate much more clearly about what is realistic at a catchment scale at different lead times to manage expectations. Add something to the last line around calculating the uncertainty using sound probabilistic methods.		
21	13/05/2019 13:37 PM ID: 116449651	Yes the above is all good, but we need good quality underlying data to support development of these methods and their implementation		
22	13/05/2019 15:07 PM ID: 116463005	Worth mentioning non-stationarity and climate specifically?		
23	14/05/2019 13:59 PM ID: 116581156	Like.		
24	14/05/2019 17:22 PM ID: 116606375	It draws on, communicates with and integrates evidence and data from different disciplines to understand and enhance our delivery of societally relevant tools and science in the area of flood hydrology.		
25	15/05/2019 11:04 AM ID: 116661131	Need to include flood history.		
26	15/05/2019 22:53 PM ID: 116749371	Methods need to apply at different spatial scales (catchment to small urban area) and be flexible to future climate/technological changes.		
27	16/05/2019 10:51 AM ID: 116792107	Vision on uncertainty should be stronger. Uncertainty should be understood so that it can inform decisions, rather than decisions made in spite of it.		
28	16/05/2019 11:10 AM ID: 116793030	Good		
29	16/05/2019 11:27 AM ID: 116788544	I think there should be more emphasis on the changing world i.e. climate change, urbanisation i.e. looking at trends in observed datasets (non-stationarity analysis) and applying these trends into the future to determine flood risk to aid future		

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
		planning. I know that a lot of work on this has already started in Cumbria and the NW of England in general. But it would make sense to incorporate this work within future guidelines.		
30	16/05/2019 12:22 PM ID: 116806561	The hydrological community understands the latest methods and when advances are made these are accepted and taken forward		
31	16/05/2019 16:14 PM ID: 116013085	Is an explicit reference to NFM a result of current trends? I think a long-term vision would benefit from being less specific and not mentioning such specific terms. I'm not sure aiming for a centralised toolkit is a good idea. Wouldn't a distributed (and consistent, accessible etc.) toolkit be a more futuristic approach? Should uncertainty not just be "calculated and used", but explicitly accounted for in the whole process, from data collection, to calculations to application. (or words to that effect)		
32	17/05/2019 13:13 PM ID: 116938744	Our methods are scalable and consistent across different catchment types and contexts/ their limitations are clearly expressed.		
33	17/05/2019 16:45 PM ID: 116772689	Very supportive of bullet 2.		
34	18/05/2019 17:03 PM ID: 115187747	That would all be good. Is there a potential for a one size fits all mentality to develop? (I.e. the words consistent, centralized, toolkit). I know that's not the intention but it may act like a strait jacket when the case in hand doesn't fit the typical. My involvement in the use of generally applied approaches; tools that have been born out of research areas such as FEH and Lowflows is that there will be some circumstances that don't neatly fit or are represented by the approach. I'm just aware that a master approach to do the hydrology may lead to complacency.		
35	18/05/2019 18:55 PM ID: 117057658	"Uncertainty is calculated" should maybe be "Uncertainty is quantified"		
36	18/05/2019 22:58 PM ID: 117056440	Is NFM just one example of catchment change? Effects of urbanisation and runoff control, afforestation and other land use change might also be included. Dealing with problem catchments - urban, permeable, dry valleys Changing runoff mechanisms in more extreme floods		
37	19/05/2019 13:30 PM ID: 116804060	This seems like >50% nice sounding but hollow waffle. "...more realistic"? ..."allows investigation" as opposed to what?, "Other measures", "Joined up" is also a very ambiguous. It would be good to define a measure of success/failure for these visions - it may help clarify them and provide a more robust roadmap. Does it mean there will be some kind of single application/tool kit to undertake flood hydrology modelling? Hard to tell. The last statement is important.		
38	19/05/2019 20:35 PM ID: 116800339	Is centralised necessary, desirable, or unnecessary?		
39	20/05/2019 09:27 AM ID: 117133175	How do we consider and account for variability across the country? Some places are quick responders, some slow, some frequent flooders, some infrequent? How do we prioritise areas at most risk?		

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Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
40	22/05/2019 07:17 AM ID: 117351653	I would add that not only methods are open access, but also that the data sets are open access to foster reproducibility and transparency.		
41	22/05/2019 12:29 PM ID: 117376373	Pleased to see the uncertainty in here in particular. Very important I feel as it helps continuous improvement and improves understanding (if done well). I feel the discipline has stagnated in some areas and this is precisely the catalyst needed to move it on. Perhaps something clearer on data would be good - not exactly sure what but it goes hand in hand with methods and we need to be looking forward and not be constrained by it. Include future possibilities.		
42	23/05/2019 11:39 AM ID: 117474750	YES! Maybe I'd also add that methods are designed in a way that makes them easy to update, as well as being up to date.		
43	23/05/2019 13:12 PM ID: 117486576	I don't like the term catchment based as it isn't always appropriate in urban areas where catchments are modified/heavily managed or poorly defined. Also I think the approach to forecasting and long term planning should be probabilistic.		
44	23/05/2019 16:48 PM ID: 117496746	In Bullet Point 1: Hydrometeorology could be mentioned. Otherwise good.		
45	24/05/2019 12:44 PM ID: 117505743	Here, flood risk management is broken down into forecasting and planning. It can be thought of as system operation, project planning and project design. System operation encompasses both monitoring and forecasting the hydrological state. What is meant by "more realistic"?		
46	24/05/2019 13:52 PM ID: 117364703	I would like to see words to say that methods are not only transparent and reproducible but also that they are designed to be easily updated (and that the impacts of updating on the results should be transparent and should be recorded).		
47	25/05/2019 01:08 AM ID: 117458964	Flood risk is calculated using impact information in forecasting and planning. Methods for assessing risk can be extended to multi-hazards (e.g. landslides, water quality)		
48	28/05/2019 17:34 PM ID: 116980263	Too wordy		
49	30/05/2019 15:31 PM ID: 118027569	the effort needs to be proportionate to the scale and magnitude of the risk		
			answered	49
			skipped	76

18. Scope the long-term development of an open, online, modular system for flood hydrology that blends statistical methods and rainfall-runoff models

This modular system could be capable of predicting floods in real time and estimating flood risk from all sources of flooding.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		4.27%	5
2	2		7.69%	9
3	3		20.51%	24
4	4		39.32%	46
5	5		28.21%	33

Analysis							answered	117
	Mean:	3.79	Std. Deviation:	1.07	Satisfaction Rate:	69.87	skipped	8
	Variance:	1.14	Std. Error:	0.1				

Comments (optional): (27)

1	29/04/2019 16:29 PM ID: 115183952	Open = free?
2	29/04/2019 16:31 PM ID: 115182364	A clear issues with RR forecasting is API/CWI hence PR
3	30/04/2019 10:34 AM ID: 115245631	What is the purpose of this? Is it to make the analysis easier? Just thinking, "if it ain't broke..."
4	30/04/2019 12:40 PM ID: 115261724	Sounds important. Please consider how you account for physical changes during that affect flood risk, such as erosion, in your assessment of uncertainty.
5	30/04/2019 13:07 PM ID: 115265228	A good vision though the NFM work in micro catchments in Cumbria is showing how complex this can be. [organisation names(s) removed] are researching how to better predict slow moving thunderstorms so should be a key partner
6	01/05/2019 18:13 PM ID: 115431558	It seems like a good idea, if ambitious. It would need to be sufficiently flexible so that it can deal with odd catchments or local specifics if it is to be of use. Careful consideration of the user should be given - if it's very user friendly it risks being applied badly or in circumstances where it should not be.
7	02/05/2019 09:35 AM ID: 115471184	However, would want to avoid a 'black box', opaque method which takes away any and all human decision-making
8	03/05/2019 10:52 AM ID: 115580983	In reality this is not going to work.
9	03/05/2019 13:35 PM ID: 115608108	Use of physical process based models that are routinely confronted with observational data (data assimilation) is key.
10	07/05/2019 11:58 AM ID: 115871782	This is a long term thing, based more on interest than operational need. The limitations of rain forecasting mean integration of 'predicting floods' into the method is a long way off. And it risks reducing trust in the wider science / or other applications of hydrology.
11	08/05/2019 09:46 AM ID: 115999807	Wary that this sounds like a bag-of-tricks open to misinterpretation
12	08/05/2019 17:58 PM ID: 116061289	This is a mammoth undertaking. Why not start smaller and achievable.
13	08/05/2019 20:56 PM ID: 115775975	This needs to incorporate real-time observations as well
14	10/05/2019 12:52 PM ID: 115383239	Questionable benefit especially as we currently have real time forecasting systems and specific investment is needed to make these resilient and efficient to operate

18. Scope the long-term development of an open, online, modular system for flood hydrology that blends statistical methods and rainfall-runoff models

This modular system could be capable of predicting floods in real time and estimating flood risk from all sources of flooding.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
		in real time. This option may not be the best to fill current gaps but could end up duplicating current capabilities in operating agencies (or trying to but not doing so).		
15	15/05/2019 11:04 AM ID: 116661131	Very ambitious from where we are now, when there isn't consistency with a single method, but would be great!		
16	16/05/2019 14:30 PM ID: 116829098	If you want the modular system to predict floods in real time you will need to think carefully about the number of modules you incorporate. If it is open source then who do you expect will be the key users?		
17	16/05/2019 16:14 PM ID: 116013085	The methods and code should be fully open source. Considerations needs given to where/how code repositories are stored, maintained and developed by the community. And what happens to deviations (forks) in core software development.		
18	18/05/2019 13:37 PM ID: 117028508	Good but don't reinvent the wheel and need to define some clear principles to demarcate basic research, applied innovation and platforms for deliver. And then make sure [organisation names(s) removed] budget is best used by targeting efficiently at the applied end of that spectrum.		
19	18/05/2019 17:03 PM ID: 115187747	Sounds good.		
20	19/05/2019 07:17 AM ID: 117075485	wait and see what technologies develop		
21	19/05/2019 11:58 AM ID: 117068304	The more blended it is could mean that the different estimates produced by different methods are hidden leading to lack of appreciation of the uncertainties involved?		
22	19/05/2019 20:35 PM ID: 116800339	Open, online. Modular OK. Is it really necessary to blend statistical methods & rainfall-runoff models? How? I don't think one system for both real-time and flood risk will be practicable within the fast response times which are essential for real-time forecasting.		
23	22/05/2019 12:29 PM ID: 117376373	Yes but let's not constrain the methods too much at this point for a new 'FEH' or whatever.		
24	23/05/2019 16:48 PM ID: 117496746	Sounds good as long as users of the information understand it and its 'open' format does not leave it vulnerable.		
25	24/05/2019 12:44 PM ID: 117505743	`This divides methods into statistical and rainfall-runoff models. This omits hydrological and hydrodynamic flow routing models, snowmelt models and so on. It is not clear why you would always want to blend statistical methods with rainfall-runoff models. Estimation of flood risk may not necessarily require a rainfall-runoff modelling approach of the type used in forecasting. Are there real benefits to be gained through a single system combing flood estimation and flood forecasting?		
26	25/05/2019 01:08 AM ID: 117458964	Bringing together estimation and real-time modelling may not necessarily give optimal results for either application.		
27	28/05/2019 21:37 PM ID: 117847148	I'm interpreting rainfall-runoff models to mean all forms of model from lumped empirical to distributed physically based		

Please rate how important you think the following modules are for a new system. Select from high, medium or low importance.

	Low	Medium	High	Response Total
Extreme value analysis	5.1% (6)	23.9% (28)	70.9% (83)	117
Multivariate/Joint probability	9.6% (11)	41.2% (47)	49.1% (56)	114
Spatial statistics (e.g. spatial coherence)	5.3% (6)	36.8% (42)	57.9% (66)	114
Precipitation	0.9% (1)	13.9% (16)	85.2% (98)	115
Evaporation	22.4% (26)	55.2% (64)	22.4% (26)	116
Snowmelt	35.3% (41)	44.8% (52)	19.8% (23)	116
Runoff/Soils	4.3% (5)	26.7% (31)	69.0% (80)	116
Groundwater	10.3% (12)	56.0% (65)	33.6% (39)	116
Sediment	47.3% (53)	42.9% (48)	9.8% (11)	112
Surface water/sewers	6.1% (7)	42.6% (49)	51.3% (59)	115
Water quality	40.2% (47)	44.4% (52)	15.4% (18)	117
Ecology	45.6% (52)	44.7% (51)	9.6% (11)	114
			answered	118
			skipped	7

Other (please specify) (16)

1	29/04/2019 16:31 PM ID: 115182364	API and variable PR
2	30/04/2019 09:38 AM ID: 115241585	linking with the whole flow range (low flows, average flows), reservoir extreme flows, coastal
3	30/04/2019 12:40 PM ID: 115261724	You need a physical change module - i.e. how natural changes will alter the shape, roughness or conveyance of channels within a catchment over time.
4	02/05/2019 12:26 PM ID: 115501184	Modified bodies of water
5	02/05/2019 12:41 PM ID: 115501839	I don't feel qualified to assign relative importance to these
6	07/05/2019 11:58 AM ID: 115871782	I work in [organisation names(s) removed], and I would like to see more leadership on snowmelt methods. Although that's a one off tasks. Unlikely to be used as a module, often. I guess these are all important so I haven't rated them all.
7	14/05/2019 17:22 PM ID: 116606375	They are all high priority
8	16/05/2019 16:14 PM ID: 116013085	Some of my entries for the above would have benefitted from N/A - i.e. I don't have an opinion.

Please rate how important you think the following modules are for a new system. Select from high, medium or low importance.			Low	Medium	High	Response Total
9	18/05/2019 17:03 PM ID: 115187747	Nothing here about rainfall-runoff representation				
10	18/05/2019 22:58 PM ID: 117056440	Is soil moisture included in evaporation and Soil/runoff				
11	19/05/2019 07:17 AM ID: 117075485	Climate change				
12	19/05/2019 11:58 AM ID: 117068304	Probably covered above but antecedent conditions, both wet and dry. E.G. 2015 floods happened after a very long wet period. Are there degrees of "saturated" that are not accounted for in current techniques. Similarly after dry periods do we understand how soils wet up and affect run-off?				
13	20/05/2019 09:27 AM ID: 117133175	Fluvial, Biodiversity, Air quality				
14	22/05/2019 12:29 PM ID: 117376373	my importance is more to do with urgency and perhaps all are highly desirable in the longer term of the strategy				
15	24/05/2019 12:44 PM ID: 117505743	Water flow routing in river channels and lakes/reservoirs.				
16	25/05/2019 01:08 AM ID: 117458964	Coastal				

Matrix Charts

Extreme value analysis			Response Percent	Response Total
1	Low		5.1%	6
2	Medium		23.9%	28
3	High		70.9%	83
Analysis	Mean: 2.66 / Std. Deviation: 0.57 / Satisfaction Rate: 82.91 / Variance: 0.33 / Std. Error: 0.05		answered	117

Multivariate/Joint probability			Response Percent	Response Total
1	Low		9.6%	11
2	Medium		41.2%	47
3	High		49.1%	56
Analysis	Mean: 2.39 / Std. Deviation: 0.66 / Satisfaction Rate: 69.74 / Variance: 0.43 / Std. Error: 0.06		answered	114

Spatial statistics (e.g. spatial coherence)		Response Percent	Response Total
1	Low	5.3%	6
2	Medium	36.8%	42
3	High	57.9%	66

Analysis							answered	114
	Mean:	2.53	Std. Deviation:	0.6	Satisfaction Rate:	76.32		
	Variance:	0.35	Std. Error:	0.06				

Precipitation		Response Percent	Response Total
1	Low	0.9%	1
2	Medium	13.9%	16
3	High	85.2%	98

Analysis							answered	115
	Mean:	2.84	Std. Deviation:	0.39	Satisfaction Rate:	92.17		
	Variance:	0.15	Std. Error:	0.04				

Evaporation		Response Percent	Response Total
1	Low	22.4%	26
2	Medium	55.2%	64
3	High	22.4%	26

Analysis							answered	116
	Mean:	2	Std. Deviation:	0.67	Satisfaction Rate:	50		
	Variance:	0.45	Std. Error:	0.06				

Snowmelt		Response Percent	Response Total
1	Low	35.3%	41
2	Medium	44.8%	52
3	High	19.8%	23

Analysis							answered	116
	Mean:	1.84	Std. Deviation:	0.73	Satisfaction Rate:	42.24		
	Variance:	0.53	Std. Error:	0.07				

Runoff/Soils			Response Percent	Response Total
1	Low		4.3%	5
2	Medium		26.7%	31
3	High		69.0%	80
Analysis	Mean: 2.65 / Variance: 0.31	Std. Deviation: 0.56 / Std. Error: 0.05	Satisfaction Rate: 82.33	answered	116

Groundwater			Response Percent	Response Total
1	Low		10.3%	12
2	Medium		56.0%	65
3	High		33.6%	39
Analysis	Mean: 2.23 / Variance: 0.39	Std. Deviation: 0.62 / Std. Error: 0.06	Satisfaction Rate: 61.64	answered	116

Sediment			Response Percent	Response Total
1	Low		47.3%	53
2	Medium		42.9%	48
3	High		9.8%	11
Analysis	Mean: 1.62 / Variance: 0.43	Std. Deviation: 0.66 / Std. Error: 0.06	Satisfaction Rate: 31.25	answered	112

Surface water/sewers			Response Percent	Response Total
1	Low		6.1%	7
2	Medium		42.6%	49
3	High		51.3%	59
Analysis	Mean: 2.45 / Variance: 0.37	Std. Deviation: 0.61 / Std. Error: 0.06	Satisfaction Rate: 72.61	answered	115

Water quality			Response Percent	Response Total
1	Low		40.2%	47
2	Medium		44.4%	52
3	High		15.4%	18
Analysis	Mean: 1.75	Std. Deviation: 0.7	Satisfaction Rate: 37.61	answered 117
	Variance: 0.49	Std. Error: 0.06		

Ecology			Response Percent	Response Total
1	Low		45.6%	52
2	Medium		44.7%	51
3	High		9.6%	11
Analysis	Mean: 1.64	Std. Deviation: 0.65	Satisfaction Rate: 32.02	answered 114
	Variance: 0.42	Std. Error: 0.06		

Please rate how important you think the following principles are for a new modular system. Select from high, medium or low importance.

	Low	Medium	High	Response Total
Will be online	9.4% (11)	29.9% (35)	60.7% (71)	117
Will be open and free to use	5.1% (6)	20.5% (24)	74.4% (87)	117
Will be modular and in one place	9.5% (11)	30.2% (35)	60.3% (70)	116
Will be appropriate for estimating extreme events (for reservoir safety)	4.2% (5)	35.3% (42)	60.5% (72)	119
Will cover all sources of flooding	5.1% (6)	37.6% (44)	57.3% (67)	117
Will cover all spatial scales of flooding (e.g. point analysis to river basin)	2.5% (3)	37.3% (44)	60.2% (71)	118
Will cover all temporal scales of flooding (e.g. flash floods to long duration groundwater events)	1.7% (2)	40.2% (47)	58.1% (68)	117
Will cover all catchment types (e.g. rural, urban, permeable, pumped, heavily attenuated)	0.8% (1)	20.2% (24)	79.0% (94)	119
Will have a range of methods, from quick screening analysis to full complex analysis	6.9% (8)	31.0% (36)	62.1% (72)	116
Will provide confidence estimates	3.4% (4)	34.2% (40)	62.4% (73)	117
Will use near real time data assimilation	19.3% (22)	44.7% (51)	36.0% (41)	114

Please rate how important you think the following principles are for a new modular system. Select from high, medium or low importance.

	Low	Medium	High	Response Total
Will be able to use a wide range of data sources (both systematic and non-systematic)	6.2% (7)	51.3% (58)	42.5% (48)	113
Methods and modules will be peer reviewed and validated	0.8% (1)	26.1% (31)	73.1% (87)	119
Methods will allow event based analysis	4.3% (5)	30.8% (36)	65.0% (76)	117
Methods will allow continuous simulation	14.7% (17)	41.4% (48)	44.0% (51)	116
Methods will allow the use of machine learning	26.1% (30)	57.4% (66)	16.5% (19)	115
Will be extensible, i.e. will allow the addition of new modules and functionality	1.8% (2)	41.2% (47)	57.0% (65)	114
Will allow users to test the impact of flood risk interventions (e.g. engineering, NFM)	4.2% (5)	40.7% (48)	55.1% (65)	118
Can account for climate change	2.5% (3)	17.6% (21)	79.8% (95)	119
Can deal with non-stationarity	12.8% (15)	28.2% (33)	59.0% (69)	117
			answered	120
			skipped	5

Other (please specify) (18)

1	29/04/2019 16:31 PM ID: 115182364	Methods to be used by trained hydrologists only - as recent experiences with site runoff and SUDS have shown
2	30/04/2019 09:38 AM ID: 115241585	May as well pack my job in if this system does it all - so what skills will be needed?
3	01/05/2019 18:13 PM ID: 115431558	Regarding point two, it should undoubtedly be open. Recent methods, such as [method removed to protect organisation(s) identity] are a step backwards as the methods used within the software are not transparent. However, it does not necessarily need to be free.
4	07/05/2019 11:58 AM ID: 115871782	My first reaction to this, is that you want to distil an entire branch of science and methods (hydrology) into one tool or toolkit. For some things, if they are not readily available in one package it is good - reinforces the idea that they should be used by advanced practitioners after lots of training.
5	08/05/2019 09:46 AM ID: 115999807	Will identify problems/biases in the methods for careful application in risk assessment.
6	10/05/2019 15:32 PM ID: 116268906	Join up with all other incident systems - it needs to be simple and accessible for customers and not be another place they have to look during an incident.
7	14/05/2019 17:22 PM ID: 116606375	Peer review is not a panacea - it can stifle genuinely novel approaches through conservative nature of reviewers. Just to be wary of it.
8	15/05/2019 22:53 PM ID: 116749371	Allow users to bring in other data sources. Produces outputs that are consistent (or can be made consistent) to feed into standard hydraulic models.
9	16/05/2019 16:14 PM ID: 116013085	Should be modular - but not in one place.
10	17/05/2019 17:26 PM ID: 116973448	"Will be open and free to use": combines two different things. I think it is likely that methods might be open and transparent, but that somebody might want to sell a better/more intuitive interface (alternatively somebody would need to fund the

Please rate how important you think the following principles are for a new modular system. Select from high, medium or low importance.

			Low	Medium	High	Response Total
		development not only of methods, but also of software which implement the methods)				
11	18/05/2019 13:37 PM ID: 117028508	A bit of a wish list! Many of the components here are being developed elsewhere (and even then in multiple ways). It is important to be aware of many of the ongoing initiatives so that public money can be marshalled efficiently and effectively without undue duplication of effort.				
12	18/05/2019 17:03 PM ID: 115187747	What does "event analysis mean"? Is it the functionality to analyse recorded events (v important to refining default guess-timates of parameter values), or is it the concept of supplying an appropriate design hydrograph?				
13	19/05/2019 14:19 PM ID: 117082368	Data sources and use of real-time data will need to be subject to some data quality assessment in advance.				
14	19/05/2019 14:33 PM ID: 117093851	Scales should also include national, beyond basin scale.				
15	19/05/2019 21:22 PM ID: 115953502	I don't understand this question. Virtually all of these issues are required in any flood estimation methodology. We currently have to deal with virtually all of them in some way depending upon the application.				
16	21/05/2019 13:45 PM ID: 117286332	I agree with it being free, not sure about being open? Could lead to inexperienced or non-hydrologists using it incorrectly? I also think it is maybe trying to do too many things - one size never does fit all, especially across the whole of the UK. But I may be misunderstanding exactly what this module is about.				
17	22/05/2019 12:29 PM ID: 117376373	See previous				
18	23/05/2019 18:04 PM ID: 117519248	Marked some items as low because they seem to be methodological options rather than principles.				

Matrix Charts

Will be online			Response Percent	Response Total
1	Low		9.4%	11
2	Medium		29.9%	35
3	High		60.7%	71
Analysis	Mean: 2.51 | Std. Deviation: 0.66 | Satisfaction Rate: 75.64 Variance: 0.44 | Std. Error: 0.06		answered	117

Will be open and free to use			Response Percent	Response Total
1	Low		5.1%	6
2	Medium		20.5%	24
3	High		74.4%	87
Analysis	Mean: 2.69 | Std. Deviation: 0.56 | Satisfaction Rate: 84.62 Variance: 0.32 | Std. Error: 0.05		answered	117

Will be modular and in one place			Response Percent	Response Total
1	Low		9.5%	11
2	Medium		30.2%	35
3	High		60.3%	70
Analysis	Mean: 2.51 | Std. Deviation: 0.66 | Satisfaction Rate: 75.43 Variance: 0.44 | Std. Error: 0.06		answered	116

Will be appropriate for estimating extreme events (for reservoir safety)			Response Percent	Response Total
1	Low		4.2%	5
2	Medium		35.3%	42
3	High		60.5%	72
Analysis	Mean: 2.56 | Std. Deviation: 0.57 | Satisfaction Rate: 78.15 Variance: 0.33 | Std. Error: 0.05		answered	119

Will cover all sources of flooding			Response Percent	Response Total
1	Low		5.1%	6
2	Medium		37.6%	44
3	High		57.3%	67
Analysis	Mean: 2.52 | Std. Deviation: 0.59 | Satisfaction Rate: 76.07 Variance: 0.35 | Std. Error: 0.05		answered	117

Will cover all spatial scales of flooding (e.g. point analysis to river basin)			Response Percent	Response Total
1	Low		2.5%	3
2	Medium		37.3%	44
3	High		60.2%	71
Analysis	Mean: 2.58 | Std. Deviation: 0.54 | Satisfaction Rate: 78.81 Variance: 0.3 | Std. Error: 0.05		answered	118

Will cover all temporal scales of flooding (e.g. flash floods to long duration groundwater events)			Response Percent	Response Total
1	Low		1.7%	2
2	Medium		40.2%	47
3	High		58.1%	68
Analysis	Mean: 2.56 | Std. Deviation: 0.53 | Satisfaction Rate: 78.21 Variance: 0.28 | Std. Error: 0.05		answered	117

Will cover all catchment types (e.g. rural, urban, permeable, pumped, heavily attenuated)			Response Percent	Response Total
1	Low		0.8%	1
2	Medium		20.2%	24
3	High		79.0%	94
Analysis	Mean: 2.78 | Std. Deviation: 0.43 | Satisfaction Rate: 89.08 Variance: 0.19 | Std. Error: 0.04		answered	119

Will have a range of methods, from quick screening analysis to full complex analysis			Response Percent	Response Total
1	Low		6.9%	8
2	Medium		31.0%	36
3	High		62.1%	72
Analysis	Mean: 2.55 Std. Deviation: 0.62 Satisfaction Rate: 77.59 Variance: 0.39 Std. Error: 0.06		answered	116

Will provide confidence estimates			Response Percent	Response Total
1	Low		3.4%	4
2	Medium		34.2%	40
3	High		62.4%	73
Analysis	Mean: 2.59 Std. Deviation: 0.56 Satisfaction Rate: 79.49 Variance: 0.31 Std. Error: 0.05		answered	117

Will use near real time data assimilation			Response Percent	Response Total
1	Low		19.3%	22
2	Medium		44.7%	51
3	High		36.0%	41
Analysis	Mean: 2.17 Std. Deviation: 0.72 Satisfaction Rate: 58.33 Variance: 0.52 Std. Error: 0.07		answered	114

Will be able to use a wide range of data sources (both systematic and non-systematic)			Response Percent	Response Total
1	Low		6.2%	7
2	Medium		51.3%	58
3	High		42.5%	48
Analysis	Mean: 2.36 Std. Deviation: 0.6 Satisfaction Rate: 68.14 Variance: 0.36 Std. Error: 0.06		answered	113

Methods and modules will be peer reviewed and validated			Response Percent	Response Total
1	Low		0.8%	1
2	Medium		26.1%	31
3	High		73.1%	87
Analysis	Mean: 2.72 | Std. Deviation: 0.47 | Satisfaction Rate: 86.13 Variance: 0.22 | Std. Error: 0.04		answered	119

Methods will allow event based analysis			Response Percent	Response Total
1	Low		4.3%	5
2	Medium		30.8%	36
3	High		65.0%	76
Analysis	Mean: 2.61 | Std. Deviation: 0.57 | Satisfaction Rate: 80.34 Variance: 0.32 | Std. Error: 0.05		answered	117

Methods will allow continuous simulation			Response Percent	Response Total
1	Low		14.7%	17
2	Medium		41.4%	48
3	High		44.0%	51
Analysis	Mean: 2.29 | Std. Deviation: 0.71 | Satisfaction Rate: 64.66 Variance: 0.5 | Std. Error: 0.07		answered	116

Methods will allow the use of machine learning			Response Percent	Response Total
1	Low		26.1%	30
2	Medium		57.4%	66
3	High		16.5%	19
Analysis	Mean: 1.9 | Std. Deviation: 0.65 | Satisfaction Rate: 45.22 Variance: 0.42 | Std. Error: 0.06		answered	115

Will be extensible, i.e. will allow the addition of new modules and functionality			Response Percent	Response Total
1	Low		1.8%	2
2	Medium		41.2%	47
3	High		57.0%	65
Analysis	Mean: 2.55	Std. Deviation: 0.53	Satisfaction Rate: 77.63	answered 114
	Variance: 0.28	Std. Error: 0.05		

Will allow users to test the impact of flood risk interventions (e.g. engineering, NFM)			Response Percent	Response Total
1	Low		4.2%	5
2	Medium		40.7%	48
3	High		55.1%	65
Analysis	Mean: 2.51	Std. Deviation: 0.58	Satisfaction Rate: 75.42	answered 118
	Variance: 0.33	Std. Error: 0.05		

Can account for climate change			Response Percent	Response Total
1	Low		2.5%	3
2	Medium		17.6%	21
3	High		79.8%	95
Analysis	Mean: 2.77	Std. Deviation: 0.48	Satisfaction Rate: 88.66	answered 119
	Variance: 0.23	Std. Error: 0.04		

Can deal with non-stationarity			Response Percent	Response Total
1	Low		12.8%	15
2	Medium		28.2%	33
3	High		59.0%	69
Analysis	Mean: 2.46	Std. Deviation: 0.71	Satisfaction Rate: 73.08	answered 117
	Variance: 0.5	Std. Error: 0.07		

Please tell us what the key outputs of a new modular system should be:

	Yes	No	Not sure	Response Total
Peak flows	99.1% (115)	0.0% (0)	0.9% (1)	116
Flood volumes	91.2% (104)	0.9% (1)	7.9% (9)	114
Hydrographs	96.6% (113)	1.7% (2)	1.7% (2)	117
Rate of rise	63.2% (72)	7.0% (8)	29.8% (34)	114
Flood durations over a threshold	66.7% (76)	3.5% (4)	29.8% (34)	114
			answered	118
			skipped	7

Other (please specify) (21)

1	29/04/2019 20:22 PM ID: 115206676	In urnan drainage, we need inflows from each source (road, roof, permeable runoff, ground infiltration) in order to assess the impact of seperation and inflow reduction interventions
2	30/04/2019 12:40 PM ID: 115261724	Areas at greatest risk of alterations to flood risk because of channel / floodplain change
3	02/05/2019 11:18 AM ID: 115488168	Uncertainty/confidence limits
4	07/05/2019 11:58 AM ID: 115871782	Are volumes significant or needed? This question must be answered first, before any renewal of statistical datasets. and only then can the question of using it as an output be used. More focus on volumes could be useful but it would be a big change in direction for the science.
5	10/05/2019 15:32 PM ID: 116268906	Impacts Comparisons to previous floods for context Rareity (more simply put than return periods though - 'highest recorded' type information)
6	14/05/2019 17:22 PM ID: 116606375	Travel time (flood wave kinematics)
7	15/05/2019 22:53 PM ID: 116749371	Confidence score based on quality of data input & uncertainty in the model.
8	16/05/2019 11:10 AM ID: 116793030	Low flows - floods and droughts can and do happen simultaneously
9	16/05/2019 11:27 AM ID: 116788544	Estimates of uncertainty Trend analysis
10	18/05/2019 10:57 AM ID: 117023552	Distinguish between the separate contributions towards flooding from each of quickflow and slowflow
11	18/05/2019 13:37 PM ID: 117028508	All of the above
12	18/05/2019 17:03 PM ID: 115187747	All of the above. Also a timing issue is important. I.e. the synchronization of hydrographs. Perhaps that's covered by hydrographs and rate of rise.
13	19/05/2019 21:22 PM ID: 115953502	See above resposne

Please tell us what the key outputs of a new modular system should be:			Yes	No	Not sure	Response Total
14	20/05/2019 09:27 AM ID: 117133175	Mapping				
15	22/05/2019 07:17 AM ID: 117351653	I think there are several layers to this question. The key outputs include all hydrological variables at appropriate spatial and temporal scales. Subsequently statistical post-processing modules should allow various analyses (such as flood durations over thresholds). This should be highly adaptable as needs change.				
16	22/05/2019 12:29 PM ID: 117376373	possibly basic routing functionality if catchment wide distributed flood flows are an output				
17	23/05/2019 11:39 AM ID: 117474750	Impacts				
18	23/05/2019 13:12 PM ID: 117486576	Estimation of severity at local and national scale				
19	23/05/2019 18:04 PM ID: 117519248	Internal states (e.g. soil moisture) and fluxes (e.g. recharge, evaporation). Spatial patterns, where relevant. Model meta data.				
20	24/05/2019 12:44 PM ID: 117505743	Soil moisture, water table depth, flood extent				
21	24/05/2019 13:52 PM ID: 117364703	Confidence/uncertainty Present-day probability of occurence				

Matrix Charts

Peak flows			Response Percent	Response Total
1	Yes		99.1%	115
2	No		0.0%	0
3	Not sure		0.9%	1
Analysis	Mean: 1.02	Std. Deviation: 0.18	Satisfaction Rate: 0.86	answered 116
	Variance: 0.03	Std. Error: 0.02		

Flood volumes			Response Percent	Response Total
1	Yes		91.2%	104
2	No		0.9%	1
3	Not sure		7.9%	9
Analysis	Mean: 1.17	Std. Deviation: 0.54	Satisfaction Rate: 8.33	answered 114
	Variance: 0.3	Std. Error: 0.05		

Hydrographs			Response Percent	Response Total
1	Yes		96.6%	113
2	No		1.7%	2
3	Not sure		1.7%	2
Analysis	Mean: 1.05	Std. Deviation: 0.29	Satisfaction Rate: 2.56	answered 117
	Variance: 0.08	Std. Error: 0.03		

Rate of rise			Response Percent	Response Total
1	Yes		63.2%	72
2	No		7.0%	8
3	Not sure		29.8%	34
Analysis	Mean: 1.67	Std. Deviation: 0.9	Satisfaction Rate: 33.33	answered 114
	Variance: 0.82	Std. Error: 0.08		

Flood durations over a threshold			Response Percent	Response Total
1	Yes		66.7%	76
2	No		3.5%	4
3	Not sure		29.8%	34
Analysis	Mean: 1.63	Std. Deviation: 0.91	Satisfaction Rate: 31.58	answered 114
	Variance: 0.83	Std. Error: 0.09		

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	15

1	29/04/2019 15:39 PM ID: 115171574	The rainfall-runoff methods available for extreme flood events require review to make better use of the FEH2013 dataset and to improve PMF estimation
2	29/04/2019 20:22 PM ID: 115206676	Almost certainly
3	30/04/2019 14:28 PM ID: 115249000	Good quality, readily accessible data sets
4	08/05/2019 17:58 PM ID: 116061289	This is large. Start small
5	16/05/2019 12:37 PM ID: 116804203	No but I am cautious oif being too ambitious with software - previous experiences of trying to developo systems with too wide a remit suggest they are generally doomed to failure. More important to get the methods available first and consider integration later

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
6	16/05/2019 16:14 PM ID: 116013085	IPR & various conflicting funding arrangements of current suppliers!		
7	17/05/2019 13:13 PM ID: 116938744	Noting the desire to "allow users to test the impact of flood risk interventions" - much of this has a cross-over between hydrology and hydraulics; where hydraulics become a dominant part of the process, there may be limitations to the use of hydrological methods.		
8	17/05/2019 17:11 PM ID: 116970244	Insufficient data, high levels of uncertainty in data.		
9	18/05/2019 22:58 PM ID: 117056440	probably		
10	19/05/2019 07:17 AM ID: 117075485	depends who runs it		
11	19/05/2019 14:19 PM ID: 117082368	Underpinning [method removed to protect organisation(s) identity] rainfall-runoff model currently in use needs development. Open sharing of data has a number of technical hurdles to be crossed. Integration of data from different sources (e.g. radar and point rainfall) will require R&D		
12	22/05/2019 12:29 PM ID: 117376373	yes, need for targetted science improvements looking beyond existing methods and collection of relevant data and alternative data ideas again from science.		
13	23/05/2019 13:12 PM ID: 117486576	integration of models and agreement on appropiate model choice		
14	24/05/2019 12:44 PM ID: 117505743	Benefits may not justify unified system for flood forecasting and estimation. Methods for both can radically differ.		
15	25/05/2019 01:08 AM ID: 117458964	Needs R&D to understand if bringing approaches together is sensible (see 22).Then scoping system. Then major IT investment.		
			answered	15
			skipped	110

19. Review the concept of probable maxima

Carry out a review of the concept of probable maximum precipitation (PMP) and probable maximum flood (PMF) and current methods for estimating these for reservoir and other critical infrastructure standards. Recommend a revised methodology for estimating very high return period inflows for these applications. This may include updated PMP depth-duration maps.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.86%	1
2	2	8.62%	10
3	3	21.55%	25
4	4	32.76%	38
5	5	36.21%	42

Analysis							
	Mean:	3.95	Std. Deviation:	1	Satisfaction Rate:	73.71	answered 116
	Variance:	1	Std. Error:	0.09			skipped 9

Comments (optional): (17)

1	29/04/2019 15:39 PM ID: 115171574	Current methods for PMF estimation are well overdue for a refresh
2	30/04/2019 10:34 AM ID: 115245631	Very important as hasn't changed for many years and other countries using more meteorology based methods
3	01/05/2019 15:47 PM ID: 115414133	This is critical for reservoir safety as the current method appears out of date
4	03/05/2019 10:52 AM ID: 115580983	This really needs incorporating into the FEH software.
5	13/05/2019 15:07 PM ID: 116463005	Is PMP and PMF outdated concept? Shouldn't we just go with a return period?
6	15/05/2019 14:46 PM ID: 116697459	Methods have been around since 1970s and therefore a review should be undertaken.
7	16/05/2019 11:27 AM ID: 116788544	Some of this work has already started; this could be expanded upon and incorporated into a revised methodology / guidelines.
8	17/05/2019 09:59 AM ID: 116899457	The partly implemented changes by the FWMA will bring many reservoirs under the Reservoirs Act, which in turn will generate a need for large investment to manage flood routing. Ensuring this investment is appropriate for the long term has to be a priority.
9	17/05/2019 14:13 PM ID: 116948761	Vital for public safety.
10	18/05/2019 13:37 PM ID: 117028508	This is a particular research need, not a strategic priority, so you'd be better off just commissioning it as a piece of analysis
11	18/05/2019 17:03 PM ID: 115187747	For reservoir and nuclear safety industry this is pertinent. The reservoir community are perhaps leaning to a risk based approach but in the nuclear industry a safety case needs to be built around precautionary 10^{-4} AEP coupled with sensitivity testing to rarer events. The concept of a bounding flood is useful since if you estimate the uncertainty on a 10^{-4} AEP event the error margins are so big it can suggest a precautionary (say 84 percentile) flood could approach the PMF. It's an area shrouded in uncertainty and better definition would be very helpful to some sectors.

19. Review the concept of probable maxima

Carry out a review of the concept of probable maximum precipitation (PMP) and probable maximum flood (PMF) and current methods for estimating these for reservoir and other critical infrastructure standards. Recommend a revised methodology for estimating very high return period inflows for these applications. This may include updated PMP depth-duration maps.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	19/05/2019 07:17 AM ID: 117075485	whatever we do can vary e.g. cyclones		
13	19/05/2019 21:22 PM ID: 115953502	Clearly important in some applications - but not a major theme		
14	19/05/2019 23:56 PM ID: 117116149	PMP should have been reviewed decades ago. The omission is a national scandal that risks discrediting all those in hydrology ... even those who have advocated the review ... when the next catastrophic reservoir failure arrives.		
15	22/05/2019 07:17 AM ID: 117351653	There is a clear need to address the scientific basis of concepts such as PMP and PMF.		
16	23/05/2019 18:04 PM ID: 117519248	This requires a hard look at uncertainty and how it is managed.		
17	25/05/2019 01:08 AM ID: 117458964	Needs to be rephrased as suggesting solution.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	9
1	29/04/2019 15:39 PM ID: 115171574	Nothing that can't be managed - similar research has been completed in the USA and Australia for example.		
2	30/04/2019 10:34 AM ID: 115245631	Needs individuals who understand this issue properly		
3	03/05/2019 10:52 AM ID: 115580983	someone to lead on it as a priority or PhD project		
4	08/05/2019 09:46 AM ID: 115999807	Consensus on what PMP and PMF are.		
5	18/05/2019 17:03 PM ID: 115187747	It’s technically bloody difficult.		
6	19/05/2019 07:17 AM ID: 117075485	Geographic		
7	19/05/2019 14:19 PM ID: 117082368	See previous comments regarding need for development of rainfall-streamflow modelling approach		
8	19/05/2019 21:22 PM ID: 115953502	It is difficult!		
9	22/05/2019 12:29 PM ID: 117376373	No. This can be updated now but we need to be less constrained by FEH and limited rainfall data.		
			answered	9
			skipped	116

20. Develop guidance to help decision makers quantify, communicate and take account of uncertainty in flood hydrology

Review and synthesise current knowledge about uncertainty in flood hydrology to provide guidance allowing end users to better take account of uncertainty in decision making. This work area should be regularly reviewed to ensure guidance keeps pace with scientific developments.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.61%	2
2	2	3.23%	4
3	3	13.71%	17
4	4	33.87%	42
5	5	47.58%	59

Analysis							
	Mean:	4.23	Std. Deviation:	0.91	Satisfaction Rate:	80.65	answered 124
	Variance:	0.84	Std. Error:	0.08			skipped 1

Comments (optional): (19)

1	30/04/2019 13:49 PM ID: 115277401	We can try but they are not required and will not be used by decision makers
2	03/05/2019 10:52 AM ID: 115580983	Essential.
3	07/05/2019 11:58 AM ID: 115871782	We currently (try to) communicate a qualitative understanding of uncertainty. I think less is more - we should not develop error bars as a standard part of flood estimates because you simply can't 'put a measure of certainty on uncertainty'.
4	08/05/2019 09:46 AM ID: 115999807	This should include guidance on interpretation of uncertainty values.
5	10/05/2019 15:32 PM ID: 116268906	I think this is for us to quantity the uncertainty rather than the decision makers. Educating people and providing guidance in understanding probabilities is high priority
6	13/05/2019 13:37 PM ID: 116449651	Any good practitioner should be aware of this, and should be included as part of education and training.
7	15/05/2019 11:04 AM ID: 116661131	Not convinced that information on uncertainty is used by decision makers. Also, there has been recent published work on this so what new guidance would achieve is not clear.
8	15/05/2019 12:27 PM ID: 116674043	As an 'end user' and decision-maker this is more important that improvements in hydrology per say
9	15/05/2019 14:46 PM ID: 116697459	It should also take account of the impacts on the planning system and viability of sustainable development
10	15/05/2019 22:53 PM ID: 116749371	Guidance also needed on how to QA input datasets like rainfall radar data.
11	16/05/2019 10:51 AM ID: 116792107	We need to turn round attitudes to uncertainty, so that understanding uncertainty is a positive thing. All hydrology outputs should be accompanied with appropriate uncertainty information - e.g. ranges for different confidence intervals.
12	16/05/2019 16:14 PM ID: 116013085	This is absolutely critical to the success of any future systems. It should be built in to the entire process.
13	17/05/2019 14:13 PM ID: 116948761	Done recently within FEH Local, released in 2017, so seems rather early to be re-doing it.

20. Develop guidance to help decision makers quantify, communicate and take account of uncertainty in flood hydrology

Review and synthesise current knowledge about uncertainty in flood hydrology to provide guidance allowing end users to better take account of uncertainty in decision making. This work area should be regularly reviewed to ensure guidance keeps pace with scientific developments.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	17/05/2019 17:26 PM ID: 116973448	I think this is an area in which we would need a lot of research/advancements before anything sensible is done routinely		
15	18/05/2019 17:03 PM ID: 115187747	Yes, yes, yes. It's about time we as a profession sorted this out. I know that the end user won't thank us, but at the moment it's a glaring omission up flood frequency curves from all but single site analysis.		
16	21/05/2019 13:45 PM ID: 117286332	Definitely - especially with a move towards probabilistic flood forecasting in the future it is vital we understand and communicate the uncertainties around our flood model inputs and outputs.		
17	23/05/2019 16:48 PM ID: 117496746	Probabilistic flood forecasting is needed.		
18	24/05/2019 12:44 PM ID: 117505743	A worthwhile task, with greater need in flood forecasting than flood estimation..		
19	25/05/2019 01:08 AM ID: 117458964	For forecasting, use of probabilistic forecasts is needed with associated verification metrics. Model uncertainty required for estimation and forecasting.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	5
1	13/05/2019 15:07 PM ID: 116463005	There's still a gap between estimating uncertainty and what we do with that as decision makers		
2	15/05/2019 14:46 PM ID: 116697459	Linkage with planning policy and split responsibilities between regulators [organisation names(s) removed]		
3	16/05/2019 10:51 AM ID: 116792107	Cultural change required		
4	22/05/2019 12:29 PM ID: 117376373	No, we have begun this journey with Local FEH and other initiatives on quantifying/qualifying uncertainty across our evidence.		
5	24/05/2019 12:44 PM ID: 117505743	Technically challenging area for flood forecasting that has great benefits in being pulled through to operational practice.		
			answered	5
			skipped	120

21. Accounting for climate change in flood hydrology

Develop a long-term strategy for ensuring that flood hydrology methods take account of climate change in a scientifically robust way.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.61%	2
2	2	1.61%	2
3	3	8.87%	11
4	4	29.03%	36
5	5	58.87%	73

Analysis							
	Mean:	4.42	Std. Deviation:	0.84	Satisfaction Rate:	85.48	answered 124
	Variance:	0.71	Std. Error:	0.08			skipped 1

Comments (optional): (14)

1	30/04/2019 10:34 AM ID: 115245631	Important - but not easy to do.
2	30/04/2019 12:40 PM ID: 115261724	Climate change could push systems across thresholds into more dynamic states, fundamentally altering channel morphology and flood risk
3	02/05/2019 09:35 AM ID: 115471184	With clear methodology behind rather than uprating flows by a certain allowance.
4	15/05/2019 11:04 AM ID: 116661131	Would obviously need to be alongside a review of the current method of 1% flood +20%, 25% 30% etc.
5	15/05/2019 12:27 PM ID: 116674043	Links to Question 20
6	16/05/2019 16:14 PM ID: 116013085	Should this be isolated to the hydrological framework? It should be flexible enough to allow simulations of all sorts of deviations from expected normals - not just climate change.
7	17/05/2019 14:13 PM ID: 116948761	Largely under way already.
8	17/05/2019 17:11 PM ID: 116970244	Vital!
9	18/05/2019 13:37 PM ID: 117028508	Yes. Particularly in synchrony with UKCP18
10	19/05/2019 11:58 AM ID: 117068304	Climate change confuses matters because we change how we deal with it. Admittedly this is probably because our understanding of it changes too, but more consistency would help.
11	19/05/2019 21:22 PM ID: 115953502	This is the big one #1.
12	22/05/2019 07:17 AM ID: 117351653	This is important, but may compromise the need for a framework for application in real time.
13	23/05/2019 16:48 PM ID: 117496746	Of course.
14	24/05/2019 12:44 PM ID: 117505743	Ongoing activity in this area.

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	7

1	07/05/2019 11:58 AM ID: 115871782	Yes lots! But I support the idea of developing a strategy (if a scientifically robust strategy is possible).
2	15/05/2019 11:04 AM ID: 116661131	Data quality of older gauged records
3	16/05/2019 14:30 PM ID: 116829098	Poor spatial and temporal resolution of current RCM/GCM climate projections does not allow climate change impacts on flood hydrology to be properly quantified.
4	17/05/2019 17:11 PM ID: 116970244	Inadequate funding. Our budgets are tiny, yet keep getting squeezed.
5	17/05/2019 17:26 PM ID: 116973448	As far as I can tell, we don't exactly know how to quantify the impact of climate change on a catchment level. So till we know that, it will be hard to account for the changes.
6	22/05/2019 12:29 PM ID: 117376373	Needs more science and guidance on changing rainfall patterns, storms, durations, antecedence etc.
7	24/05/2019 12:44 PM ID: 117505743	Constrained by climate model prediction uncertainty, and scale of convective rainfall.

answered	7
skipped	118

22. Review how real-time flood forecasting and longer-term flood risk assessment could be more integrated.

Carry out a review of the current level of integration between flood forecasting and flood estimation methods for all sources of flooding. The review could include a scoping exercise to identify actions that would allow greater integration of flood forecasting and flood estimation methods.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	4.03%	5
2	2	12.10%	15
3	3	30.65%	38
4	4	35.48%	44
5	5	17.74%	22

Analysis							
	Mean:	3.51	Std. Deviation:	1.04	Satisfaction Rate:	62.7	answered 124
	Variance:	1.09	Std. Error:	0.09			skipped 1

Comments (optional): (15)

1	30/04/2019 14:28 PM ID: 115249000	Two distinct things, and not to be confused!
2	03/05/2019 10:52 AM ID: 115580983	Not sure why.
3	07/05/2019 11:58 AM ID: 115871782	Interesting study; not a priority for the way we apply hydrology.
4	10/05/2019 15:32 PM ID: 116268906	Definitely!! There is so much information from flood estimation modelling that could supplement real-time flood forecasts - e.g. real-time inundation mapping
5	15/05/2019 12:27 PM ID: 116674043	Automation of water management controls enable us prepare the way for higher flows by maximising the benefits of conveyance and storage thus minimising flooding. We should aim to have real-time capabilities that inform downstream water level management to minimise the consequences of higher flows. I hope this could be covered within this is a related review.
6	16/05/2019 10:51 AM ID: 116792107	I'm not sure of the merit of this - they have different purposes
7	16/05/2019 11:27 AM ID: 116788544	This could just be as simple as relating known flood thresholds to impacts based on outputs from detailed hydraulic models. Or it could be more complex; such as incorporating detailed hydraulic models into flood forecasting (this would require much more computer power to have results available in real-time-parallelisation). Or the use of look-up tables of detailed modelled outputs.
8	17/05/2019 16:45 PM ID: 116772689	An [organisation names(s) removed] project on improving surface water flood forecasts has found that engaging early and continuously with operational users on data and modelling is critical. [organisation names(s) removed] has found that more information is not necessarily welcome without careful consideration of the various decision making contexts.
9	18/05/2019 13:37 PM ID: 117028508	Not obvious that this will provide any near term value for money
10	18/05/2019 22:58 PM ID: 117056440	It would be good to develop methods to estimate parameters for PDM/TCM type models on ungauged catchments so they can be used in continuous simulation
11	19/05/2019 07:17 AM ID: 117075485	Integrate historic-real time-predictive

22. Review how real-time flood forecasting and longer-term flood risk assessment could be more integrated.

Carry out a review of the current level of integration between flood forecasting and flood estimation methods for all sources of flooding. The review could include a scoping exercise to identify actions that would allow greater integration of flood forecasting and flood estimation methods.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	19/05/2019 14:19 PM ID: 117082368	There is scope for rainfall-streamflow model concept development to better integrate between the 2 end-user applications for consistency coupled with the use of meta-models (emulators)		
13	19/05/2019 23:56 PM ID: 117116149	.A stupid idea		
14	23/05/2019 13:12 PM ID: 117486576	Needed due to communication challenge when there are inconsistencies		
15	24/05/2019 12:44 PM ID: 117505743	Continuous simulation approach to flood estimation provides the opportunity for greater integration with models for flood forecasting. Setting of severity thresholds in flood forecasting provides an integration link with flood estimation.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	2
1	10/05/2019 12:52 PM ID: 115383239	Resilience and operational requirement for real time forecasting are very different for estimation especially ICT systems and data management		
2	24/05/2019 12:44 PM ID: 117505743	This could be progressed now.		
			answered	2
			skipped	123

23. Investigate how scientific advances in physics/process/conceptual based modelling could be applied in operational flood hydrology

Review and translate scientific developments in to practice; including event based, continuous simulation and machine learning approaches. This work area should be regularly reviewed to ensure methods keep pace with scientific developments

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	2.50%	3
2	2	5.00%	6
3	3	21.67%	26
4	4	43.33%	52
5	5	27.50%	33

Analysis							
	Mean:	3.88	Std. Deviation:	0.95	Satisfaction Rate:	72.08	answered 120
	Variance:	0.9	Std. Error:	0.09			skipped 5

Comments (optional): (14)

1	30/04/2019 10:34 AM ID: 115245631	The issue is particularly around learning from meteorological research to inform PMP
2	30/04/2019 12:40 PM ID: 115261724	Whether we like it or not, machine learning is the future. Make use of it.
3	30/04/2019 13:49 PM ID: 115277401	Please avoid machine learning. It is only as good as your flood history. Not valid for future
4	02/05/2019 09:35 AM ID: 115471184	Include in annual review and update of guidance
5	03/05/2019 10:52 AM ID: 115580983	Rivers aren't always natural and it's difficult to model simply.
6	07/05/2019 11:58 AM ID: 115871782	This is a good aim to have. This general assessment seems more useful to me, than the previous point (integrating flood estimation and flood forecasting).
7	08/05/2019 17:58 PM ID: 116061289	Investigate isn’t clear. Review and translate is a large undertaking
8	10/05/2019 15:32 PM ID: 116268906	Machine learning approaches could in a very short space of time completely change the way real-time floods are predicted. We need to be involved with this from an early stage else we could be left behind
9	18/05/2019 10:57 AM ID: 117023552	There is often a debate as to whether continuous simulation or event-based analysis is better for estimating floods. Having long experience of each method, rather than excluding one or other method, I think that each has an important contribution to make towards our understanding of floods, so both methods should be pursued in parallel in future.
10	18/05/2019 13:37 PM ID: 117028508	This is a job for the research and academic community, funded by [organisation names(s) removed]. Duplication of effort here will of necessity mean not fulfilling the [organisation names(s) removed] remit as well as might be achieved through more appropriate division of labour.
11	19/05/2019 11:58 AM ID: 117068304	I do not like continuous simulation. It is a "black box" that cannot be checked by our normal hydrology review procedures.
12	22/05/2019 12:29 PM ID: 117376373	Important to investigate other areas away from confines of FEH. Essential
13	23/05/2019 11:39 AM ID: 117474750	Yes, but I don't know why machine learning is placed so highly.

23. Investigate how scientific advances in physics/process/conceptual based modelling could be applied in operational flood hydrology

Review and translate scientific developments in to practice; including event based, continuous simulation and machine learning approaches. This work area should be regularly reviewed to ensure methods keep pace with scientific developments

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	24/05/2019 12:44 PM ID: 117505743	There is ongoing activity on this by model developers who maintain their codes to be state-of-the-art. Further investment targeted at [organisation names(s) removed] needs would bring benefits to operational models. Event-based and machine learning approaches would have lowest priority.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	6
1	30/04/2019 10:34 AM ID: 115245631	Needs experienced meteorologists to combine with hydrologists		
2	02/05/2019 14:48 PM ID: 115198816	More technical career positions at the government agencies and less in consulting		
3	15/05/2019 14:46 PM ID: 116697459	Whilst the use of machine learning / AI is useful, the issues of relying on historic data may bias the machine learning and provide incorrect answers (i.e. go in the wrong direction).		
4	19/05/2019 14:19 PM ID: 117082368	A policy of greater data sharing through a common open platform would enable pilot testing of models in the research community. Potential output standards could help in determining models that may be contenders for R&D investment, etc.		
5	24/05/2019 12:44 PM ID: 117505743	No, but needs to be sensibly targeted.		
6	28/05/2019 21:37 PM ID: 117847148	Data availability		
			answered	6
			skipped	119

24. Investigate how scientific advances in statistical modelling could be applied in operational flood hydrology

Review and translate scientific developments in to practice. The review should look beyond Extreme Value Analysis of annual maximum flow data, be applicable to all sources of flooding, and take account of non-stationarity. This work area should be regularly reviewed to ensure methods keep pace with scientific developments.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.00%	0
2	2	4.17%	5
3	3	20.00%	24
4	4	49.17%	59
5	5	26.67%	32

Analysis							
	Mean:	3.98	Std. Deviation:	0.8	Satisfaction Rate:	74.58	
	Variance:	0.63	Std. Error:	0.07			

		Response Percent	Response Total
	answered		120
	skipped		5

Comments (optional): (7)

1	08/05/2019 09:46 AM ID: 115999807	Just "using the newest methods" may lead to a lack of understanding of the results by practitioners.
2	18/05/2019 17:03 PM ID: 115187747	There are developments in extreme value analysis not used in UK flood hydrology, use more of the flood data than just AMAX - absolutely, non-stationarity needs better understanding and guidance. Fully agree.
3	19/05/2019 13:30 PM ID: 116804060	I'd note that this is essentially the same as above. Partly because machine learning is a statistical method (it's automated statistical modelling)
4	19/05/2019 21:22 PM ID: 115953502	Non-stationarity is my #2
5	22/05/2019 12:29 PM ID: 117376373	As previous
6	24/05/2019 12:44 PM ID: 117505743	The use of "operational hydrology" needs to be clarified here.
7	28/05/2019 21:37 PM ID: 117847148	This is a short term priority

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	4

1	15/05/2019 11:04 AM ID: 116661131	Data quality
2	16/05/2019 11:27 AM ID: 116788544	Reluctance to adapt to new methods - particularly switching from the stationary approach to flood estimation, to analysing trends and undertaking non-stationarity analysis.
3	19/05/2019 14:19 PM ID: 117082368	See comment for previous question regarding data sharing and model testing, which could be extended to enable testing of multiple source modelling approaches and continuous simulation

Are there any technical barriers to this happening now? (optional)				
			Response Percent	Response Total
	4	24/05/2019 12:44 PM ID: 117505743	No	
			answered	4
			skipped	121

25. Investigate how machine learning and artificial intelligence could benefit flood hydrology

Carry out a review to define how machine learning and artificial intelligence could be used in flood hydrology and the datasets required. The review should go on to recommend future work areas and projects relevant to the UK.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	5.79%	7
2	2	14.05%	17
3	3	38.84%	47
4	4	30.58%	37
5	5	10.74%	13

Analysis							
	Mean:	3.26	Std. Deviation:	1.02	Satisfaction Rate:	56.61	answered 121
	Variance:	1.04	Std. Error:	0.09			skipped 4

Comments (optional): (14)

1	02/05/2019 09:35 AM ID: 115471184	But keep human element for review
2	03/05/2019 13:35 PM ID: 115608108	The use of data assimilation should also be reviewed.
3	08/05/2019 09:46 AM ID: 115999807	This seems to go against the current feelings of practitioners who either want physically-motivated models or want to know "where the model came from". Machine Learning does neither of these things.
4	10/05/2019 15:32 PM ID: 116268906	As per comments above. This whole approach could be very different to what we do now but very effective. We should embrace it now while it's still being developed.
5	15/05/2019 14:46 PM ID: 116697459	Also understand the limitations and uncertainties associated with machine learning and artificial intelligence.
6	16/05/2019 16:14 PM ID: 116013085	This is a totally novel and new way to think about such science - risks and opportunities need considering.
7	18/05/2019 13:37 PM ID: 117028508	Worth doing, but be wary of getting caught up with all the buzzwords. Could be achieved quite efficiently by commissioning a review but implementation is another story so unless there is a big budget to support ML in flood forecasting it might be better to let the research identify itself from the bottom up. [organisation names(s) removed] have several programmes in this area.
8	18/05/2019 17:03 PM ID: 115187747	Don't know about this but sounds interesting.
9	18/05/2019 22:58 PM ID: 117056440	Is the data good enough to get good results from ML?
10	19/05/2019 13:30 PM ID: 116804060	I don't think machine learning should be differentiated too much from statistical modelling in this way. It creates a buzz about it and can cloud judgement (it's known, for example, in academia, to attract more funding if the phrases "machine learning or AI" are used rather than the underlying models). The title makes models sound more attractive, when perhaps more robust considerations are necessary
11	19/05/2019 23:56 PM ID: 117116149	Possibly relevant for flood forecasting

25. Investigate how machine learning and artificial intelligence could benefit flood hydrology

Carry out a review to define how machine learning and artificial intelligence could be used in flood hydrology and the datasets required. The review should go on to recommend future work areas and projects relevant to the UK.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	22/05/2019 07:17 AM ID: 117351653	Should be an integral part to the scientific development. Would be good to include new and innovative data sources (e.g. drones etc.)		
13	24/05/2019 12:44 PM ID: 117505743	ML and AI are best used where process understanding is weakest and to account for errors from unknown sources. It has links to data assimilation for forecast updating.		
14	28/05/2019 21:37 PM ID: 117847148	Need to consider data required for this to be effective		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	4
1	08/05/2019 09:46 AM ID: 115999807	Are there any experts in this field already working on hydrology?		
2	16/05/2019 11:27 AM ID: 116788544	General lack of hydrologists who also have complex IT skill sets, and vice-versa; lack of IT experts with an interest in hydrology. This work would most likely have to built/developed by IT experts, with oversight/input from expert hydrologists and the proposed Scientific Advisory Group. The output of this work could be an approach/toolkit that is freely available for use and is included in future guidelines, so that it can be used widely.		
3	19/05/2019 14:19 PM ID: 117082368	There is a reasonably extensive body of research literature in this area. Developing a shared database of relevant flood hydrology research literature may be helpful as a starting point (linked to relevant current journal feeds)		
4	24/05/2019 12:44 PM ID: 117505743	No		
			answered	4
			skipped	121

26. Develop methods and guidance for quantifying the hydrological benefits of flood risk management interventions in the catchment

Carry out a review and develop methods and visualisation tools to help decision makers quantify the hydrological changes (e.g. reducing peak flows and changing timings) from management interventions in the catchment, such as natural flood management measures. Methods should be applicable from reach to catchment scale.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	2.44%	3
2	2	4.88%	6
3	3	18.70%	23
4	4	49.59%	61
5	5	24.39%	30

Analysis							
	Mean:	3.89	Std. Deviation:	0.91	Satisfaction Rate:	72.15	answered 123
	Variance:	0.83	Std. Error:	0.08			skipped 2

Comments (optional): (17)

1	30/04/2019 10:34 AM ID: 115245631	Is this not already possible using river modelling / drainage modelling?
2	30/04/2019 12:40 PM ID: 115261724	We spend a lot of money on measures. Not all will be spent wisely! A tool should account for geomorphological as well as hydrological processes operating in catchments. If you ignore the geomorphological changes the predictions will be wrong because physical interventions fundamentally alter physical processes.
3	30/04/2019 13:07 PM ID: 115265228	Perhaps a little late when so much NFM has been installed already?
4	03/05/2019 10:52 AM ID: 115580983	Sounds good. Not sure natural flood risk measures would make much difference on peak flows but to visualise it would be good to show if the cost is worth it.
5	15/05/2019 11:04 AM ID: 116661131	Needed but I don't think there's an appetite for the actual evidence on this, there's a rush to call any works Natural Flood Management to gain funding and public approval (due to public's overoptimistic views on NFM).
6	15/05/2019 12:27 PM ID: 116674043	We need this now and alongside quantify, communicate account for uncertainty action.
7	15/05/2019 14:46 PM ID: 116697459	Suggest that a set of pilot catchments be used to test / verify the outcomes of applying interventions, in particular NFM. I.e. long term monitoring is required pre and post intervention.
8	15/05/2019 22:53 PM ID: 116749371	This is needed now by decision makers. Already happening on a small scale for SuDS. Also need national scenarios for adaptation planning - e.g. what if urbanisation increased beyond growth targets / what if no SuDS / what if lots of retrofitting SuDS
9	16/05/2019 10:51 AM ID: 116792107	Building on existing work on NFM
10	16/05/2019 16:14 PM ID: 116013085	Should this be considered in the hydraulics platform rather than hydrology?
11	17/05/2019 14:13 PM ID: 116948761	Lots of work already done / happening on NFM.
12	18/05/2019 13:37 PM ID: 117028508	Crucial. [organisation names(s) removed] are likely to be called upon to advise on this with increasing precision in the near future. A robust methodology and practitioner toolkit is very important. Need to go beyond evidence synthesis

26. Develop methods and guidance for quantifying the hydrological benefits of flood risk management interventions in the catchment

Carry out a review and develop methods and visualisation tools to help decision makers quantify the hydrological changes (e.g. reducing peak flows and changing timings) from management interventions in the catchment, such as natural flood management measures. Methods should be applicable from reach to catchment scale.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
13	18/05/2019 17:03 PM ID: 115187747	Yes to those measures that effect catchment runoff. But I'm not so sure if those that require hydraulic modelling are the domain of this initiative since there are perfectly good tools already out there, and to do that properly requires a significant model. Regarding working with natural process; NFM we as a community need to be careful not to suggest over confidence in the estimate of benefit and the presentation of uncertainty will also be needed to give an honest view, (that goes for now but also almost certainly into the future).		
14	19/05/2019 21:22 PM ID: 115953502	We have tools for doing such assessments already - better to spend ££ elsewhere e.g. on the interventions themselves		
15	22/05/2019 12:29 PM ID: 117376373	Certainly of current interest with NFM. Is this a current phase and given the difficulties of attenuating the bigger floods and will it continue? Perhaps with increasing interest now in mass tree planting/rewilding etc. as a mitigation effort for greenhouse gas emissions.		
16	23/05/2019 18:04 PM ID: 117519248	I think Road Map recommendations should prioritise steps to enable this analysis, not necessarily to deliver it.		
17	24/05/2019 12:44 PM ID: 117505743	Area of government interest requiring R&D to clarify benefits of NFM measures, locally and at larger scales. Benefits need to be assessed beyond solely flood mitigation.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	8
1	02/05/2019 14:48 PM ID: 115198816	Remarks like "decision-makers cannot handle more than one option", "trust us", "it is too complicated to explain to decision makers" (yes actual comments made)		
2	10/05/2019 12:52 PM ID: 115383239	Available datasets (locations and quality) to calibrate methodologies		
3	15/05/2019 22:53 PM ID: 116749371	Data availability for modelling national what if scenarios.		
4	17/05/2019 13:13 PM ID: 116938744	Much of this has a cross-over between hydrology and hydraulics; where hydraulics become a dominant part of the process, there may be limitations to the use of hydrological methods.		
5	18/05/2019 13:37 PM ID: 117028508	Yes the fundamental science base in this area is weak at the largest scales and for the rarest most impactful events		
6	18/05/2019 17:03 PM ID: 115187747	We will still have limited understanding given the great variation in environmental conditions as to what the effects will be (Soil type, vegetation, antecedent conditions, land management, rarity of event etc. Must include a measure of the uncertainty.		
7	19/05/2019 14:19 PM ID: 117082368	A very challenging model problem given catchment complexity, but increasingly being asked for by end users. Physics based models have the potential but data requirements (cost) and subsurface flow path complexity are typical issues. Suggest staged approach to agree which of the hydrological processes can be		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
		modelled to an acceptable degree now given the availability of data and propose R&D strategy going forwards.		
8	24/05/2019 12:44 PM ID: 117505743	Ability of current generation of models to capture the effects of a multitude of small intervention measures on the flood hydrograph at all locations.		
			answered	8
			skipped	117

27. Benchmarking of flood hydrology models

Establish benchmarking tests for flood forecasting and flood estimation models assess their quality and compare them. This would include developing data sets from range of catchments, at a range of scales, and for all sources of flooding. To include establishing quality criteria for inclusion or acceptance of methods/codes.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.64%	2
2	2	8.20%	10
3	3	28.69%	35
4	4	37.70%	46
5	5	23.77%	29

Analysis							
	Mean:	3.74	Std. Deviation:	0.96	Satisfaction Rate:	68.44	answered 122
	Variance:	0.93	Std. Error:	0.09			skipped 3

Comments (optional): (16)

1	30/04/2019 10:34 AM ID: 115245631	This already exists with the performance testing guidance
2	10/05/2019 12:52 PM ID: 115383239	This has already been done before for flood forecasting (e.g. recent R&D on model performance) so questionable benefit doing it again for this aspect of hydrological work
3	10/05/2019 15:32 PM ID: 116268906	Really important for real-time models in enabling interoperability of incident roles/mutual aid. This information needs to be presented in a very quick/easy way to digest
4	13/05/2019 13:37 PM ID: 116449651	I think this is a very large job, but would be useful to have an independent assessment of the relative strengths and weaknesses of different approaches.
5	14/05/2019 17:22 PM ID: 116606375	You're developing new stuff so this is not so important - but good basis if it really has not been done before....pretty sure it has.
6	15/05/2019 12:27 PM ID: 116674043	Greater consistency and rational for model choice would increase decision-maker confidence when models are being used given their fundamental importance. This was a finding of a recent Defra review of FCERM investment assurance.
7	16/05/2019 11:27 AM ID: 116788544	Definitely worthwhile pursuing and developing datasets / quality criteria etc.
8	17/05/2019 16:45 PM ID: 116772689	[organisation names(s) removed] is doing this for hydrology model application to natural flood management projects in Yorkshire
9	18/05/2019 13:37 PM ID: 117028508	This seems to me to be the proper role of the regulator in this field
10	18/05/2019 17:03 PM ID: 115187747	Is this on flows or flood levels and extents.
11	19/05/2019 13:30 PM ID: 116804060	Perhaps ensuring it's actually benchmarking rather than comparing software such as [organisation names(s) removed] hydraulic benchmarking reports
12	19/05/2019 14:19 PM ID: 117082368	See response to Q23
13	19/05/2019 21:22 PM ID: 115953502	QA is important but I do not understand the need for benchmarking - hydrology is not analogous with river modelling.
14	22/05/2019 12:29 PM ID: 117376373	Useful start to help steer and focus on replacement methods for UK

27. Benchmarking of flood hydrology models

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Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
15	23/05/2019 13:12 PM ID: 117486576	would need clear guidance on how applicable methods are in different catchment types		
16	24/05/2019 12:44 PM ID: 117505743	A number of benchmarking studies have been done for rainfall-runoff and hydraulic river models. Flood estimation studies have internally reviewed and assessed different approaches prior to developing a recommended approach. Results of benchmarking sometimes are not clear-cut. Investing in model improvements alongside benchmarking can bring benefits.		

Are there any technical barriers to this happening now? (optional)

				Response Percent	Response Total
1	Open-Ended Question			100.00%	6
1	08/05/2019 09:46 AM ID: 115999807	Common method for comparing code/methods, i.e. github			
2	13/05/2019 10:48 AM ID: 116422927	Costs			
3	16/05/2019 11:27 AM ID: 116788544	A wide range of hydrological models and open-source models that are being updated all of the time. Therefore, would different quality criteria be needed depending on the model used, and would these quality criteria need to be updated as models improve and take advantage of new technologies (machine learning).			
4	22/05/2019 12:29 PM ID: 117376373	no			
5	24/05/2019 12:44 PM ID: 117505743	No			
6	25/05/2019 01:08 AM ID: 117458964	Existing model assessment studies for flood forecasting have been pooled and available through a web portal (SC130006). Need mechanism for this to be updated when new models calibrated.			
			answered	6	
			skipped	119	

28. Develop methods for identifying, attributing and accounting for non-stationarity in flood hydrology

Develop end-user focused tools and guidance to help decision makers visualise, communicate, identify, attribute and account for non-stationarity in flood extremes. This should cover all sources of hydrological non-stationarity such as climate change, physical changes in catchments and geomorphological channel and floodplain evolution.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.67%	2
2	2	5.83%	7
3	3	24.17%	29
4	4	36.67%	44
5	5	31.67%	38

Analysis							
	Mean:	3.91	Std. Deviation:	0.97	Satisfaction Rate:	72.71	answered 120
	Variance:	0.93	Std. Error:	0.09			skipped 5

Comments (optional): (14)

1	30/04/2019 12:40 PM ID: 115261724	The rivers and floodplains we know are a snapshot in time. They weren't the same in the past; they won't be the same in the future, particularly with changing land use and climate change. You absolutely have to understand how physical changes will affect flood extremes.
2	03/05/2019 10:52 AM ID: 115580983	Would be so useful if this could be done but would be a massive project
3	08/05/2019 09:46 AM ID: 115999807	There are sources of contention within this work that must be dealt with carefully.
4	14/05/2019 17:22 PM ID: 116606375	Yes because of climate and land use /land cover change we need to be able to understand non-stationarity and how it influences estimation of critical flows.
5	15/05/2019 11:04 AM ID: 116661131	No point having fancy tools for assessing non-stationarity when method that assume stationarity are lacking. Which is the greater source of uncertainty? I think it is important, but we shouldn't try to run before we can walk.
6	15/05/2019 12:27 PM ID: 116674043	None specialists know the world is not static so better accounting for change is a great aid to increasing confidence in models/hydrology
7	16/05/2019 15:47 PM ID: 116840164	needs to recognise long term variability beyond 1960-present
8	17/05/2019 14:13 PM ID: 116948761	Ongoing project to do this already, at least in an interim way.
9	18/05/2019 13:37 PM ID: 117028508	Not clear how it would be used. Not clear that [organisation names(s) removed] should be entering the realm of attribution science. Changing flood risk from changing channel morphology is important though.
10	18/05/2019 17:03 PM ID: 115187747	Good
11	19/05/2019 11:58 AM ID: 117068304	A very frequent comment I have heard from members of the public is that their local rivers are a lot "flashier" than they used to be. Is this "non-stationarity"? Can we investigate it and prove it either way?
12	19/05/2019 23:56 PM ID: 117116149	Important but often misunderstood. Detecting non-stationarity is important. Accounting for it is not at all trivial.

28. Develop methods for identifying, attributing and accounting for non-stationarity in flood hydrology

Develop end-user focused tools and guidance to help decision makers visualise, communicate, identify, attribute and account for non-stationarity in flood extremes. This should cover all sources of hydrological non-stationarity such as climate change, physical changes in catchments and geomorphological channel and floodplain evolution.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
13	24/05/2019 12:44 PM ID: 117505743	Ongoing work in this area.		
14	28/05/2019 21:37 PM ID: 117847148	Short term priority		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	5
1	03/05/2019 10:52 AM ID: 115580983	It's a large project.		
2	17/05/2019 17:11 PM ID: 116970244	Insufficient data, too much uncertainty.		
3	17/05/2019 17:26 PM ID: 116973448	Long term high-quality data which could be used to quantify the changes is sparse. This is not a technical barrier, and as such it can't be solved easily.		
4	19/05/2019 14:19 PM ID: 117082368	Current integrated modelling approaches are restricted by resources (data, time) and incomplete model representation of key processes		
5	24/05/2019 12:44 PM ID: 117505743	No		
			answered	5
			skipped	120

29. Understand flood hydrology outputs required for current and future needs

Review information needs of end users of flood studies to ensure flood hydrology methods are able to produce useful outputs for all types of flood studies.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	2.48%	3
2	2	5.79%	7
3	3	17.36%	21
4	4	30.58%	37
5	5	43.80%	53

Analysis							answered	121
	Mean:	4.07	Std. Deviation:	1.03	Satisfaction Rate:	76.86	skipped	4
	Variance:	1.06	Std. Error:	0.09				

Comments (optional): (9)

1	30/04/2019 13:07 PM ID: 115265228	Like every profession and science hydrology has a lot of jargon which creates barriers so this is essential
2	08/05/2019 09:46 AM ID: 115999807	This should include selecting the right methods for the output desired.
3	14/05/2019 17:22 PM ID: 116606375	Essential - without it it is pure research
4	15/05/2019 11:04 AM ID: 116661131	Agree, R&D should be need driven not based on what academics fancy researching.
5	15/05/2019 12:27 PM ID: 116674043	Know your customer...must be a priority
6	19/05/2019 14:19 PM ID: 117082368	A useful starting point for the review of FEH after 20 years of use.
7	19/05/2019 21:22 PM ID: 115953502	Important - but not difficult
8	22/05/2019 07:17 AM ID: 117351653	The process should be inherently bottom-up, ensuring that the outputs need the needs.
9	24/05/2019 12:44 PM ID: 117505743	Not clear that outputs are being considered here. Is it clear that there is an unfulfilled need?

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	1

1	24/05/2019 12:44 PM ID: 117505743	Identification of end users and summarising their unfulfilled needs.

answered	1	
skipped	124	

30. Do you think there are any other key work areas related to methods in flood hydrology? Please tells us in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	26

1	29/04/2019 16:20 PM ID: 115181559	Flood estimation in urban catchments
2	30/04/2019 09:38 AM ID: 115241585	Hydrometry methods - i.e. quality of the underpinning data
3	30/04/2019 12:40 PM ID: 115261724	1. Understand how ecological processes affect physical processes and the roughness and behaviour of channels over time. Vegetation colonisation and succession, tree growth and senescence all dominate in lower energy systems. 2. Understand / predict how changes in land and river management will affect both physical and hydrological processes in catchments. Particularly NFM and other environmentally-focused work; but also changes to channel maintenance.
4	30/04/2019 13:07 PM ID: 115265228	There is much that can be done in terms of agricultural and forest soils and how improving their structure can help water retention, but also whether not removing water as quickly as possible leads to longer term declines in soil productive quality
5	01/05/2019 18:13 PM ID: 115431558	Current methods often work well for different flood mechanisms or catchments. This is problematic in catchments with mixed flooding regimes where event based models often have to be mixed with other techniques, The overall result is a fairly unsatisfactory representation of the flood regime, so approaches which can take a more holistic view of flood generation would be useful.
6	02/05/2019 11:18 AM ID: 115488168	Review and update reservoir hydrology guidance so it is fully integrated with best practice flood estimation methods
7	02/05/2019 12:41 PM ID: 115501839	No
8	03/05/2019 13:35 PM ID: 115608108	Data assimilation and use of remote sensing observations -used for state estimation to keep forecasts on track - identifying modelling problems, parameter estimation - reanalysis of past events
9	08/05/2019 20:56 PM ID: 115775975	develop methods for quantifying groundwater flood risk
10	09/05/2019 16:49 PM ID: 116171071	Groundwater, and groundwater/fluvial interactions Surface water. Operational forecasting
11	10/05/2019 15:32 PM ID: 116268906	More emphasis on probabilistic forecasting
12	14/05/2019 16:48 PM ID: 116603459	integration with flood warning definitions
13	14/05/2019 17:22 PM ID: 116606375	Yes - explain how you are going to integrate other critical factors that influence flood hydrology into this vision/workflow such as mobile bed and mobile channels, effects of restoration and rapid catchment changes on hydrology/flood travel times and flooding. Groundwater flooding and processes
14	15/05/2019 14:46 PM ID: 116697459	Integration with flood modelling software
15	16/05/2019 12:37 PM ID: 116804203	Better understanding of extreme event hydrology and how we derive estimates and integrate these into our design hydrology
16	16/05/2019 15:47 PM ID: 116840164	Needs to be user friendly and adaptable for non-expert use if to be of value, e.g. can a planner use and understand. Needs to be support qualitative data too.
17	17/05/2019 12:25 PM ID: 116931781	A better understanding of the physical atmospheric processes that produce and generate rainfall, including cloud formation, ice melt, temperature and wind.

30. Do you think there are any other key work areas related to methods in flood hydrology? Please tells us in the box below:

			Response Percent	Response Total
18	17/05/2019 14:13 PM ID: 116948761	19 (probable maxima) should be accompanied by research into rainfall-runoff modelling for extreme floods such as the 10,000-year, and lead to revised guidance on flood estimation for reservoir safety. This should be prioritised above more long-term goals such as an all-singing, all-dancing modular system (18).		
19	18/05/2019 17:03 PM ID: 115187747	1. Refine catchment descriptors. The very obvious ones are those that relate to the 1:250,000 scale soils mapping. That scale is not appropriate for small catchments. The applied sector works on a huge number of small catchments (<5km^2). The level of detail on the soils; ground is ill served by extracting info from a 1:250,000 scale map. May be as LIDAR coverage improves we could have improved catchment boundaries coupled to the catchment descriptors. ii) Provide free access to high quality test datasets (flow, rainfall, [snow], antecedent data, soil moisture monitoring) that have captured extreme flooding for a range of catchment sizes and types. Academics, researchers, practitioners, universities can then use these examples to follow their own lines of enquiry. Innovation and good ideas don't always come from a centralized committee. This would also stimulate interest in people if the data is available - get young people involved, schools, universities.		
20	19/05/2019 07:17 AM ID: 117075485	Are we thinking UK or international?		
21	19/05/2019 11:58 AM ID: 117068304	See comment to Question 51.		
22	19/05/2019 20:35 PM ID: 116800339	Question 29 is important. Here's another question: Are our present flood estimation methods adequate for extreme events? Answer: NO Next question: What are we going to do about it?		
23	19/05/2019 21:22 PM ID: 115953502	Most of my "Big Five" are covered #1 Non-stationarity (rain/flow) #2 Data quality #3 Plot/small scale catchments #4 Change #5 Confidence		
24	21/05/2019 10:47 AM ID: 117265485	Urban-rural interface, urban land use changes and whether they are offset by NFM and SuDS		
25	24/05/2019 12:44 PM ID: 117505743	Spatial datasets on landscape properties underpinning grid-based hydrological models (G2G) such as river width, bank-full discharge, soil/geology properties. Improved estimation of gridded rainfall time-series (15 min, 1km) for input to grid-based hydrological models. Evaporation loss functions in rainfall-runoff models (PDM, G2G) Many more.		
26	25/05/2019 01:08 AM ID: 117458964	Impact calculation methodologies. (e.g. Hazard Impact Model approaches used by [organisation names(s) removed], builds on SC120020) Multi-hazard approaches.		
			answered	26
			skipped	99

31. What do you think of this draft UK vision for data in flood hydrology?

We have sufficient funding, knowledge, capability and resources to monitor everything we need, particularly the extremes using innovative methods. We have intelligent monitoring plans and collect the baseline data that allows us to adequately characterise our river systems. New and historical data are communicated and shared openly, properly archived and centrally located to support flood hydrology studies and machine learning investigations. Data is of sufficient quality for the proposed application and we understand the uncertainties in the data.

Is there anything missing? Tell us what you think in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	47

1	29/04/2019 15:39 PM ID: 115171574	A strategic plan for improving the training and development of people with relevant skills to realise the vision into the future
2	29/04/2019 16:09 PM ID: 115180750	Social media
3	29/04/2019 16:20 PM ID: 115181559	sounds good
4	29/04/2019 16:29 PM ID: 115183952	Good but I don't think this is achievable to monitor everything
5	29/04/2019 20:22 PM ID: 115206676	Vast quantities of urban drainage flow data is gathered by sewerage undertakers, who may be reluctant to share this in a meaningful way
6	30/04/2019 10:34 AM ID: 115245631	Last bullet - Data is / Data are (prefer data are)
7	30/04/2019 13:07 PM ID: 115265228	No
8	30/04/2019 14:28 PM ID: 115249000	Most data is collected using public funds - so why don't we say is should be made freely available to all? This is the case in the USA. If we don't do the same then we are excluding it use by a whole raft of potential users with potentially bright ideas!
9	01/05/2019 15:47 PM ID: 115414133	Nothing missing that I can think of.
10	01/05/2019 18:13 PM ID: 115431558	There are always situations where an analyst would prefer more data, yet the cost of collecting it would unlikely be justifiable. 'Everything we need' is subjective. Data requirements need considered alongside the methods that use them, so an alternative vision could be 'to monitor everything our methods require' or similar.
11	03/05/2019 09:57 AM ID: 115578165	I don't think we currently have a strong enough understanding of what is actually required to deliver the outcomes. Too many decisions are made about funding and staff retention without fully understanding the impact on delivering good data.
12	03/05/2019 10:52 AM ID: 115580983	It's a good vision but with more than 1 measuring authority, sufficient funding is always going to be the key.
13	07/05/2019 11:58 AM ID: 115871782	New data should be centrally managed. This should be added, where it currently says 'centrally located'. Add 'We understand and communicate (or share) the uncertainties in the data'.
14	08/05/2019 16:34 PM ID: 116056900	First bullet seems unlikely to be able to be achieved. I think proper funding of data collection is vital, but this bullet point seems very open ended
15	08/05/2019 20:56 PM ID: 115775975	Why limit bullet two to river systems - could this not be catchment
16	09/05/2019 15:19 PM ID: 116159498	Data to be shared freely
17	10/05/2019 12:52 PM ID: 115383239	Yes - no mention of need to be clear on what data availability and quality is needed - otherwise how will we know data is of sufficient quality?

31. What do you think of this draft UK vision for data in flood hydrology?

We have sufficient funding, knowledge, capability and resources to monitor everything we need, particularly the extremes using innovative methods. We have intelligent monitoring plans and collect the baseline data that allows us to adequately characterise our river systems. New and historical data are communicated and shared openly, properly archived and centrally located to support flood hydrology studies and machine learning investigations. Data is of sufficient quality for the proposed application and we understand the uncertainties in the data.

Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
18	10/05/2019 15:32 PM ID: 116268906	Perhaps more emphasis on the importance of data. If hydrological data is poor all the modelling will be poor so it's worth investing in. Perhaps something around considering future data requirements?		
19	14/05/2019 17:22 PM ID: 116606375	We are fully integrated into local development plans, agricultural planning and catchment based restoration plans. Without knowing how your landscape is going to change your vision is static.		
20	15/05/2019 22:53 PM ID: 116749371	Monitoring plans for surface water & groundwater.		
21	16/05/2019 10:27 AM ID: 116787849	There is nothing about open data		
22	16/05/2019 10:51 AM ID: 116792107	Final bullet - we need to understand uncertainties so that we know whether data is of sufficient quality for the proposed application. Uncertainty isn't an add-on.		
23	16/05/2019 11:10 AM ID: 116793030	I think bullet 1 is a bit over ambitious, however the debate is what do we actually "need" to monitor??!		
24	16/05/2019 11:27 AM ID: 116788544	Agreed. The hydrology community would benefit from a data gap analysis study across the UK. The first point would be to identify all available data (rainfall and flow/level), including data owned by [organisation names(s) removed] / councils / other organisations / individuals etc, and understanding the data quality / uncertainty with each of the datasets and owners of these datasets. Once this is completed, a proper gap analysis could be undertaken to highlight areas where more data is needed. Additionally, there should be more focus on developing a national spot gauging strategy to improve the quality of ratings across the country; this could be prioritised in key areas where there is a lack of good flow data.		
25	16/05/2019 12:22 PM ID: 116806561	End users understand the importance of data collection		
26	16/05/2019 15:47 PM ID: 116840164	Historical data should include 'local' data too		
27	17/05/2019 16:45 PM ID: 116772689	There could be more ambition in the vision - facilitate long-term integrated catchment monitoring plans to guide work and investment		
28	17/05/2019 17:11 PM ID: 116970244	I would disagree with most of the statements. We have not yet really progressed very far. We need the skills and the freedom to develop the tools to do this.		
29	18/05/2019 13:37 PM ID: 117028508	Not missing as such, but an emphasis on the importance of maintaining monitoring networks and improving their reliability is absolutely crucial. Scarce [organisation names(s) removed] resources would be much better focussed on that than (for example) getting all snazzy with machine learning (because others are doing that with much better resources and expertise)		
30	18/05/2019 17:03 PM ID: 115187747	As a vision - yes. But we're not there yet. Having a free web based platform for access to data will be important. At the moment the applied sector is stifled by [method removed to protect organisation(s) identity]. Someone should re produce these and make them available for free. Lots to be done here - yes the vision is good though you're being overly bold in the bullet point 1. What does "intelligent monitoring plans" mean?		

31. What do you think of this draft UK vision for data in flood hydrology?

We have sufficient funding, knowledge, capability and resources to monitor everything we need, particularly the extremes using innovative methods. We have intelligent monitoring plans and collect the baseline data that allows us to adequately characterise our river systems. New and historical data are communicated and shared openly, properly archived and centrally located to support flood hydrology studies and machine learning investigations. Data is of sufficient quality for the proposed application and we understand the uncertainties in the data.

Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
31	18/05/2019 18:55 PM ID: 117057658	I think that including sufficient funding is not helpful. What is sufficient? How would you define it?		
32	18/05/2019 22:58 PM ID: 117056440	Reviewing and quality control of archived data. Useful metadata, especially about gauging stations, available to users		
33	19/05/2019 07:17 AM ID: 117075485	I don’t know		
34	19/05/2019 13:30 PM ID: 116804060	"Everything we need" depends on need and plausibility of the associated "everything" - seems a bit vague. Again, "characterise" is vague and what does "baseline" mean in this sense? Why specify machine learning specifically and not all the other statistical methods (or non-statistical methods) that are and can be used in flood hydrology? Again lots of silly, meaningless phrases such as "intelligent monitoring plans"		
35	19/05/2019 20:35 PM ID: 116800339	"Particularly the extremes using innovative methods" should be a separate question "centrally located" may be desirable, but that's another question what is "machine learning" doing here?		
36	20/05/2019 09:27 AM ID: 117133175	Open source data? Check out https://openaq.org/		
37	21/05/2019 13:45 PM ID: 117286332	Nothing missing but I think there needs to be a culture shift regarding funding of data collection etc. All too often this is the first part of the business to take a hit when resources are stretched, yet it is the data that underpins everything else. Without good quality data we cannot have good quality flood hydrology, and good quality data costs money.		
38	22/05/2019 07:17 AM ID: 117351653	I think the vision is good, but also suggests a static situation. I would suggest to include also into the vision that there is room for inclusion of new innovative methods for monitoring and improving data,		
39	22/05/2019 12:29 PM ID: 117376373	Not just quality but quantity as well - not just in terms of temporal but also spatial. Both important and special increasingly important for understanding the patterns and moving us away from the point sampling and wild extrapolations of the past.		
40	23/05/2019 11:39 AM ID: 117474750	Sounds fine		
41	23/05/2019 13:12 PM ID: 117486576	This sounds good. It is very important to include 'data are shared openly and available to all'		
42	23/05/2019 16:48 PM ID: 117496746	Bullet Point 2: "....adequately characterise our river systems." does sound a little 'minimum viable' rather than starting from as good a point as we can.		
43	24/05/2019 12:44 PM ID: 117505743	Modelling and forecasting the hydrological system is difficult because much of it is difficult to observe (especially below ground). To suggest we can "monitor everything we need" may not be quite right. Even monitoring river flows out of bank can be problematic. There is also the issue of scale (footprint) of measurement to consider for different quantities (e.g. COSMOS soil moisture, water table level). Why the emphasis on machine learning investigations? (Data are of sufficient quality") Design of monitoring networks (rain gauge, river flow, weather radar) are cost-constrained which it at odds with "sufficient funding"..		

31. What do you think of this draft UK vision for data in flood hydrology?

We have sufficient funding, knowledge, capability and resources to monitor everything we need, particularly the extremes using innovative methods. We have intelligent monitoring plans and collect the baseline data that allows us to adequately characterise our river systems. New and historical data are communicated and shared openly, properly archived and centrally located to support flood hydrology studies and machine learning investigations. Data is of sufficient quality for the proposed application and we understand the uncertainties in the data.

Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
44	24/05/2019 13:52 PM ID: 117364703	we can quantify the influence different parameters have on the outputs		
45	25/05/2019 01:08 AM ID: 117458964	Needs to include supporting spatial datasets (e.g. river characteristics, land use, soil information, groundwater properties)		
46	28/05/2019 21:37 PM ID: 117847148	Understand and communicate the uncertainties in the data		
47	30/05/2019 15:31 PM ID: 118027569	Good, sufficient and easy accessible data is the key		
			answered	47
			skipped	78

32. Establish and maintain a register of data relevant to UK flood hydrology studies

Collate and publish metadata that can be used in flood hydrology operations and research. The register should be regularly updated and gather metadata from a wide variety of sources.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		0.00%	0
2	2		6.72%	8
3	3		16.81%	20
4	4		36.13%	43
5	5		40.34%	48

Analysis							answered	119
	Mean:	4.1	Std. Deviation:	0.91	Satisfaction Rate:	77.52	skipped	6
	Variance:	0.83	Std. Error:	0.08				

Comments (optional): (15)

1	29/04/2019 16:20 PM ID: 115181559	Isn't this what High Flows UK > NRFA does already?
2	29/04/2019 16:31 PM ID: 115182364	Information must be disseminated to all hydrologists
3	29/04/2019 20:22 PM ID: 115206676	As above
4	30/04/2019 10:34 AM ID: 115245631	Would be good for public funded work; often these are confidential in private sector
5	30/04/2019 14:28 PM ID: 115249000	Data should only be published after it has undergone some QA. Make it available free of charge
6	08/05/2019 17:58 PM ID: 116061289	funding will be tough
7	14/05/2019 17:22 PM ID: 116606375	On what?
8	15/05/2019 11:04 AM ID: 116661131	Not sure what you mean, what kind of metadata?
9	16/05/2019 14:30 PM ID: 116829098	This should be an open source dataset
10	18/05/2019 17:03 PM ID: 115187747	Be nice but it'll end up with patchy regional coverage.
11	18/05/2019 18:55 PM ID: 117057658	Would be very useful, but would be a continuous process
12	18/05/2019 22:02 PM ID: 116681882	The NRFA Peak Flows Dataset which is regularly updated includes a suite of metadata for each gauging station.
13	19/05/2019 20:35 PM ID: 116800339	This question is vague. How does it relate to questions 33 onwards? We already have HiFlows-UK; NRFA Peak Flow dataset, and CBHE. Interest in improving these (outside the core people who are doing them) has really dropped in recent years.
14	23/05/2019 13:12 PM ID: 117486576	Would be Very useful

32. Establish and maintain a register of data relevant to UK flood hydrology studies

Collate and publish metadata that can be used in flood hydrology operations and research. The register should be regularly updated and gather metadata from a wide variety of sources.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
	15	24/05/2019 12:44 PM ID: 117505743	Essential	

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	6
	1	03/05/2019 10:52 AM ID: 115580983	Nobody to collate it	
	2	10/05/2019 12:52 PM ID: 115383239	Multiple archives across [organisation names(s) removed]	
	3	17/05/2019 13:13 PM ID: 116938744	Is metadata useful in isolation?	
	4	19/05/2019 14:19 PM ID: 117082368	Data 'owners' may be reluctant to share data due to cost and potential quality issues	
	5	24/05/2019 12:44 PM ID: 117505743	No	
	6	24/05/2019 13:52 PM ID: 117364703	Yes - knowing what metadata are needed	
			answered	6
			skipped	119

33. Carry out a comprehensive review of existing UK flood hydrology data

Review data in the flood hydrology data register (previous work area) to define its quality, applicability to particular technical areas, and scope for improvement. This should cover hydrometric data from all sources of flooding, meteorological and spatial data (including flood impacts).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.83%	1
2	2	5.79%	7
3	3	19.01%	23
4	4	39.67%	48
5	5	34.71%	42

Analysis							
	Mean:	4.02	Std. Deviation:	0.92	Satisfaction Rate:	75.41	answered 121
	Variance:	0.84	Std. Error:	0.08			skipped 4

Comments (optional): (19)

1	29/04/2019 16:20 PM ID: 115181559	This has been done before e.g. HiFlows-UK. I think more focus should be on methods rather than data quality reviews.
2	29/04/2019 16:31 PM ID: 115182364	Needs constant review and updates to station data quality where applicable
3	29/04/2019 20:22 PM ID: 115206676	As above
4	30/04/2019 10:34 AM ID: 115245631	Good to do but could be a mammoth task - would need a well thought out and clearly defined scope
5	03/05/2019 09:57 AM ID: 115578165	Not a small job, are there enough resources?
6	08/05/2019 17:58 PM ID: 116061289	Can you make it open?
7	14/05/2019 13:59 PM ID: 116581156	Harmonisation of all stage-discharge ratings.
8	14/05/2019 17:22 PM ID: 116606375	Sounds worthy but not exciting - what's it for and what are the outcomes?
9	15/05/2019 11:04 AM ID: 116661131	For flood peak data on NRFA it would be useful to know the uncertainty in gauged QMED from data quality and/or record length. This information could be then used by both researches - to guide use of the data, and by practitioners - to guide choice of QMED donor in flood estimation and then to quantify the uncertainty in flood estimates.
10	18/05/2019 13:37 PM ID: 117028508	Good idea but surely you already have!
11	18/05/2019 17:03 PM ID: 115187747	Can RADR data be included? I'm not sure if this is referring to Peak Flows or a database held in [organisation names(s) removed].
12	18/05/2019 22:02 PM ID: 116681882	The NRFA holdings of hydrometric, meteorological and spatial data are regularly reviewed and updated.
13	19/05/2019 11:58 AM ID: 117068304	See answer to Q51.
14	19/05/2019 20:35 PM ID: 116800339	Really too vague

33. Carry out a comprehensive review of existing UK flood hydrology data

Review data in the flood hydrology data register (previous work area) to define its quality, applicability to particular technical areas, and scope for improvement. This should cover hydrometric data from all sources of flooding, meteorological and spatial data (including flood impacts).

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
15	22/05/2019 07:17 AM ID: 117351653	I would extend this to not only carry out a review, but also make data available, including relevant metadata.		
16	22/05/2019 12:29 PM ID: 117376373	regularly review quality and coverage		
17	23/05/2019 18:04 PM ID: 117519248	May be approaching diminishing returns for some data sets after much good work in the past.		
18	24/05/2019 12:44 PM ID: 117505743	Typically an activity that would be tailored and form part of a specific study.		
19	28/05/2019 21:37 PM ID: 117847148	I think this should be the remit of the regional teams responsible for the data rather than this science/ future developments group		

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	5

1	29/04/2019 15:39 PM ID: 115171574	Inclusion of early non-digital data which would be useful for estimating extreme events
2	17/05/2019 17:26 PM ID: 116973448	We would also need information on the changes of catchment and channel properties to be able to link those to changes in flooding behaviour.
3	18/05/2019 22:02 PM ID: 116681882	Information on groundwater, surface water and fluvial flooding and their impacts is distributed across a number of public and non-public sources.
4	23/05/2019 13:12 PM ID: 117486576	Hard to provide universal assessment of quality as acceptable quality will vary between applications
5	24/05/2019 12:44 PM ID: 117505743	Technical areas of applicability too broad to be of value?

answered	5
skipped	120

34. Investigate future flood hydrology data needs

Identify ways to improve existing data. Identify data gaps and recommend ways to fill these gaps, particularly by exploiting new technology. This should cover data for operational and research use and include hydrometric data from all sources of flooding, meteorological and spatial data.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		0.00%	0
2	2		4.27%	5
3	3		17.95%	21
4	4		40.17%	47
5	5		37.61%	44

Analysis								
	Mean:	4.11	Std. Deviation:	0.85	Satisfaction Rate:	77.78	answered	117
	Variance:	0.71	Std. Error:	0.08			skipped	8

Comments (optional): (12)

1	30/04/2019 14:28 PM ID: 115249000	Rainfall data needs to be made more widely available
2	01/05/2019 16:10 PM ID: 115396023	The existing dataset is good and very valuable, but there are known issue with consistency in the period of record of data that need to be addressed with significant funding invested in digitising historic records to allow for re-processing to produce better flow data
3	03/05/2019 10:52 AM ID: 115580983	Some gauging stations are not built for flood risk management purposes so improving the data would be difficult
4	10/05/2019 12:52 PM ID: 115383239	Does this implicitly mean we need to expand this work to include hydrometry which is a specialism in its own right?
5	18/05/2019 13:37 PM ID: 117028508	Ditto
6	18/05/2019 22:02 PM ID: 116681882	A register of quality issues relating to existing peak flows data and critical improvements that are needed for national consistency is held by the NRFA.
7	19/05/2019 11:58 AM ID: 117068304	I think we have to be careful with applying new technology. How good is it? But if it enables to get more good and useful data then it is to be welcomed.
8	19/05/2019 20:35 PM ID: 116800339	This is the important question!
9	23/05/2019 13:12 PM ID: 117486576	We have lots of data compared to some countries - priority should be to make what we have more accessible first
10	23/05/2019 16:48 PM ID: 117496746	This is important to improve the overall quality of flood hydrology.
11	24/05/2019 12:44 PM ID: 117505743	Gap filling often best done in the context of a particular purpose, maybe aligned to a particular model
12	30/05/2019 15:31 PM ID: 118027569	We already know that we need good and reliable data

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	4

1	29/04/2019 16:20 PM ID: 115181559	I'd prefer less robust data in more locations rather than improving the existing gauging stations etc.
2	18/05/2019 22:02 PM ID: 116681882	Digitisation of early records. Improvements to existing data (for example following reviews of ratings, POT independence or thresholds) are not possible where historical data are held only in chart format.
3	19/05/2019 07:17 AM ID: 117075485	who
4	24/05/2019 12:44 PM ID: 117505743	Gap filling often best aligned to purpose.

answered	4
skipped	121

35. Investigate the use of citizen science data in flood hydrology

Carry out a review of how citizen science could be used to collect data in flood hydrology. This review could consider how community observations can be integrated with more traditional data collection methods, and how to encourage community groups and volunteers to get involved.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.82%	1
2	2	17.21%	21
3	3	35.25%	43
4	4	29.51%	36
5	5	17.21%	21

Analysis							
	Mean:	3.45	Std. Deviation:	0.99	Satisfaction Rate:	61.27	answered 122
	Variance:	0.99	Std. Error:	0.09			skipped 3

Comments (optional): (17)

1	30/04/2019 13:07 PM ID: 115265228	Given professional training, mentoring and evaluation Citizen Science can add useful data
2	02/05/2019 09:35 AM ID: 115471184	Would have to be a huge emphasis on quality control and would need to involve people within the industry to ensure data is being collected and recorded in a suitable way, in correct locations with adequate and reliable equipment.
3	03/05/2019 09:57 AM ID: 115578165	There is a place for this, but it has to be treated appropriately and it is not a holy grail.
4	08/05/2019 16:34 PM ID: 116056900	This is important area. Recent flood modelling studies we have undertaken have benefited greatly from this.
5	10/05/2019 12:52 PM ID: 115383239	Risk the data/time spent on this may not yield data of the usefulness hoped for
6	14/05/2019 10:52 AM ID: 116548266	Citizen data is the current new thing. It's great, but please be aware of the limitations!
7	15/05/2019 11:04 AM ID: 116661131	Should include historical flooding. Quality control may be an issue.
8	16/05/2019 10:27 AM ID: 116787849	This is key considering [organisation names(s) removed] funding and how cheap it now is to share data.
9	17/05/2019 17:11 PM ID: 116970244	Consider use of academia too - can bring them right into the mix of finding new solutions and build links.
10	18/05/2019 13:37 PM ID: 117028508	Concerns about precision and reliability
11	18/05/2019 17:03 PM ID: 115187747	But not hydrometric data unless there is some clever way of ensuring we don't end up with 3rd quality information
12	18/05/2019 22:02 PM ID: 116681882	There is great scope for citizen science engagement for recording both historical and unfolding flood events. Best practice guidance for citizen science has been published by [organisation names(s) removed].
13	22/05/2019 07:17 AM ID: 117351653	This should be closely tied in with the educational and awareness raising objectives stated in "ways of working"
14	23/05/2019 13:12 PM ID: 117486576	This are has been bumbling on for a while - it is of interest, particularly for flood impact data, but I'm yet to see it proved to be a significant return on investment due to inconsistencies in the data

35. Investigate the use of citizen science data in flood hydrology

Carry out a review of how citizen science could be used to collect data in flood hydrology. This review could consider how community observations can be integrated with more traditional data collection methods, and how to encourage community groups and volunteers to get involved.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
15	23/05/2019 16:48 PM ID: 117496746	Has some benefit I am sure but do these sort of observations vary in quality/reliability and often have a limited duration?		
16	24/05/2019 12:44 PM ID: 117505743	Best done in the context of a specific purpose, such as validation of flood impact for surface water flooding.		
17	28/05/2019 21:37 PM ID: 117847148	I'm keen for citizen science as a means to collect information on events (high and low flows) and associated impacts, but as a means of regular data collection I think there are other priorities.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	9
1	02/05/2019 09:35 AM ID: 115471184	I wouldn't use data collected unless the accuracy and certainty of the data was guaranteed. It would require people working within the industry to volunteer their time.		
2	03/05/2019 10:52 AM ID: 115580983	No one to coordinate. Concern that community groups could provide misleading data to get flood risk management schemes built.		
3	07/05/2019 11:58 AM ID: 115871782	Any photos or records must have a data stamp - if we are seeking community observations, we should publicise this requirement loudest and first.		
4	09/05/2019 16:49 PM ID: 116171071	Too many attempts to design the perfect system. Need to develop an approach and use it in operations, then improvements		
5	15/05/2019 14:46 PM ID: 116697459	Potential data quality issues		
6	18/05/2019 22:02 PM ID: 116681882	The technical feasibility of adapting existing [organisation names(s) removed] citizen science techniques and systems for flood hydrology has been established and reported in the FEH Local Data Archive proposal.		
7	19/05/2019 11:58 AM ID: 117068304	How would it be collected? How do we inform the general public what is valuable information to record for us?		
8	19/05/2019 14:19 PM ID: 117082368	Data collection (upload) from citizen suppliers needs development (although there is a growing body of research from pilot studies)		
9	24/05/2019 12:44 PM ID: 117505743	No		
			answered	9
			skipped	116

36. Develop and maintain open access data archives for all sources of flood hydrology data

This will include (but not be limited to) a 'local data' archive to complement systematic flood hydrology data archives. The local data archive should be able to log and store input from citizen science approaches and also archive historical and palaeoflood data and results from previous hydrological studies and reports.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.00%	0
2	2	3.36%	4
3	3	16.81%	20
4	4	28.57%	34
5	5	51.26%	61

Analysis							
	Mean:	4.28	Std. Deviation:	0.86	Satisfaction Rate:	81.93	answered 119
	Variance:	0.74	Std. Error:	0.08			skipped 6

Comments (optional): (12)

1	01/05/2019 16:10 PM ID: 115396023	This is a key element to flood estimation, a suitable 'home' and updating procedure needs to be established.
2	02/05/2019 09:35 AM ID: 115471184	Again, with a big emphasis on quality control and making sure the source of the data (e.g. citizen science, [organisation names(s) removed] recorded, historical) is clearly stated
3	03/05/2019 09:57 AM ID: 115578165	Open access is good, but no without risks. Also I don't think that the value of current open access data is correctly recognised.
4	07/05/2019 11:58 AM ID: 115871782	Can we have a clear statement that we value, and want to integrate, [organisation names(s) removed] archive' of historic flood data.
5	15/05/2019 11:04 AM ID: 116661131	Only if part of/merged with the [organisation names(s) removed] - two separate archives is no good. There may be copyright issues with publishing previous hydrological studies from either the practitioner and from [organisation names(s) removed].
6	15/05/2019 14:46 PM ID: 116697459	The architecture of the software/database needs to be compatible with use in the proposed 'methods'.
7	16/05/2019 15:47 PM ID: 116840164	This is key
8	18/05/2019 13:37 PM ID: 117028508	Good idea but already implemented. The open data releases in the past couple of years are to be welcomed. A bit of funding to bring them all together in one place would help
9	18/05/2019 17:03 PM ID: 115187747	Yes - good. Aspirational? I see that [removed to protect the identity of individual(s)] has put out a call for comment on the future of the flood history database since few if any floods had been added in the last few years.
10	18/05/2019 22:02 PM ID: 116681882	Flood hydrology requires both long records for probabilistic methodologies, and local information for flood risk management. The collation of historical and local information should be of the highest priority.
11	19/05/2019 20:35 PM ID: 116800339	The question is too prescriptive. I think this would cost a lot of money (making it difficult to promote. How useful is local data? Perhaps we need more info on when (& when not) it is useful, and how to use it. I've found Consultants are OK at putting the data together, less happy about using it.
12	24/05/2019 12:44 PM ID: 117505743	Maintaining archive for [organisation names(s) removed] use would seem to have greatest priority. Making this open access is a secondary priority.

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	5

1	30/04/2019 10:34 AM ID: 115245631	[organisation names(s) removed] cannot easily release data for non-academic purposes
2	10/05/2019 12:52 PM ID: 115383239	Roles and governance of the data will need to be agreed - [organisation names(s) removed] to lead? Co-ordination and consistency given measurement and processing carried out by different agencies across UK.
3	16/05/2019 10:27 AM ID: 116787849	This is key considering [organisation names(s) removed] funding and how cheap it now is to share data.
4	18/05/2019 22:02 PM ID: 116681882	The task is non-trivial, but the NRFA is well placed to extend its flood hydrology data archiving services with historical and local data.
5	24/05/2019 12:44 PM ID: 117505743	No

answered	5
skipped	120

37. High flow gauging during flood incidents

Measuring authorities encouraged to review and improve high flow gauging during flood events from all sources of flooding. This could also include collection of other event based data such as flood extent and duration.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.65%	2
2	2	0.00%	0
3	3	5.79%	7
4	4	29.75%	36
5	5	62.81%	76

Analysis							answered	121
	Mean:	4.52	Std. Deviation:	0.75	Satisfaction Rate:	88.02	skipped	4
	Variance:	0.56	Std. Error:	0.07				

Comments (optional): (20)

1	29/04/2019 16:31 PM ID: 115182364	H&S issues hence has to be remote methods
2	30/04/2019 10:34 AM ID: 115245631	This is so important for flood forecasting and rating validity.
3	01/05/2019 16:10 PM ID: 115396023	Flood extent and duration are elements that are currently poorly understood. With increasing technology such as drones, aerial photograph and videos during events should be a lot easier in the future.
4	02/05/2019 09:35 AM ID: 115471184	Reliable flood gauging during flood events would be invaluable information for peak flow estimation!
5	03/05/2019 09:57 AM ID: 115578165	Resources severely stretched most of the time already
6	10/05/2019 12:52 PM ID: 115383239	Cost is a significant constraint and most measuring authorities under pressure with resources (manpower and equipment) and unlikely to be able to support this in current public funding climate.
7	10/05/2019 15:32 PM ID: 116268906	Really important if we want to improve our ratings, flood estimation and forecasts
8	13/05/2019 13:37 PM ID: 116449651	In practice you would need some sort of remote assessment to safely achieve this.
9	15/05/2019 11:04 AM ID: 116661131	Needs funding! Remote methods and drone use should be considered - research/guidance may be needed on these
10	17/05/2019 17:11 PM ID: 116970244	Strong messages that insufficient quantity and quality of high flow data the biggest issue facing flood hydrology.
11	17/05/2019 17:26 PM ID: 116973448	This is very important, but I think it should also be acknowledged that having imperfect data can be OK, as long as it is made clear that a measurement comes with some uncertainty (which can ideally be quantified). Better to have a vague measurement of many events that to aim to have a perfect measurement of only a handful of events.
12	18/05/2019 10:57 AM ID: 117023552	Good idea
13	18/05/2019 13:37 PM ID: 117028508	Crucial

37. High flow gauging during flood incidents

Measuring authorities encouraged to review and improve high flow gauging during flood events from all sources of flooding. This could also include collection of other event based data such as flood extent and duration.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	18/05/2019 17:03 PM ID: 115187747	YES. Particularly the spot gauging of floods.		
15	18/05/2019 22:02 PM ID: 116681882	The need for stations suitable for pooling, the inherent uncertainty in extrapolating stage/discharge curves, and implications of inaccuracy means that monitoring should be a very high priority.		
16	19/05/2019 11:58 AM ID: 117068304	See Q51 also. [organisation names(s) removed] are under similar pressures to the rest of us: to do more for less and they need a strong steer to get the best for us, otherwise they will just do the minimum that is acceptable (to their line management). But we need more. They need to be guided in order to give us what we want but it is not just a case of "nagging" them, it is also to make them appreciate how much we value their work and what it provides us. We are not doing this enough because it is not seen as a priority by us.		
17	19/05/2019 20:35 PM ID: 116800339	Very important. Also very difficult.		
18	23/05/2019 16:48 PM ID: 117496746	Yes - often there is limited good information available.		
19	23/05/2019 18:04 PM ID: 117519248	Especially "other" event based data in addition to flow.		
20	24/05/2019 12:44 PM ID: 117505743	Constraints due to Health & Safety. May not be critical to know flow at highest level for some purposes (exceedance of a threshold may suffice).		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	11
1	29/04/2019 16:20 PM ID: 115181559	How will this happen without better funding?		
2	30/04/2019 13:07 PM ID: 115265228	High flow gauging is very difficult once water is out of bank		
3	02/05/2019 09:35 AM ID: 115471184	H&S? Doing spot flows and comparing to gauged data during a flood may be complex and unsafe.		
4	03/05/2019 09:57 AM ID: 115578165	Lack of funding for equipment updates		
5	03/05/2019 10:52 AM ID: 115580983	No funding for this. Little staff time available. [organisation names(s) removed].		
6	17/05/2019 13:28 PM ID: 116938355	There are limitations in collecting peak levels and flows on the floodplains during flood incidents due to safety. There needs to be technology available for authorities to record floodplain flooding safely and in a timely fashion. This would also help in improve gauge ratings.		
7	17/05/2019 17:11 PM ID: 116970244	Resources and skills. Yet it costs pennies. [organisation names(s) removed] needs to increase investment in Hydrometry measurement skills and innovation - this WILL save money.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
8	18/05/2019 22:02 PM ID: 116681882	Safety, but new methods, such as surface velocity cameras, triggered dilution gauging and drones are improving the safe recording of flood events.		
9	19/05/2019 11:58 AM ID: 117068304	I think it is more a lack of understanding and a resource issue than a technical one.		
10	24/05/2019 12:44 PM ID: 117505743	Health & Safety. Difficult gauging situations. Surface water depth and velocity may be difficult to measure at local scales over broad area.		
11	28/05/2019 10:24 AM ID: 117779189	Access to sites and H&S implications during flood events can make this difficult. Q39 may get around these issues		
			answered	11
			skipped	114

38. Salvaging historical data

Digitisation and salvaging historical data (e.g. archiving the spatial radar estimates of rainfall, historic flood records, analogue records)

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.84%	1
2	2	7.56%	9
3	3	21.01%	25
4	4	27.73%	33
5	5	42.86%	51

Analysis							answered	119
	Mean:	4.04	Std. Deviation:	1.01	Satisfaction Rate:	76.05	skipped	6
	Variance:	1.02	Std. Error:	0.09				

Comments (optional): (17)

1	29/04/2019 16:20 PM ID: 115181559	Could be a lot of work for not much gain.
2	30/04/2019 13:07 PM ID: 115265228	Climate change may make this less useful
3	01/05/2019 16:10 PM ID: 115396023	There is a significant amount of historical river level chart data that needs to be digitised in order to improve the existing records of peak flow data, but this is very costly and needs significant investment
4	02/05/2019 09:35 AM ID: 115471184	Again, invaluable information especially for
5	03/05/2019 09:57 AM ID: 115578165	Of some use maybe, so many large changes to landscape, are they really that useful most of the time.
6	15/05/2019 11:04 AM ID: 116661131	Sometime between 2006 and 2010, numerous records were removed from [organisation names(s) removed], I have not been able to find out why. This needs to be investigated and events added back in - if they were removed due to uncertainty or poor referencing, then they could be caveated, but at least this would enable the reader to do their own research.
7	15/05/2019 14:46 PM ID: 116697459	A confidence scoring of historic data should be included e.g. are historic flood records reliable?
8	17/05/2019 17:26 PM ID: 116973448	And digitised old records from the NRFA (among others old records)
9	18/05/2019 10:57 AM ID: 117023552	More work needed on digital processing of existing pre-1951 British Rainfall observed hard copy records; ii) similar work that [removed to protect the identity of individual(s)] did on processing short term extreme rainfall records from chart recorders;
10	18/05/2019 13:37 PM ID: 117028508	Crucial
11	18/05/2019 17:03 PM ID: 115187747	Actually a very good idea. And where do we stand on rainfall records. The met observers in the UK were very diligent and there is a huge amount of historic data in the [organisation names(s) removed] archive. Also much cheaper than running monitoring stations to get extra data.
12	19/05/2019 11:58 AM ID: 117068304	We have lots of historic data that could be digitised. We expect our models to use the latest hydrology and therefore after a few years expect the hydrology to be updated, but we can only move forward one day at a time. If we went backwards using this historic data some sites could add years of data in an instant.

38. Salvaging historical data

Digitisation and salvaging historical data (e.g. archiving the spatial radar estimates of rainfall, historic flood records, analogue records)

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
13	19/05/2019 20:35 PM ID: 116800339	Really difficult. Also really expensive unless we can find ways to do it more cheaply - so that's the first priority		
14	19/05/2019 21:22 PM ID: 115953502	Difficult - since this can generate a lot of work with limited gain due to issues of historical data quality that it may not be possible to quantify		
15	22/05/2019 07:17 AM ID: 117351653	This is important. But needs to be explicitly linked with strategies on how such data should be used.		
16	23/05/2019 16:48 PM ID: 117496746	Past data is important to keep as long as it is used to improve future flood hydrology practices.		
17	24/05/2019 12:44 PM ID: 117505743	Good historical holdings of radar rainfall data are held already [organisation names(s) removed].		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	6
1	30/04/2019 10:34 AM ID: 115245631	Data volumes? Use cloud storage?		
2	03/05/2019 10:52 AM ID: 115580983	Staff time.		
3	18/05/2019 22:02 PM ID: 116681882	High cost. But some studies have successfully used citizen science to salvage data.		
4	19/05/2019 11:58 AM ID: 117068304	I think it is more a lack of understanding and a resource issue than a technical one.		
5	19/05/2019 14:19 PM ID: 117082368	Cost is an obvious issue, but also quality assessment of historic data (but valuable for historic flood estimation)		
6	24/05/2019 12:44 PM ID: 117505743	There may be problems with old media holding data.		
			answered	6
			skipped	119

39. Investigate new techniques for flood measurement

Exploration of new technology and methods for capturing flood information for all sources of inland flooding.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.82%	1
2	2	4.10%	5
3	3	19.67%	24
4	4	37.70%	46
5	5	37.70%	46

Analysis							
	Mean:	4.07	Std. Deviation:	0.9	Satisfaction Rate:	76.84	answered 122
	Variance:	0.81	Std. Error:	0.08			skipped 3

Comments (optional): (12)

1	30/04/2019 09:38 AM ID: 115241585	Don't chase this for ever. Sometimes logical answers are as good as the whole shebang. Cost a lot less and are better explainable.
2	03/05/2019 09:57 AM ID: 115578165	Innovation must be allowed, or improvements are very difficult
3	03/05/2019 13:35 PM ID: 115608108	New satellite instruments, high flying drones capable of carrying SAR etc.
4	10/05/2019 12:52 PM ID: 115383239	Is this the role of a hydrology road map or is this beyond scope and more in the realm of hydrometry? Also will it happen anyway regardless of the road map hydrometry is continually evolving new methods?
5	14/05/2019 10:52 AM ID: 116548266	Let the commercial market develop these through innovation
6	15/05/2019 11:04 AM ID: 116661131	Is this for Hydrology to do or is it for us to encourage a Hydrometry colleagues to do?
7	16/05/2019 12:37 PM ID: 116804203	I think techniques are there but need to particularly investigate how to adopt these in practice so they are able to be deployed widely in the field in real events
8	17/05/2019 17:11 PM ID: 116970244	Vital. And full of opportunity for science. innovation, motivation. And we have the networks in place to do this. A quick win
9	19/05/2019 11:58 AM ID: 117068304	New technology must work adequately.
10	19/05/2019 14:19 PM ID: 117082368	Opportunity for working across organisations who have flood risk concerns ([organisation names(s) removed])
11	23/05/2019 16:48 PM ID: 117496746	As long as there is a check on quality of that information.
12	24/05/2019 12:44 PM ID: 117505743	[organisation names(s) removed] maintain a watching brief on new technology already.

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	3

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	03/05/2019 10:52 AM ID: 115580983	No one to lead on it		
2	17/05/2019 17:11 PM ID: 116970244	Sigh. Yes. We need more technical expertise resource. What if I leave? [removed to protect the identity of individual(s)]		
3	24/05/2019 12:44 PM ID: 117505743	No		
			answered	3
			skipped	122

40. Do you think there are any other key work areas related to data in flood hydrology?

Please tells us in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	16

1	30/04/2019 10:34 AM ID: 115245631	Moving away from the current design storm approach and use of spatially varying rainfall for design purposes - a big research area and would need analysis of radar data. [organisation names(s) removed] project tried this in 2007 but could only access radar data from 2002 - 2006 - now much more flood event radar data are available
2	30/04/2019 11:05 AM ID: 115248873	Open access to the data
3	30/04/2019 13:07 PM ID: 115265228	No
4	01/05/2019 20:32 PM ID: 115443184	Methods of integrating quantitative and qualitative (mainly historical flood) data need special attention
5	03/05/2019 10:52 AM ID: 115580983	Nothing in here about paleo flood data
6	03/05/2019 13:35 PM ID: 115608108	Satellite missions: SAR, SWOT etc.
7	08/05/2019 20:56 PM ID: 115775975	Review the monitoring network to ensure it is fit-for-purpose, including the groundwater level network
8	13/05/2019 10:48 AM ID: 116422927	One of the key issues with flood hydrology is the costs associated with the [method removed to protect organisation(s) identity]. In my opinion, whilst the idea of an online system is good, in practice the 'pay per use' has been a big back step in hydrology. Previously, hydrologists could look at catchment descriptors at a lot of different locations and get a really good feel for the catchment and surrounding area, and hence improve flow estimates. Now, due to 'pay to use' hydrologists are limited on the amount of investigations they can do because project budgets do not allow for unlimited purchase of catchment descriptors to investigate catchments - it tends to be limited to the locations that flow estimations are required.
9	14/05/2019 17:22 PM ID: 116606375	Capture the changes in river channel and floodplain capacity to ensure uncertainties resulting form changes in these during extreme floods are accounted for in flood hydrology models/forecasts.
10	15/05/2019 22:53 PM ID: 116749371	Better sharing of real-time data (e.g. rainfall).
11	18/05/2019 17:03 PM ID: 115187747	Targeting paired catchment monitoring to get a better understanding of NFM measures. Modelling by itself (unless it's a water volume storage situation) doesn't tell us the answers.
12	19/05/2019 07:17 AM ID: 117075485	Some things are suited to government departments(definitely need a solution), some to Universities (Where outcomes are unknown) Some unknown (Private tenders)
13	19/05/2019 11:58 AM ID: 117068304	High flow gauging – we miss opportunities. Working hours are relatively few (22%, 37hrs out of 168 per week, and this does not account for holidays and other absences). What are the chances of being able to gauge high flows in working hours (especially in the more rapidly responding catchments). But we still miss a lot of these opportunities. So we need to help [organisation names(s) removed]to help us. How? By forecasting for sites we want gauging, getting more staff available to assist them in and out of hours, encouraging them to go out in horrible weather (safety permitting) by helping them understand the value of the data. I have tried to do these things but it is without any formal management backing and the current message is that we do not have the resources to do it: it doesn't directly contribute to [organisation names(s) removed] goals. So I have had to stop.

40. Do you think there are any other key work areas related to data in flood hydrology?

Please tells us in the box below:

			Response Percent	Response Total
		We struggle to get gauging at existing flow sites but we need gauging at sites that are not considered as flow sites by [organisation names(s) removed]. I am thinking of anything used in a PDM forecasting model, and that is a vast number of additional sites.		
14	19/05/2019 20:35 PM ID: 116800339	Rainfall (especially historic events, old data sources) often seems to be forgotten. In the longer-term the NRFA Peak Flow dataset (or it successor) and the Measuring Authorities archives (WISKI) should either show the same values, or have notes to explain differences. That in itself is a major undertaking. We need more data to support FRAs (e.g. more small catchments with a reasonable spatial coverage, not necessarily to a high data standard (even improved QMED estimates would be an improvement). The "Small catchment" R&D project was disappointing in this regard.		
15	24/05/2019 12:44 PM ID: 117505743	Software systems used to archive/disseminate data in flood hydrology are undergoing change and need to be maintained fit for purpose.		
16	30/05/2019 15:31 PM ID: 118027569	To improve the capability to capture high flow data accurately		
			answered	16
			skipped	109

41. What do you think of this draft UK vision for scientific understanding of flood hydrology?

We understand the processes governing all sources of inland flood risk better which allows us to improve our methodologies. We understand links between hydrological processes and other processes that affect hydrology at all scales. We have an improved ability to detect and characterise rainfall spatially.

Is there anything missing? Tell us what you think in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	27

1	30/04/2019 10:34 AM ID: 115245631	- First bullet - remove the term 'better' - begs question, better than what?
2	30/04/2019 12:40 PM ID: 115261724	A brief mention of what other processes affect hydrology - particularly physical changes (natural processes, NFM interventions, restoration) as well as climate change.
3	30/04/2019 13:07 PM ID: 115265228	No
4	01/05/2019 15:47 PM ID: 115414133	Nothing missing that I can think of.
5	01/05/2019 18:13 PM ID: 115431558	No
6	03/05/2019 09:57 AM ID: 115578165	There is still some way to go before we understand the links
7	07/05/2019 11:58 AM ID: 115871782	The second bullet point sounds strange, to lay readers or hydrologists. A 'process that affects hydrology' is also a 'hydrological process', albeit a lesser/minor process.
8	08/05/2019 20:56 PM ID: 115775975	These visions need to be written in a consistent manner. This should be a statement of where we are at some point in the future. If we are then comparing that point to the past it should be clear when that is.
9	09/05/2019 15:19 PM ID: 116159498	No
10	09/05/2019 16:49 PM ID: 116171071	Include a link to benefitting operations / real time flood forecasting somehow
11	10/05/2019 12:52 PM ID: 115383239	Other hydrological parameters e.g. river flow, catchment conditions and perhaps snowmelt?
12	10/05/2019 15:32 PM ID: 116268906	Add 'forecast' to the last line? Spatial uncertainty in rainfall forecasting is something that is very difficult to quantify and model (in Hydro models) - again a probabilistic approach is probably the way forward but it's something we should be putting more effort into improving
13	14/05/2019 17:22 PM ID: 116606375	Good
14	16/05/2019 10:51 AM ID: 116792107	I think uncertainty should feature here too
15	16/05/2019 12:22 PM ID: 116806561	These improvements in scientific understand are fed through to operational use
16	17/05/2019 13:28 PM ID: 116938355	Links with hydraulics is also very important.
17	17/05/2019 16:45 PM ID: 116772689	Focus on inland flooding, given catchment-based approach, should it also include inter-tidal understanding otherwise this might fall through gaps? At least explicitly mention links to coastal processes equivalent Roadmap

41. What do you think of this draft UK vision for scientific understanding of flood hydrology?

We understand the processes governing all sources of inland flood risk better which allows us to improve our methodologies. We understand links between hydrological processes and other processes that affect hydrology at all scales. We have an improved ability to detect and characterise rainfall spatially.

Is there anything missing? Tell us what you think in the box below:

			Response Percent	Response Total
18	18/05/2019 17:03 PM ID: 115187747	OK		
19	18/05/2019 18:55 PM ID: 117057658	I would rather formulate this in terms of your understanding being state of the art and continuously updated through interactions with the scientific community.		
20	19/05/2019 13:30 PM ID: 116804060	Perhaps we're missing something simple like: "We have reduces the uncertainty in design flow estimates and forecasting by x." This is the end goal; understanding certain processes and "characterising" and "detecting" rainfall spatially may of course lead to that.		
21	19/05/2019 14:19 PM ID: 117082368	We are aware of the limitations of our understanding of certain flood hydrology processes and can estimate the consequential uncertainty in flood estimation and forecasting		
22	20/05/2019 09:27 AM ID: 117133175	How does inland link with coastal? In particular in tidal areas?		
23	22/05/2019 07:17 AM ID: 117351653	This again suggests a static situation. While I agree that this is a clear vision, I would again include that the vision is open to progressing scientific insight.		
24	23/05/2019 11:39 AM ID: 117474750	Nope.		
25	23/05/2019 16:48 PM ID: 117496746	Bullet Points 1 and 3: 'better' and 'improved' compared to what?		
26	24/05/2019 12:44 PM ID: 117505743	In the last bullet, might add evaporation as a key component of the water balance that, through its effect on soil moisture, impacts on flood response to storm rainfall.		
27	25/05/2019 01:08 AM ID: 117458964	Forecasting research.		
			answered	27
			skipped	98

42. Research on all sources of uncertainty in flood estimation and forecasting

This work area would identify the relative importance of different sources of uncertainty. It would include understanding the practical limits of prediction, sources of uncertainty and development of new methods to take account of uncertainty in flood hydrology.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		0.00%	0
2	2		4.10%	5
3	3		19.67%	24
4	4		40.98%	50
5	5		35.25%	43

Analysis							
	Mean:	4.07	Std. Deviation:	0.84	Satisfaction Rate:	76.84	answered 122
	Variance:	0.71	Std. Error:	0.08			skipped 3

Comments (optional): (15)

1	30/04/2019 12:40 PM ID: 115261724	Work by [removed to protect the identity of individual(s)] at [organisation names(s) removed] has highlighted huge uncertainties that propagate through models of river behaviour - worth a discussion with him.
2	30/04/2019 13:07 PM ID: 115265228	Much data is presented including at Conferences would be improved if confidence limits were shows
3	01/05/2019 18:13 PM ID: 115431558	As well as research, we need to think carefully about how limits of prediction and uncertainty analysis can be practically used.
4	10/05/2019 15:32 PM ID: 116268906	I think we are quite bad at this at the moment and very vague. What does 'medium confidence' mean? Confidence in the rainfall amount, duration, intensity, location (at different scales), the flood peak volume, timing, duration, impact thresholds....there's so much uncertainty that is swept up into a generic confidence level at the moment - it might be useful to be more specific with particular aspects where we can.
5	13/05/2019 15:07 PM ID: 116463005	This should be evidence based (i.e. comparison to the real world rather than just sensitivity analysis) so we can capture unknown unknowns
6	15/05/2019 11:04 AM ID: 116661131	Uncertainty should contribute to prioritising R&D so this is quite high priority
7	15/05/2019 12:27 PM ID: 116674043	As a decision-maker this links to my other flagged priorities on the theme of uncertainty.
8	17/05/2019 13:28 PM ID: 116938355	Uncertainty needs to be accounted for risk management authorities and water companies when designing schemes.
9	17/05/2019 17:11 PM ID: 116970244	Uncertainty over peak flows increased due to uncertainty over peak flows (if you have hardly measured something, it's difficult to quantify how confident you actually are!)
10	19/05/2019 20:35 PM ID: 116800339	Will an improved understanding uncertainty help us reduce flooding?
11	23/05/2019 13:12 PM ID: 117486576	To me understanding the sources of uncertainty is more important that developing methods to quantify it. Process based understanding would improve flood prediction
12	23/05/2019 16:48 PM ID: 117496746	Some work is underway in this area but more is needed.

42. Research on all sources of uncertainty in flood estimation and forecasting

This work area would identify the relative importance of different sources of uncertainty. It would include understanding the practical limits of prediction, sources of uncertainty and development of new methods to take account of uncertainty in flood hydrology.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
13	24/05/2019 12:44 PM ID: 117505743	An important topic for flood forecasting; less so for flood estimation.		
14	25/05/2019 01:08 AM ID: 117458964	Care needed if combining estimation and forecasting optima approach.		
15	30/05/2019 15:31 PM ID: 118027569	The effort should be proportionate to the risk		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	3
1	10/05/2019 12:52 PM ID: 115383239	Data quality especially observational data for extreme events (quality and availability)		
2	17/05/2019 17:11 PM ID: 116970244	Skills, resources, inadequate incident response for measurements		
3	24/05/2019 12:44 PM ID: 117505743	No		
			answered	3
			skipped	122

43. Improving process understanding

his work could include the establishment of long-term monitoring in experimental catchments, understanding which processes are important in which catchment types and studying hindcast data to understand the climatic drivers of floods and the natural variability in these drivers. To include improving understanding of surface/groundwater interactions for flooding and understanding whether there is a step-change in process functioning for floods of different magnitudes. To include investigations around the impacts of other processes on flood hydrology (and vice-versa), such as ecological response, erosion, hill-slope river coupling, woody debris, sediment transport and geomorphological change.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.67%	2
2	2	5.00%	6
3	3	27.50%	33
4	4	36.67%	44
5	5	29.17%	35

Analysis							
	Mean:	3.87	Std. Deviation:	0.95	Satisfaction Rate:	71.67	answered 120
	Variance:	0.9	Std. Error:	0.09			skipped 5

Comments (optional): (18)

1	30/04/2019 12:40 PM ID: 115261724	Rivers and floodplains change. A better understanding of the physical processes operating is critical.
2	30/04/2019 13:07 PM ID: 115265228	Long terms studies e.g. twenty years - would be very useful due to problems of shorter dry periods and climate change
3	01/05/2019 18:13 PM ID: 115431558	A number of extremely detailed (and expensive) scaled catchment studies have already been undertaken. Understanding surface-groundwater interactions is a useful objective. However, we could probably do a lot through synthesising existing process based studies to draw conclusions on research gaps and setting up new long-term process studies without doing this would be of little value.
4	02/05/2019 09:35 AM ID: 115471184	And communication of this information
5	03/05/2019 10:52 AM ID: 115580983	Yes - forward thinking is important.
6	08/05/2019 17:58 PM ID: 116061289	huge undertaking
7	13/05/2019 13:37 PM ID: 116449651	A lot has been done, but on a plot scale. On a catchment there is too much heterogeneity to make any firm conclusions.
8	14/05/2019 10:52 AM ID: 116548266	Let's focus on using the knowledge gained over the last century. Now is the time to pull it all together.
9	14/05/2019 17:22 PM ID: 116606375	But if your vision is all data all scales why do you need a few detailed catchments? Surely your aim / vision is to develop methods for capturing the relevant attributes of these at all scales so they can be attributed and included in your new approaches etc.
10	15/05/2019 14:46 PM ID: 116697459	The outcomes of such research need to be effective and transferable to practical application.
11	17/05/2019 14:13 PM ID: 116948761	Plenty of research already on this.

43. Improving process understanding

his work could include the establishment of long-term monitoring in experimental catchments, understanding which processes are important in which catchment types and studying hindcast data to understand the climatic drivers of floods and the natural variability in these drivers. To include improving understanding of surface/groundwater interactions for flooding and understanding whether there is a step-change in process functioning for floods of different magnitudes. To include investigations around the impacts of other processes on flood hydrology (and vice-versa), such as ecological response, erosion, hill-slope river coupling, woody debris, sediment transport and geomorphological change.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
12	17/05/2019 16:45 PM ID: 116772689	There is a lot to include in this work area compared to others		
13	18/05/2019 10:57 AM ID: 117023552	Fluvial hydrographs may be divided into two main subcomponents, namely quickflow and slowflow. In practice, these subcomponents should not be identified directly as surface water and groundwater, as we do not know their exact origins. Historically the quickflow has been extensively analysed, as it plays the greater part in determining the hydrograph peak flows. The slowflow contribution has relegated to a secondary status, either ignored or treated as a near constant flow. There are now rainfall-runoff models available which include the contribution that this slowflow makes to the overall hydrograph. These models include the IHACRES model (combination of two linear reservoirs) and RIS model approach (two non-linear reservoirs), and there is now an opportunity of applying these sorts of model to examine both the quickflow and slowflow contributions to flooding.		
14	18/05/2019 13:37 PM ID: 117028508	Important but not [organisation names(s) removed] role		
15	19/05/2019 11:58 AM ID: 117068304	A very frequent comment I have heard from members of the public is that their local rivers are a lot "flashier" than they used to be. Is this "non-stationarity"? Can we investigate it and prove it either way? Also, antecedent conditions, both wet and dry. E.G. 2015 floods happened after a very long wet period. Are there degrees of "saturated" that are not accounted for in current techniques. Similarly after dry periods do we understand how soils wet up and affect run-off?		
16	23/05/2019 13:12 PM ID: 117486576	Also how developments in the urban area affect surface water flooding		
17	24/05/2019 12:44 PM ID: 117505743	Given additional impetus through need to assess benefits of NFM. Needs to be linked closely to model formulation studies.		
18	24/05/2019 13:52 PM ID: 117364703	very useful as long as it also feeds into FRM decision making and approaches, not just for pure hydrological science		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	7
1	30/04/2019 12:40 PM ID: 115261724	Quite a lot of challenges here. Uncertainty in the physical processes. How physical and ecological processes interact. Models that are fit for purpose. [Name removed to protect identity].		
2	01/05/2019 18:13 PM ID: 115431558	We don't know enough about what has already been done - it is patchy in terms of accessibility.		
3	03/05/2019 10:52 AM ID: 115580983	No one to lead on it even though this is essential.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
4	10/05/2019 12:52 PM ID: 115383239	Cost/sustainable funding commitments needed to deliver this. Quality of current data and data gathered from this to be able to assess/quantify impacts of the processes detailed in the statement above		
5	18/05/2019 22:02 PM ID: 116681882	Lack of funding for experimental catchments		
6	24/05/2019 12:44 PM ID: 117505743	No.		
7	25/05/2019 01:08 AM ID: 117458964	Major activity, beyond current [organisation names(s) removed] funding. Need major collaborative investment [organisation names(s) removed]. Potential to exploit existing data (and emerging datasets like NFM test catchments such as Morton-under-Wychwood). Needs to include suitable model development too.		
			answered	7
			skipped	118

44. Understanding the spatial, temporal and cumulative impacts of flood risk interventions

Research to help understand how the cumulative effects of small and large scale flood risk interventions impact on flood risk. This work could include examining the wider impacts of natural flood management measures at various spatial and temporal scales for different magnitude flood events.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.00%	0
2	2	5.79%	7
3	3	23.14%	28
4	4	49.59%	60
5	5	21.49%	26

Analysis							
	Mean:	3.87	Std. Deviation:	0.81	Satisfaction Rate:	71.69	
	Variance:	0.66	Std. Error:	0.07			

answered	121
skipped	4

Comments (optional): (10)

1	30/04/2019 10:34 AM ID: 115245631	Spatial issue is very important - please see comment re design storm on previous page
2	30/04/2019 12:40 PM ID: 115261724	This is very important and under-studied at present. We don't know what impact the NFM measures are having.
3	10/05/2019 12:52 PM ID: 115383239	Imperative to get definitive research/monitoring on this across range of catchments, for range of interventions to inform policy decisions across UK. Lack of consistent and rigorous evidence base at present for a lot of NFM interventions and consequent policy decisions.
4	14/05/2019 10:52 AM ID: 116548266	That should be part of the design
5	15/05/2019 12:27 PM ID: 116674043	The many constraints on deploying increasingly large single interventions to manage flood risk mean we have to move to 'package' approach which requires models to understand cumulative impacts across different spatial extents.
6	16/05/2019 16:14 PM ID: 116013085	This feels like it should be considered in the hydraulics rather than hydrology.
7	17/05/2019 14:13 PM ID: 116948761	Plenty of research already on this.
8	23/05/2019 16:48 PM ID: 117496746	Seems sensible.
9	24/05/2019 12:44 PM ID: 117505743	Local and larger scale impacts need to be established in a quantitative way. Need for model development and validation studies..
10	24/05/2019 13:52 PM ID: 117364703	Challenging but necessary to look at variation in types of flood (timing/rainfall patterns, direction of storm movement etc.), not just magnitude of events

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	5

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	03/05/2019 10:52 AM ID: 115580983	Very important before money is spent on natural flood risk management. If the difference is minimal to flood maps then we should not spend time doing it.		
2	10/05/2019 12:52 PM ID: 115383239	Availability of data both now and in future for the range of potentially complex and disparate interventions which fall under the definition of NFM		
3	17/05/2019 17:11 PM ID: 116970244	Skills, resources and methods.		
4	24/05/2019 12:44 PM ID: 117505743	Ongoing activity.		
5	25/05/2019 01:08 AM ID: 117458964	See comments under 43.		
			answered	5
			skipped	120

45. Improving characterisation of rainfall for flood hydrology

This work could include improving quantitative estimates from weather radar, spatial measurement of rainfall.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		0.00%	0
2	2		4.27%	5
3	3		16.24%	19
4	4		35.90%	42
5	5		43.59%	51

Analysis							
	Mean:	4.19	Std. Deviation:	0.86	Satisfaction Rate:	79.7	answered 117
	Variance:	0.73	Std. Error:	0.08			skipped 8

Comments (optional): (15)

1	30/04/2019 10:34 AM ID: 115245631	Same comment as above
2	30/04/2019 13:07 PM ID: 115265228	[organisation names(s) removed] are trying to get a better understanding of when there is a risk of slow moving or parked thunderstorms which can unleash high volumes of rainfall from towering Cumulonimbus clouds particularly on the edge of cold fronts. Current rainfall data is very localised
3	03/05/2019 10:52 AM ID: 115580983	Would be useful where no rain gauges are available.
4	03/05/2019 13:35 PM ID: 115608108	And rainfall forecasts from NWP - which will be needed for advanced lead time predictions!
5	10/05/2019 15:32 PM ID: 116268906	This is the most uncertain aspect in forecasting a river or surface water response - much more effort is needed in quantifying the uncertainty involved.
6	13/05/2019 13:37 PM ID: 116449651	It would be useful to have greater confidence in rainfall radar data, to have the spatial context too.
7	14/05/2019 17:22 PM ID: 116606375	Loads of work on this - sounds like [organisation names(s) removed] wanting more money for tweaking. Time to invest in other areas first.
8	17/05/2019 17:11 PM ID: 116970244	Not enough innovation/investigation in this area. We need much better spatially/topographically distributed information.
9	19/05/2019 07:17 AM ID: 117075485	It will change
10	22/05/2019 12:29 PM ID: 117376373	Storm durations and storm tracks (speed, direction) really important variables to add in for the multivariate mix going forward
11	23/05/2019 16:48 PM ID: 117496746	Vital to get the best possible precipitation inputs for flood hydrology.
12	23/05/2019 18:04 PM ID: 117519248	
13	24/05/2019 12:44 PM ID: 117505743	Merging of radar and raingauge rainfall has recently been investigated in a meteorological context, but not how it feeds through to flood hydrology. There is a small commission to [organisation names(s) removed] examining this right now, but limited to assessment of the current merged product which has shortcomings. Getting the spatial rainfall right is key to the quality of the flood forecast. There is scope to do more.

45. Improving characterisation of rainfall for flood hydrology

This work could include improving quantitative estimates from weather radar, spatial measurement of rainfall.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
14	25/05/2019 01:08 AM ID: 117458964	[organisation names(s) removed] and others continue to work on this. Some ongoing work with X-band under Hydro-JULES. Need to ensure hydrological model assessment is included (some being undertaken under SC150016).		
15	28/05/2019 21:37 PM ID: 117847148	The statement could be made broader so as not just to focus on radar (I'm thinking specifically here around the issue of orographic effects on rainfall and the limitations of radar). It's about improving observation and representation of temporal and spatial variation in rainfall for improved input into our hydrological models		

46. Improving characterisation of rainfall for flood hydrology

This work could include improving quantitative estimates from weather radar, spatial measurement of rainfall.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.92%	2
2	2	4.81%	5
3	3	16.35%	17
4	4	33.65%	35
5	5	43.27%	45

Analysis							answered	104
	Mean:	4.12	Std. Deviation:	0.97	Satisfaction Rate:	77.88	skipped	21
	Variance:	0.95	Std. Error:	0.1				

Comments (optional): (24)

1	30/04/2019 10:34 AM ID: 115245631	Duplication of Q 45?
2	30/04/2019 13:07 PM ID: 115265228	Same question as 45!
3	30/04/2019 14:28 PM ID: 115249000	This is a repeat of Question 45!!!
4	03/05/2019 13:35 PM ID: 115608108	Same as Q 45!
5	07/05/2019 11:58 AM ID: 115871782	This is a repeat of the previous question
6	08/05/2019 09:46 AM ID: 115999807	Note Q45 and Q46 are the same (not response to question)
7	08/05/2019 17:58 PM ID: 116061289	Double up from above
8	08/05/2019 20:56 PM ID: 115775975	Repeat
9	10/05/2019 12:52 PM ID: 115383239	Critical for flood forecasting especially for how it impacts (could improve) quality of short term forecasts (nowcasts) based on observational data
10	14/05/2019 13:08 PM ID: 116573674	Repeat question!
11	16/05/2019 17:21 PM ID: 116851056	This is a repeat of 45
12	17/05/2019 16:45 PM ID: 116772689	An [organisation names(s) removed] project on improving surface water flood forecasts has found that engaging early and continuously with operational users on data and modelling is critical. [organisation names(s) removed] has found that more information is not necessarily welcome without careful consideration of the various decision making contexts.
13	18/05/2019 10:57 AM ID: 117023552	Repeat of previous paragraph
14	18/05/2019 17:03 PM ID: 115187747	Presumably put in to see if I'm still awake.
15	19/05/2019 20:35 PM ID: 116800339	As 45

46. Improving characterisation of rainfall for flood hydrology

This work could include improving quantitative estimates from weather radar, spatial measurement of rainfall.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
16	19/05/2019 21:22 PM ID: 115953502	Looks like #45		
17	21/05/2019 13:45 PM ID: 117286332	This is a huge issue for forecasting, especially in mountainous areas where radar struggles with the orographic impacts. In Wales our underlying forecasting models are generally very accurate when run with rainfall inputs from raingauges, but are very poor when run with Nowcast products (e.g. radar propagated and blended with NWP data). I think that improving rainfall estimates would be the single biggest factor in improving fluvial forecasts in hilly areas (at least in Wales anyway!)		
18	22/05/2019 07:17 AM ID: 117351653	This should be closely integrated with the process understanding (q.43). I would call for a much closer integration between flood hydrology and flood meteorology. Separation of these communities may well be an impediment to making real progress.		
19	22/05/2019 12:29 PM ID: 117376373	Repeated		
20	23/05/2019 16:48 PM ID: 117496746	Vital to get the best possible precipitation inputs for flood hydrology.		
21	24/05/2019 12:44 PM ID: 117505743	Merging of radar and raingauge rainfall has recently been investigated in a meteorological context, but not how it feeds through to flood hydrology. There is a small commission to [organisation names(s) removed] examining this right now, but limited to assessment of the current merged product which has shortcomings. Getting the spatial rainfall right is key to the quality of the flood forecast. There is scope to do more.		
22	25/05/2019 01:08 AM ID: 117458964	See 45 above		
23	28/05/2019 10:24 AM ID: 117779189	Repeated question		
24	28/05/2019 21:37 PM ID: 117847148	Same question as 45? Please see my comment for 45.		

Are there any technical barriers to this happening now? (optional)

			Response Percent	Response Total
1	Open-Ended Question		100.00%	2
1	10/05/2019 12:52 PM ID: 115383239	Quality of current radar network - still some significant gaps in UK radar network, Also outcome of current trial of Cumbrian X band radar - what role do new/cheaper/more flexible radars have alongside current established C band UK radar network		
2	24/05/2019 12:44 PM ID: 117505743	No.		
			answered	2
			skipped	123

47. Development of flood estimation science

Research to drive the development of new methods flood estimation in a changing world. This could include the development of new physics based, conceptual and/or statistical models applicable from the site scale to the catchment scale.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	1.68%	2
2	2	1.68%	2
3	3	22.69%	27
4	4	38.66%	46
5	5	35.29%	42

Analysis							
	Mean:	4.04	Std. Deviation:	0.89	Satisfaction Rate:	76.05	answered 119
	Variance:	0.8	Std. Error:	0.08			skipped 6

Comments (optional): (13)

1	30/04/2019 10:34 AM ID: 115245631	Commented on data page - important to use meteorological research for PMP
2	30/04/2019 12:40 PM ID: 115261724	Absolutely critical. Some of the greatest impacts from recent major floods happened because of physical changes but existing models ignore these factors.
3	30/04/2019 13:07 PM ID: 115265228	This seems to have been covered by earlier questions
4	14/05/2019 10:52 AM ID: 116548266	Higher priority is implementing into the software and using more data.
5	15/05/2019 12:27 PM ID: 116674043	Priority and assumed to be part of previously flagged priorities for hydrology in a changing world. Also links to managing /accounting for uncertainty where more probabilistic approaches ad outputs could be developed/used
6	15/05/2019 14:46 PM ID: 116697459	This needs to be transferable and applicable for practitioners
7	18/05/2019 18:55 PM ID: 117057658	I think how to tailor models to each location is equally critical
8	19/05/2019 07:17 AM ID: 117075485	Separate statistical from physical estimates
9	19/05/2019 13:30 PM ID: 116804060	It's hard to provide a firm score on this because new may or may not be better
10	19/05/2019 14:19 PM ID: 117082368	Memory-based models of rainfall-streamflow transformation may be worth development and pilot testing
11	19/05/2019 20:35 PM ID: 116800339	Why mention these specific examples?
12	22/05/2019 12:29 PM ID: 117376373	Essential especially given where we are with data and the fact we are unlikely to ever have enough data for existing methods and variations of
13	24/05/2019 12:44 PM ID: 117505743	Continuous simulation approach well fitted for this task combined with latest climate model high res ensemble outputs.

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	6

1	30/04/2019 09:38 AM ID: 115241585	There's loads already. It will never be accurate as catchments are bespoke.
2	03/05/2019 10:52 AM ID: 115580983	No competition to develop new methods. The industry is not big enough for this and not enough people with the required skill.
3	10/05/2019 12:52 PM ID: 115383239	Do we have enough data to be able to do this i.e. do we properly understand what the changing world is in terms of hydrological processes to be able to develop robust models to quantify this for estimation?
4	19/05/2019 14:19 PM ID: 117082368	Sometimes end users can limit their capacity to adopt different conceptual modelling approaches having become used to a particular way of undertaking flood estimation
5	24/05/2019 12:44 PM ID: 117505743	No
6	28/05/2019 21:37 PM ID: 117847148	Data limitations

answered	6
skipped	119

48. Improving hydrological modelling for flood forecasting

Research to drive the development of improved methods flood forecasting in a changing world. To include developments in data assimilation.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

			Response Percent	Response Total
1	1		0.85%	1
2	2		5.13%	6
3	3		23.93%	28
4	4		39.32%	46
5	5		30.77%	36

Analysis							answered	117
	Mean:	3.94	Std. Deviation:	0.91	Satisfaction Rate:	73.5	skipped	8
	Variance:	0.83	Std. Error:	0.08				

Comments (optional): (12)

1	30/04/2019 13:07 PM ID: 115265228	There seems to be a lot going on already
2	03/05/2019 13:35 PM ID: 115608108	Data assimilation developments are key to improving forecasts!
3	10/05/2019 12:52 PM ID: 115383239	Hydrological methods are not the major constraint in flood forecasting - it's the quality of rainfall forecasts and also how we quantify all the sources of uncertainty in an understandable way, in real time, for real time decision makers (who may not be expert hydrologists) The one priority area within hydrological modelling might be real time updating where some current techniques e.g. ARMA still face challenges and issues of reliability in real time use
4	15/05/2019 22:53 PM ID: 116749371	Particularly for surface water and groundwater
5	16/05/2019 11:10 AM ID: 116793030	Linked to the above. Good models/stats methods already exist. We need better process understanding to improve the way we use them
6	17/05/2019 16:45 PM ID: 116772689	[organisation names(s) removed] project on improving surface water flood forecasts has found that engaging early and continuously with operational users on data and modelling is critical. [organisation names(s) removed] has found that more information is not necessarily welcome without careful consideration of the various decision making contexts.
7	19/05/2019 13:30 PM ID: 116804060	This is a step in the right direction. Using as much data as possible to derive probabilities of threshold exceedance with margins of error is very achievable and beneficial now
8	19/05/2019 14:19 PM ID: 117082368	Opportunity to integrate radar and point rainfall data in the development of improved modelling
9	23/05/2019 13:12 PM ID: 117486576	Should be explicit that this is flood forecasting at all scales for all sources. I would also like to see integrated flood forecasting for fluvial, pluvial and coastal flooding
10	23/05/2019 16:48 PM ID: 117496746	To assess impacts of climate change, modelling is vital.
11	24/05/2019 12:44 PM ID: 117505743	This can bring immediate operational benefits. The changing world element of this is less important, other than the threat of flooding is of greater magnitude and frequency. The nature of the flood response process should be similar (given limited land use change). There are opportunities for revisiting data assimilation of flow, soil moisture, snow water equivalent, and groundwater level.
12	28/05/2019 21:37 PM ID: 117847148	Needs to include improved use of hydrological ensembles (not just rainfall ensembles)

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	4

1	30/04/2019 13:07 PM ID: 115265228	Too many flood models and different companies promoting them need to settle on a small number of promoted models
2	10/05/2019 12:52 PM ID: 115383239	Meteorological rainfall forecasting and nowcasting capabilities.
3	19/05/2019 13:30 PM ID: 116804060	[organisation names(s) removed] "consistency" drive, stifles forecasting innovation. Consistency is better for the outcome not the process (such as forecasting)
4	24/05/2019 12:44 PM ID: 117505743	No

answered	4
skipped	121

49. Improve evidence for long-term drivers of hydrological variability and change

Research to understand drivers of hydrological variability and change. To include development of methods for the analysis of non-stationarity.

Score 5 to tell us this is of the highest priority, down to 1 for the lowest priority

		Response Percent	Response Total
1	1	0.88%	1
2	2	11.40%	13
3	3	29.82%	34
4	4	31.58%	36
5	5	26.32%	30

Analysis							answered	114
	Mean:	3.71	Std. Deviation:	1.01	Satisfaction Rate:	67.76	skipped	11
	Variance:	1.01	Std. Error:	0.09				

Comments (optional): (7)

1	10/05/2019 12:52 PM ID: 115383239	Is this a significant duplication of scientific work on climate change and its impacts?
2	15/05/2019 14:46 PM ID: 116697459	This needs to be transferable and applicable for practitioners
3	17/05/2019 14:13 PM ID: 116948761	Methods for analysis of non-stationarity already in use and being further developed. But more would be useful on drives of change.
4	17/05/2019 17:26 PM ID: 116973448	I think a key aspect of this is to quantify the impacts of different drivers to rank them by relative importance
5	18/05/2019 18:55 PM ID: 117057658	Maybe much more research than practical question?
6	24/05/2019 12:44 PM ID: 117505743	Ongoing work in this area as new climate change assessments become available.
7	28/05/2019 21:37 PM ID: 117847148	I wasn't sure what this question was driving at. I've put it as a high priority as we need methods for analysing/dealing with non-stationary ASAP. Understanding the meteorological and anthropogenic drivers for hydrological variability is important and may be a required stage in developing techniques for non-stationarity, it is perhaps not quite as urgent from an application perspective.

Are there any technical barriers to this happening now? (optional)

		Response Percent	Response Total
1	Open-Ended Question	100.00%	1

1	24/05/2019 12:44 PM ID: 117505743	As new climate change assessments become available.

answered	1	
skipped	124	

50. Do you think there are any other key work areas related to scientific understanding in flood hydrology? Please tells us in the box below:

		Response Percent	Response Total
1	Open-Ended Question	100.00%	14

1	30/04/2019 11:47 AM ID: 115259106	Small catchments - plot scale
2	30/04/2019 13:07 PM ID: 115265228	No
3	08/05/2019 17:58 PM ID: 116061289	There was specific mention of all sources of flood risk. If so then burst water mains should get covered.
4	08/05/2019 20:56 PM ID: 115775975	interaction of subsurface infrastructure and pluvial and groundwater flooding
5	10/05/2019 12:52 PM ID: 115383239	No
6	15/05/2019 11:04 AM ID: 116661131	Joining up flood estimation 'at gauging stations' and 'near gauging stations', currently different statistical methods are preferred (Enhanced Single Site and Pooled) and these can give step changes in flow estimates. Gaps in methods such as these, need to be filled before more ambitious tasks and new methods are undertaken.
7	16/05/2019 11:27 AM ID: 116788544	Increasing the hydrological knowledge across the general public and better communication of science via media outlets. Additionally, it would be worth increasing the hydrological knowledge within Met services vice-versa; increasing meteorological knowledge within hydrological services. Enabling better exchange of information/knowledge using [organisation names(s) removed].
8	18/05/2019 13:37 PM ID: 117028508	Lots, but they are what the research and academic community are working on. [organisation names(s) removed] ought more properly to deploy public funds to the uptake of such research into practice (which itself is a valid yet costly research endeavour), and on operationalising those components of flood science needed to fulfil its regulatory remit.
9	18/05/2019 17:03 PM ID: 115187747	A particular issue is in pluvial flooding - improving our ability to estimate surface runoff from rural surfaces for return period runs.
10	19/05/2019 07:17 AM ID: 117075485	Need different levels of models
11	19/05/2019 20:35 PM ID: 116800339	Plot-scale flood hydrology Rainfall-runoff models in design mode tend to fit annual floods (mostly winter) using annual rainfalls (mostly summer). Soil moisture (& its seasonal changes) is important. Not much about soil moisture in this questionnaire! See [removed to protect the identity of individual(s)]
12	23/05/2019 16:48 PM ID: 117496746	Geo-political drivers as well as economics need to be considered.
13	23/05/2019 18:04 PM ID: 117519248	The above topics seem strongly inter-linked.
14	24/05/2019 12:44 PM ID: 117505743	There are many more detailed aspects, but they are broadly embraced by the above work areas. It is not appropriate to go into detail through this form.

answered	14
skipped	111

51. Do you have any final thoughts or ideas you'd like to share with us?

		Response Percent	Response Total
1	Open-Ended Question	100.00%	46

1	29/04/2019 16:20 PM ID: 115181559	This questionnaire was a bit long.
2	29/04/2019 16:23 PM ID: 115180583	Thanks for organising this survey. I think the key thing is to: 1) Have a single source of reference for guidance documents on hydrological methods 2) Have a point of contact for discussion and to make recommendations on changes I attended the Reservoir Flood Estimation meeting earlier this year. That subject is a good example of where things need to be improved: - we currently have a patchwork quilt of methods to cover the range of flood magnitudes required (different method needed for different magnitudes) - some of the methods date from the 1970s relying on assumptions that were meant to be temporary - there is no clear guidance on how the methods should be implemented leading to variations in interpretation - software has been developed by people who do not understand practitioners needs (e.g. the commercially available release of [method removed to protect organisation(s) identity] not allowing estimation of the 10,000-year flood despite the team behind the method thinking it is better to use [method removed to protect organisation(s) identity] for the 10,000-year flood than the [method removed to protect organisation(s) identity] rainfall-runoff model) - there doesn't appear to be any plan to sort this out
3	29/04/2019 16:31 PM ID: 115182364	Survey is far too long.
4	30/04/2019 12:40 PM ID: 115261724	Your ideas and vision are good and welcomed. [organisation names(s) removed] would be happy to help and discuss further.
5	30/04/2019 13:07 PM ID: 115265228	Not really hope answers of some use
6	30/04/2019 19:22 PM ID: 115320893	The survey mentions the impacts of geomorphic change (i.e. shifts in river channel conveyance/ sediment in channels) on flood characteristics in passing. I would suggest getting some input from hydro-geomorphologists, [organisation names(s) removed].
7	01/05/2019 20:32 PM ID: 115443184	Previous research and applications have focused on river flooding but surface water flooding is (and has been historically) as important in damage and economic losses. There needs to be a shift in emphasis both with respect to estimation of risk and forecasting.
8	02/05/2019 12:41 PM ID: 115501839	None to add
9	02/05/2019 14:48 PM ID: 115198816	Nice survey. Thank you.
10	03/05/2019 09:57 AM ID: 115578165	I think that the general principles are great, however I think that there is a fundamental lack of appreciation of the amount of work that would be involved in delivering the objectives. One of the key challenges I see is that experience is very much undervalued and experts are encouraged to move around to progress their careers instead of being able to develop in role. Funding is a major challenge that is at the heart of much of the challenge, and until the work done by people is accurately valued it will always be seen as a cost and not an asset. Innovation could really drive forward the changes, but people are often blocked, (sometimes only because they can't face the bureaucracy), from innovating.
11	07/05/2019 11:58 AM ID: 115871782	It's great to have a roadmap. It is clearly at a detailed stage!

51. Do you have any final thoughts or ideas you'd like to share with us?

			Response Percent	Response Total
		[organisation names(s) removed]. With lots of experience in developing forecasting models. I was interested in that aspect of the roadmap. My hydrological skill is mid-range but my experience in FRA reviews, and the above forecasting work, will be of most use to you.		
12	08/05/2019 17:58 PM ID: 116061289	Huge undertaking. Good to see but I suggest this is broken down into more manageable pieces. Let's start with open source rainfall and runoff.		
13	08/05/2019 20:56 PM ID: 115775975	There was very little emphasis on pluvial flooding or the capacity of organisations to undertake the work		
14	10/05/2019 12:52 PM ID: 115383239	Only the need to take a UK perspective on this and also make international links, its critical this work is done with a wider perspective as floods do not respect political borders and we need methods which can be applied consistently across the UK and where needed in studies for river catchments which cross national borders.		
15	13/05/2019 15:07 PM ID: 116463005	I like the direction this is going in, and the survey has been useful. Looking forward to seeing the results.		
16	14/05/2019 17:22 PM ID: 116606375	There is much in here that is interesting and exciting but without a definition of flood hydrology and what it means / covers it comes across as parochial. I think you need to reflect on this before progressing as it looks like you got loads of experts on flood hydrology who know what they mean but rather than facing outwards they all faced inwards and forgot to communicate their science and societal importance to a wider community. State clearly what flood hydrology is, why it is important and how it crosses disciplines to deliver what outputs for societal benefit. Flooding (and other flows) are genuinely essential but this does not come across in this survey. Hope this helps - critical friend rather than winging nutter.		
17	15/05/2019 11:04 AM ID: 116661131	Underfunding of data collection and processing is a big issue, any way that this can be highlighted, and hopefully addressed with [organisation names(s) removed]. with have a major benefit to flood hydrology.		
18	15/05/2019 12:27 PM ID: 116674043	The four themes make for a strong headline but they omit a focus on customers. As a customer, I was relieved to see that in the detail numerous customer focus items are included i.e. the needs of decision-makers. Could you have a fifth customer focus theme or perhaps an obvious overarching to ensure hydrology meets the future needs of its customers.		
19	15/05/2019 14:46 PM ID: 116697459	Greater representation from practitioners who have to interpret and apply the scientific developments. Competitors to both innovate but also work collaborative to provide the best solutions for the end user.		
20	15/05/2019 22:53 PM ID: 116749371	Really like the vision statements and areas of potential research. Pleased also to see it is for all sources of flooding. The technical barriers will be greater for surface water / groundwater / reservoir - will the framework help tackle those technical barriers so they don't prevent the vision being met for all sources?		
21	16/05/2019 10:51 AM ID: 116792107	Embrace uncertainty and provide it in simple ways so that non-hydrologists can make better decisions. Be wary of over-automation of hydrology which hides uncertainties.		
22	16/05/2019 11:10 AM ID: 116793030	Understanding floods and droughts together. They are often intrinsically linked. Too much time is spent focusing on just one extreme tail.		
23	16/05/2019 11:27 AM ID: 116788544	It was very worthwhile having this survey. Would have made sense to have undertaken this survey about 5 years ago. A lot of the things that I suggested for the draft vision were mentioned in the subsequent questions. The majority of the ideas listed are high priority in my		

51. Do you have any final thoughts or ideas you'd like to share with us?

			Response Percent	Response Total
		opinion. Where possible, I've tried to distinguish between really high priority topics and slightly less priority topics.		
24	16/05/2019 12:37 PM ID: 116804203	I really support this approach to developing a plan for flood hydrology development for the future and I hope it attracts the required funding and can maintain impetus to deliver over the long term		
25	16/05/2019 16:14 PM ID: 116013085	Good luck! This has the chance to become a landmark change in the way we deliver hydrology in the UK and beyond. Also, let's encourage [organisation names(s) removed] to remove the differentiation between hydrometry and hydrology staff. They are all hydrologists!		
26	17/05/2019 09:59 AM ID: 116899457	The need to improve our flood forecasting is apparent across the industry. Those investing public funds for flood resilience would benefit from better hydrology so this project is to be encouraged.		
27	17/05/2019 16:45 PM ID: 116772689	There is quite a lot of repetition in work areas across the Roadmap with work areas that could usefully be integrated.		
28	17/05/2019 17:11 PM ID: 116970244	Climate change is going to make this work more and more important. A critical part of this is improving measurement science and capability (resource). At time of writing, ever decreasing funding seems to be making this harder, not easier. Yes, I am doing stuff, but I am teetering on a knife doing so. It is not supported or funded beyond my passion and motivation and 15% of my time. 15% of one person's time to work on flood measurement methods...! Global collaboration vital. Recognition of shared benefit critical.		
29	17/05/2019 17:26 PM ID: 116973448	I think I gave a 4/5 to all suggestions: this is probably no very useful but just indicates that I don't really know what is the most important starting point for this vision to develop and become real. I believe though the most important thing would probably be to make sure that any advancement in any of the suggested areas should be reported back to the whole community so that a more integrated approach can be adopted.		
30	18/05/2019 13:37 PM ID: 117028508	Interesting survey. A little broad in its scope though and covers quite a lot of areas that are already well provided for by other organisations. It is going to be important to define the scope and remit of the programme so that it is directed at the areas of science and technology where the greatest value for money can be had.		
31	18/05/2019 17:03 PM ID: 115187747	A very long set of questions, and I found that some of the issues in questions I had already dealt with in an earlier response. Therefore my later responses I put less into - therefore there is likely to be a bias towards the earlier questions. Also it’s difficult to distinguish between what I need now and what I think flood hydrology should be aiming at in the longer term.		
32	18/05/2019 18:55 PM ID: 117057658	Very exercise. Maybe the form is a bit long. Fortunately the FA cup final was boring!		
33	19/05/2019 07:17 AM ID: 117075485	How to retain the best scientists. I feet technology is emigrating.		
34	19/05/2019 11:58 AM ID: 117068304	From my experience of working at [organisation names(s) removed] we are not getting the best out of what we have now and unless this is addressed it will remain a hindrance to the vision. [organisation names(s) removed] rely on hydrometry and topographic survey both of which are external to [organisation names(s) removed]. [organisation names(s) removed] are under similar pressures to the rest of us: to do more for less and they need a strong steer to get the best for us, otherwise they will just do the minimum that is acceptable. But we need more. They need to be guided in order to give us what we want, but it is not just a case of "nagging" them, it is also to make them appreciate how much we value their work		

51. Do you have any final thoughts or ideas you'd like to share with us?

			Response Percent	Response Total
		and what it provides us. Examples where we are failing from my experience are: High flow gauging – we miss opportunities. Working hours are relatively few (22%, 37hrs out of 168 per week, and this does not account for holidays and other absences). What are the chances of being able to gauge high flows in working hours (especially in the more rapidly responding catchments). But we still miss a lot of these opportunities. So we need to help [organisation names(s) removed] to help us. How? By forecasting for sites we want gauging, getting more staff available to assist them in and out of hours, encouraging them to go out in horrible weather (safety permitting) by helping them to understand the value of their data. I have tried to do these things but it is without any formal structure or management backing and the current message is that we do not have the resources to do it: it doesn't directly contribute to [organisation names(s) removed]. So I have had to stop. We struggle to get gaugings at existing flow sites but we need gaugings at sites that are not considered as flow sites by [organisation names(s) removed]. I am thinking of anything used in a PDM forecasting model, and that is a vast number of additional sites. We want to make evidence based decisions but without the resources being directed to these issues we will never be in the satisfactory position of being able to say we have obtained and used the best evidence that was available.		
35	19/05/2019 13:30 PM ID: 116804060	It is really good to see a concerted effort/push to improve flood hydrology over the coming years- including a wide FRM community to do so. Sad to see so much management waffle in the visions; it hopefully won't hamper progress - more concise visions would certainly help when defining the next step. The first step should, of course, be a review of current uncertainty in the current methods (including uncertainty in the quantification of uncertainty). We will then have a baseline against which we can set standards for our vision.		
36	19/05/2019 20:35 PM ID: 116800339	Catchment-scale joint hydrological and hydraulic (+ floodplain) models: Many have been built. Calibration across the catchment can be difficult. Intermediate catchments are a source of uncertainty. The links between the flood hydrology & flood hydraulics are poorly understood. We need better understanding of how direct rainfall can be applied (this is an urgent need, not one for the long time scales of the RoadMap. I am concerned that addressing real urgent needs will be delayed whilst people spend years refining the Road Map. (E.g. extreme events (where I don't think our present methods are adequate), catchment-wide modelling integrated with hydraulic models).		
37	19/05/2019 21:22 PM ID: 115953502	I applaud the efforts of those that seek to establish a Road Map and some kind of strategy for flood hydrological research. I have tried to engage with this questionnaire but it has been difficult. It is not well structured and the invitation to comment on various lengthy statements was difficult to engage with. It was suggested that the questionnaire should take around 30 minutes to complete. I have so far spent 3 h on it and have rushed certain sections - apologies for that and for any inconsistency in my responses. It would have been helpful to have a print option so that I could have reviewed my own responses. Further, I do not wish to be negative in the face of such endeavour, but I am rather dismayed at the direction of travel. It seems to be leading to a committee approach to develop a strategy. That generally leads to a lot of talking and doesn't always produce a coherent strategy. The other problem that I have is that the big issues are leaping off the page to me. Top of the list is the stationarity assumption that has underpinned our frequency analysis for decades and can no longer be supported. Where do we go with flood frequency analysis and, of course, we need to get on top of this very soon. I have outlined my other big issues in this response. OK, they are my big issues - but I doubt I am alone.		

51. Do you have any final thoughts or ideas you'd like to share with us?

			Response Percent	Response Total
		Rather than more talking about the technical issues, I think the discussion needs to be about the mechanics of the research. Who does it, who funds it. I have suggested in my responses that we used to have a suitable vehicle for this. Now I am not suggesting that we reinvent [organisation names(s) removed] - it did have some problems. However, we can learn from the past and build something that delivers in the way the [organisation names(s) removed] was able to do over many years. So, apologies if this is a bit negative and that I may be late to the party. I am happy to make a contribution to the strategy if that would be useful.		
38	19/05/2019 23:56 PM ID: 117116149	Ran out of time. Not prepared to miss the deadline		
39	20/05/2019 09:27 AM ID: 117133175	Sounds great. We need this.		
40	23/05/2019 13:12 PM ID: 117486576	I think this is a really good initiative and you have done well to get to this point of having a vision laid out however this survey was very long and included lots of very detailed questions. Is there a risk that the roadmap will become too detailed and therefore have less impact than if it had a clear/simple structure? For example in the quest to include everyone's priorities in the vision statements they have become very long and hard to read. As well as being useful for hydrologists I think the roadmap should also be accessible to other disciplines so they can clearly see where hydrology is heading and identify how skills from within their own discipline could be integrated into hydrology - to do this the language in the road map would need to be accessible to all. Hydrology in this survey is still largely seen as catchment based - since most of the population live in towns/cities we need to have more focus on urban hydrology over the next 25 years.		
41	23/05/2019 16:48 PM ID: 117496746	Glad to be able to contribute but this took me a lot longer than 30 mins!		
42	24/05/2019 12:44 PM ID: 117505743	This survey form could be much improved, especially as the information requested requires careful thought. The small boxes and partial visibility of inserted text is not conducive to careful thought and entry. A form that can be seen in its entirety from the outset, and possibly filled in offline, would be better.		
43	24/05/2019 13:52 PM ID: 117364703	I think it's really important that we draw together the work on characterising floods, and updating flood estimates, such that we are always thinking in terms of giving an updated estimate to a given flood/standard of service/water level rather than just having to re-estimate what a 1 in x flood will be like.		
44	25/05/2019 01:08 AM ID: 117458964	It is commendable that [organisation names(s) removed] are wanting to consult widely on this strategy. A general comment is that this is a very long survey. Combined with the initial institutional questionnaire and roadmap workshop, this is requiring a considerable amount of voluntary time from the community which can present challenges for some contributors. It may be useful to group the responses by sector as these may have different priorities.		
45	30/05/2019 15:31 PM ID: 118027569	Make the hydrometric data and the existing studies freely accessible online		
46	03/06/2019 09:19 AM ID: 118277211	I think the two key themes that stick out in my mind are the need to quantify and communicate uncertainty to inform decisions; and, making data and methods openly accessible and available, which will encourage the uptake of new methods or approaches across all levels of the industry.		
			answered	46
			skipped	79

14. Finally, tell us a little about you

52. Where do you work?

		Response Percent	Response Total
1	England	80.80%	101
2	Wales	17.60%	22
3	Scotland	9.60%	12
4	Northern Ireland	1.60%	2
5	Other (please specify):	6.40%	8

Analysis							
	Mean:	1.83	Std. Deviation:	1.19	Satisfaction Rate:	16.8	answered 125
	Variance:	1.41	Std. Error:	0.11			skipped 0

Other (please specify): (8)

1	30/04/2019 10:34 AM ID: 115245631	Work across UK and internationally, located in England
2	05/05/2019 14:32 PM ID: 115774323	Internationally (now), previously England
3	16/05/2019 11:27 AM ID: 116788544	Republic of Ireland
4	17/05/2019 17:26 PM ID: 116973448	Italy
5	18/05/2019 10:57 AM ID: 117023552	Also overseas, mainly South Asia and East & Central Africa
6	19/05/2019 07:17 AM ID: 117075485	Africa,
7	19/05/2019 14:33 PM ID: 117093851	Research Centre with sites in England, Wales and Scotland
8	22/05/2019 07:17 AM ID: 117351653	International

53. Please let us know which type of employer you work for or where your interest in flood hydrology comes from?

		Response Percent	Response Total
1	Voluntary sector or flood group	0.00%	0
2	Public body - Environment Agency	27.20%	34
3	Public body - Natural Resources Wales	7.20%	9
4	Public body - Scottish Environment Protection Agency	0.80%	1
5	Public body - Northern Ireland Rivers Agency	0.00%	0
6	Public body - Local Government	0.80%	1
7	Public body - UK wide	2.40%	3

53. Please let us know which type of employer you work for or where your interest in flood hydrology comes from?

			Response Percent	Response Total
8	NGO/3rd sector organisation		1.60%	2
9	Private industry - Water Company		2.40%	3
10	Private industry - Consultancy		36.00%	45
11	Insurance industry		0.00%	0
12	Academia - University		10.40%	13
13	Academia - Research institute		9.60%	12
14	Concerned individual		1.60%	2
15	Other (please specify):		4.80%	6

Analysis								
	Mean:	8.39	Std. Deviation:	4.52	Satisfaction Rate:	52.46	answered	125
	Variance:	20.39	Std. Error:	0.4			skipped	0

Other (please specify): (6)

1	02/05/2019 12:26 PM ID: 115501184	Charity
2	08/05/2019 17:58 PM ID: 116061289	[organisation names(s) removed]
3	14/05/2019 10:52 AM ID: 116548266	[organisation names(s) removed]
4	16/05/2019 11:27 AM ID: 116788544	[organisation names(s) removed]
5	18/05/2019 10:57 AM ID: 117023552	Lifelong interest in rainfall-runoff models, both continuous flow data and event-based, starting in 1967 at [organisation names(s) removed]
6	19/05/2019 23:56 PM ID: 117116149	Semi-retired self-employed sole-trader

54. This Flood Hydrology Road Map is being created for all of us to use to work together. Making changes in flood hydrology will require many people working together. You have already contributed by filling in this survey. Please let us know what more you think you or your organisation could contribute towards this?

			Response Percent	Response Total
1	I'd like to see the outputs		82.57%	90
2	I'd be keen to attend future workshops		54.13%	59
3	|'d be keen to help peer review the draft roadmap		38.53%	42
4	I'd be keen to be actively involved in the delivery of the roadmap work areas		40.37%	44
5	Other (please specify):		11.93%	13

Analysis	Mean:	5.28	Std. Deviation:	4.85	Satisfaction Rate:	75	answered	109
	Variance:	23.56	Std. Error:	0.46			skipped	16

Other (please specify): (13)

1	29/04/2019 20:22 PM ID: 115206676	Subject to funding
2	30/04/2019 12:40 PM ID: 115261724	Would like to work in partnership on projects or tasks of common interest
3	30/04/2019 13:07 PM ID: 115265228	We manage 270 ha of land and can bring an agricultural, forestry and land management perspective plus we set up one of the [organisation names(s) removed] NFM research projects called Farm the Flow and manage a Citizen Science Project called Learning about Lydebrook where will be carrying out soil science with Universities in relation to flooding
4	02/05/2019 12:41 PM ID: 115501839	I'd rely on my specialist colleagues being kept informed
5	07/05/2019 11:58 AM ID: 115871782	The questions you are asking have given me confidence in what you are doing. I don't want to be involved in any of the above.
6	08/05/2019 17:58 PM ID: 116061289	[organisation names(s) removed] would appreciate involvement
7	15/05/2019 12:27 PM ID: 116674043	Keen to be involved but time limited and focused on matters relating to decision-making in an uncertain world
8	16/05/2019 16:54 PM ID: 116849290	Interested in project
9	17/05/2019 16:45 PM ID: 116772689	Nominate [removed to protect the identity of individual(s)], [organisation names(s) removed] to be a member of the scientific advisory group.
10	17/05/2019 17:11 PM ID: 116970244	I'd like to lead on measurement aspects!
11	18/05/2019 17:03 PM ID: 115187747	Yes to all, but not in my free time
12	19/05/2019 07:17 AM ID: 117075485	How do you decide who should be involved
13	24/05/2019 13:52 PM ID: 117364703	I'm not a hydrologist so my input is limited :) but keen to help understand 'what will help us make better decisions'

If you'd like to be more involved, please tell us your email address. This will only be used by the project team to contact you about the flood hydrology roadmap - totally optional.

		Response Percent	Response Total
1	Open-Ended Question	100.00%	64

1	29/04/2019 16:06 PM ID: 115180310	[removed to protect the identity of individual(s)]
2	29/04/2019 16:23 PM ID: 115180583	[removed to protect the identity of individual(s)]
3	29/04/2019 16:29 PM ID: 115183952	[removed to protect the identity of individual(s)]
4	29/04/2019 16:30 PM ID: 115181878	[removed to protect the identity of individual(s)]
5	29/04/2019 16:44 PM ID: 115183749	[removed to protect the identity of individual(s)]
6	29/04/2019 19:23 PM ID: 115203101	[removed to protect the identity of individual(s)]
7	29/04/2019 20:22 PM ID: 115206676	[removed to protect the identity of individual(s)]
8	30/04/2019 10:09 AM ID: 115246309	[removed to protect the identity of individual(s)]
9	30/04/2019 10:34 AM ID: 115245631	[removed to protect the identity of individual(s)]
10	30/04/2019 11:05 AM ID: 115248873	[removed to protect the identity of individual(s)]
11	30/04/2019 11:47 AM ID: 115259106	[removed to protect the identity of individual(s)]
12	30/04/2019 12:40 PM ID: 115261724	[removed to protect the identity of individual(s)]
13	30/04/2019 13:07 PM ID: 115265228	[removed to protect the identity of individual(s)]
14	30/04/2019 19:22 PM ID: 115320893	[removed to protect the identity of individual(s)]
15	01/05/2019 18:13 PM ID: 115431558	[removed to protect the identity of individual(s)]
16	02/05/2019 09:35 AM ID: 115471184	[removed to protect the identity of individual(s)]
17	02/05/2019 11:18 AM ID: 115488168	[removed to protect the identity of individual(s)]
18	02/05/2019 12:26 PM ID: 115501184	[removed to protect the identity of individual(s)]
19	02/05/2019 14:48 PM ID: 115198816	[removed to protect the identity of individual(s)]
20	05/05/2019 14:32 PM ID: 115774323	[removed to protect the identity of individual(s)]
21	08/05/2019 09:46 AM ID: 115999807	[removed to protect the identity of individual(s)]
22	08/05/2019 16:34 PM ID: 116056900	[removed to protect the identity of individual(s)]

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			Response Percent	Response Total
23	08/05/2019 20:56 PM ID: 115775975	[removed to protect the identity of individual(s)]		
24	09/05/2019 09:29 AM ID: 115194390	[removed to protect the identity of individual(s)]		
25	10/05/2019 12:52 PM ID: 115383239	[removed to protect the identity of individual(s)]		
26	13/05/2019 10:48 AM ID: 116422927	[removed to protect the identity of individual(s)]		
27	13/05/2019 13:37 PM ID: 116449651	[removed to protect the identity of individual(s)]		
28	13/05/2019 15:07 PM ID: 116463005	[removed to protect the identity of individual(s)]		
29	14/05/2019 13:08 PM ID: 116573674	[removed to protect the identity of individual(s)]		
30	15/05/2019 14:46 PM ID: 116697459	[removed to protect the identity of individual(s)]		
31	15/05/2019 22:53 PM ID: 116749371	[removed to protect the identity of individual(s)]		
32	16/05/2019 10:27 AM ID: 116787849	[removed to protect the identity of individual(s)]		
33	16/05/2019 10:51 AM ID: 116792107	[removed to protect the identity of individual(s)]		
34	16/05/2019 11:27 AM ID: 116788544	[removed to protect the identity of individual(s)]		
35	16/05/2019 11:33 AM ID: 116799369	[removed to protect the identity of individual(s)]		
36	16/05/2019 12:37 PM ID: 116804203	[removed to protect the identity of individual(s)]		
37	16/05/2019 14:30 PM ID: 116829098	[removed to protect the identity of individual(s)]		
38	17/05/2019 09:59 AM ID: 116899457	[removed to protect the identity of individual(s)]		
39	17/05/2019 13:13 PM ID: 116938744	[removed to protect the identity of individual(s)]		
40	17/05/2019 16:45 PM ID: 116772689	[removed to protect the identity of individual(s)]		
41	17/05/2019 17:11 PM ID: 116970244	[removed to protect the identity of individual(s)]		
42	17/05/2019 17:26 PM ID: 116973448	[removed to protect the identity of individual(s)]		
43	18/05/2019 10:57 AM ID: 117023552	[removed to protect the identity of individual(s)]		
44	18/05/2019 13:37 PM ID: 117028508	[removed to protect the identity of individual(s)]		
45	18/05/2019 17:03 PM ID: 115187747	[removed to protect the identity of individual(s)]		

If you'd like to be more involved, please tell us your email address. This will only be used by the project team to contact you about the flood hydrology roadmap - totally optional.

			Response Percent	Response Total
46	18/05/2019 18:55 PM ID: 117057658	[removed to protect the identity of individual(s)]		
47	18/05/2019 22:58 PM ID: 117056440	[removed to protect the identity of individual(s)]		
48	19/05/2019 07:17 AM ID: 117075485	[removed to protect the identity of individual(s)]		
49	19/05/2019 11:58 AM ID: 117068304	[removed to protect the identity of individual(s)]		
50	19/05/2019 14:19 PM ID: 117082368	[removed to protect the identity of individual(s)]		
51	19/05/2019 14:33 PM ID: 117093851	[removed to protect the identity of individual(s)]		
52	19/05/2019 20:35 PM ID: 116800339	[removed to protect the identity of individual(s)]		
53	19/05/2019 21:22 PM ID: 115953502	[removed to protect the identity of individual(s)]		
54	21/05/2019 10:47 AM ID: 117265485	[removed to protect the identity of individual(s)]		
55	21/05/2019 13:45 PM ID: 117286332	[removed to protect the identity of individual(s)]		
56	22/05/2019 07:17 AM ID: 117351653	[removed to protect the identity of individual(s)]		
57	22/05/2019 12:29 PM ID: 117376373	[removed to protect the identity of individual(s)]		
58	23/05/2019 13:12 PM ID: 117486576	[removed to protect the identity of individual(s)]		
59	23/05/2019 16:48 PM ID: 117496746	[removed to protect the identity of individual(s)]		
60	24/05/2019 12:44 PM ID: 117505743	[removed to protect the identity of individual(s)]		
61	24/05/2019 13:52 PM ID: 117364703	[removed to protect the identity of individual(s)]		
62	25/05/2019 01:08 AM ID: 117458964	[removed to protect the identity of individual(s)]		
63	28/05/2019 21:37 PM ID: 117847148	[removed to protect the identity of individual(s)]		
64	30/05/2019 15:31 PM ID: 118027569	[removed to protect the identity of individual(s)]		
			answered	64
			skipped	61

Abbreviations used in this survey

These abbreviations have been inferred after the survey and may not be completely accurate.

AI	Artificial intelligence
AMAX	Annual maximum peak flow
API	Antecedent Precipitation Index
ARMA	Autoregressive–moving-average model
BSI	British Standards Institution
CBHE	Chronology of British hydrological events
COSMOS	Cosmic-ray soil moisture monitoring network
CPD	Continued professional development
CWI	Catchment wetness index
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FE	Further education
FEH	Flood estimation handbook
FFIR	Flooding from intense rainfall
FRA	Flood risk assessment
FWMA	Flood and Water Management Act
GCM	Global climate model
GW	Groundwater
H&S	Health and safety
HE	Higher education
IHACRES	A type of rainfall-runoff model
IT	Information technology
LIDAR	Light detection and ranging
ML	Machine learning
MSc	Master of Science
NFM	Natural flood management
NRFA	National river flow archive
NW	North west
OGL3	Open government licence 3
PDM	Probability distributed model
PFR	Property flood resilience
PG	Post graduate
PhD	Doctor of Philosophy
PMF	Probable maximum flood
PMP	Probable maximum precipitation
POT	Peaks over threshold
PR	Percentage runoff
QA	Quality assurance
QMED	Median annual maximum flood
R&D	Research and development
RCM	Regional climate model
ReFH2	Second version of the revitalised flood hydrograph method
RIS	Not sure of intended definition

RR	Rainfall runoff
SAR	?
STEM	?
SuDS	Sustainable drainage systems
SWOT	?
TCM	?
UK	United Kingdom
UKCP18	UK climate projections 2018
VAR	?
WISKI	?