

DDAHS 2026 summer school Thursday morning keynotes-20260716_090339-Meeting Recording

16 July 2026, 08:03am

1h 10m 49s

● **Gianni Vesuviano** started transcription



Gianni Vesuviano 0:07

So our first keynote of the day is going to be communicating hydrological data with Steve Cole. Steve, over to you.



Steven Cole 0:17

Brilliant. All right, thanks very much, Gianni. And morning, everybody. Great to see so many people here. Even if some of you might have been, I don't know, I was watching the football last night and just about recovered now for the disappointment of yesterday. But anyway,

I was going to share some of the work that we've been doing around communicating hydrological data.

So my name's Steve Cole. I head up one of the science groups at UKCEH, so on hydrological forecasting and digital systems, and I'll share some of the work that we've been doing and also some other work within UKCEH in this area.

Right, so.

I guess we probably all, we all know that the data is, there's all sorts of data out there and it's only getting bigger, I think, the amount of data and sort of types of data that you can have. So these can be ranging from sort of classic point observations, so rain gauge data, river levels, river flows,

snowfall maybe. Then we may have some gridded type of data products. So these could be the sort of images you see on the TV, weather forecasts, so things like radar rainfall, we do a lot of work with that, satellite data.

And then there's also model outputs. And in this world, we'll talk a little bit about deterministic. So that's just where you have one future projection of what might happen. But increasingly, we're using things like ensembles to try and understand the uncertainty in the predictions. So that's great, but it also presents extra challenges for how you might communicate that information. If you think of trying to make decisions, particularly in some of the areas that we support, such as real time

forecasting, you need to be able to make decisions quickly. So how you communicate this data and how you communicate it succinctly to help these decisions is really important. So I guess that's really the sort of challenge. How do we how do we help make all this sort of data and information actionable to support decision makers and other people that might want to use this? And then just sort of give a bit of an overview of some of the areas that we contribute to. On the bottom there, we've got a sort of lead time. So we're thinking about what we might be doing now or in the next few hours. So this is looking at, say, live observations. So on the top there, that's some software that we have for viewing radar data.

And so that's giving you a snapshot of what's happening now. And below is some work that we've been doing across Africa, looking at satellite products for what is going on right now. But you can also use that information. It can be really good for predicting what might happen over the next few hours. So

For example, in Africa, they have huge storms that are 10s of kilometres across, but dropping really intense rainfall. So like the thunderstorms that we might have here in the UK, but on a sort of bigger scale. And using that satellite information, you can get a really good idea of what's happening over the next few hours.

And.

In the UK in particular, we interface and support how flood warning and flood guidance statements are made. So whilst we're not the operational agency for issuing warnings, we're providing tools and software and information that others like the Environment Agency or the Flood Forecasting Centre will use.

So that might be typically over the next few days.

Then a bit further, we're sort of getting into sub-seasonal space of looking, so this is some quite new work that's been looking at in the next four weeks and sort of giving you that heads up of do we think the flood situation might be getting better, getting worse? Are there things that we need to be worried about in the next?

Next 4 weeks.

And then Katie and others, who's going to give the next talk, do an awful lot of work on what we call outlooks or the seasonal scale, say one to three months and beyond. So there's an example there of something called the hydrological outlook, which obviously at the moment

is got quite a lot of interest there with the sort of emerging situation and the dry...

You know, we're in our third heat wave at the moment. And so there's lots of interest

in understanding what that might mean for water resources, for example. Then we also help on longer time scales. So there's something called the National Risk Register, which is sort of looking at risks over the next five years or so, and that gets periodically updated. I should update this because I think there's been a new one out this week. But yeah, that's another area that we contribute to. And then at the very long time, so decades and beyond, we're looking at things like climate change risk assessment. So we feed information into those types of government reports, but also we're thinking about flood design. And there's something that there's something called the Flood Estimation Handbook that Gianni works on a lot. And I'll just give a brief

Brief introduction, but hopefully that sets the scene a bit of some of the areas that we contribute to.

There's some real global drivers to the work we do as well, and one's around something called the Sendai framework. So that's one of the United Nations drivers, say, trying to reduce disaster risk. So

One of the key outcomes that we want to make is reducing that disaster risk, whether it's in terms of lives, livelihoods and health across economies, physical, so like your physical infrastructure, social and cultural impacts.

So that's one of the big drivers from a global perspective. And within it, it's got lots of sub-priorities. And one of them that we've been contributing a lot to is this understanding disaster risk. And it really wants people to, or countries and organisations to understand

more about risk in a more holistic sense, so not just understanding where might flood, for example, but understanding really what the impact of that flooding might be. So to help that, there's been a big push on things like hazard impact modelling, so not just forecasting the hazard.

but also forecasting the impact.

So these, in this sort of context, it's useful to think about a timeline again, say the current risk, you know, like what, what's the sort of background risk today? You can think about that in terms of say things like the average annual flood damage, say what,

What we might expect from sort of a typical, a typical year.

We're also really interested in how that's going to change in the future. And so that's where the climate change projections come in. But we're increasingly, as I was saying, we're trying to incorporate this risk forecasting into the short term as well. So I'll say

something about that. So trying to help with preparedness for an emerging situation. It's also really useful to look back and make best use of historical events and data as well. So that might be to test models, it might be to train models. And it's a really, it's a really good practice to make best use of that sort of historical data that we might have.

So I said that we'd say something about the Flood Estimation Handbook and Gianni would be able to tell you much more about it than me. But one of the important things is that it uses the sort of industry standard across the UK for understanding flood risk. So the sorts of questions it's trying to help you answers are how much rainfall or river flow does new infrastructure have to cope with? Say, you may have come across a phrase of sort of return period. So there's a sort of idea of like the 100-year return period. So on average, an event like this might only happen every 100 years, but we want to protect our infrastructure for that. So we need to know what the rainfall and what the river flow amounts are for that type of event. And it's used in all sorts of things like property and bridge design or culvert design. So part of it, there's a really, for the rainfall part, there's something called the depth duration frequency model. So this is where we make really good use of that historical data. So all the rain gauges that we have across the UK feed into developing these types of models. And then we can develop frequency, this depth duration frequency model. We can do similar things with flood frequency as well and building information on catchments that might be important, so catchment descriptors, so things to do with area and so forth. And on the right there, there's some of the outputs that you can get. So we deliver this through web services. So that's been a massive development over the last decade or so of how we communicate our information and make it available to others. And on the right there, as I said, there's interest in, right, what is an extreme rainfall for a certain catchment, for example, and this happens to be a 1000-year return period. rainfall for the one-hour duration. So they sort of really short, intense convective storms. And in this case, it was 67 millimeters. So yeah, you start thinking about how much that is. And if you spread that across a whole whole catchment or a large area, then that's going to cause quite a lot of quite a lot of flooding. But these methods get continually updated and part of the challenge is how you communicate it to the practitioners. So not only are we making the data available, but we're also communicating it to others through webinars and training and those sorts of things as well.

So now just going to think a little bit more about forecasting. So this is sort of typical flood forecasting model chain. So this is what we might use for some of the short-term forecasting that we do. So up to time now, so that dotted line in the middle, we're going to make best use of all sorts of inputs on precipitation, river flows, potential evaporation. So we've got all these different sort of sources of data out there that we're using. We're then going to use them with some sort of flood model.

And then we produce some modelled output, say that we can use these observations to estimate what the river flow might be up to time now. And then when we want to look forward, we're going to have to use some forecast information. So again, this is the sort of information that's used for the weather forecasts.

they provided by people at the Met Office. But it's called something like numerical weather prediction is the technical name for the models that they use. And they're running it on massive computers at the Met Office. So, as I said before,

For a long time, the sort of standard way of doing it was really just to have one forecast of the future. And partly that was because of the computational power required to run the models, so they just couldn't run lots of them. But as time's gone on, we've moved from deterministic forecast to ensemble forecast. So

What we're showing there on the right is several different potential.

future forecasts of what might happen, because we know there's uncertainty, the forecasts aren't perfect. So one way of capturing that uncertainty is to not just have one realisation of the future, but to have several. And this extends, that sort of methodology extends to climate change and seasonal forecasting as well.

But you can see when you see that sort of spread of outputs, you can start to make better maybe risk-based decisions on what you might what you might need to do.

So, one of the one of the key things that we support in the UK is this sort of national scale flood forecasting. So,

about, well, almost 20 years ago, say back in 2007, there was a huge summer storm, the big summer floods in the UK. And we at that point, we didn't really have a very good nationwide overview of flooding. It was all done in sort of different regional centres.

of the Environment Agency. So following that, there was a real driver to get a better national picture. So this is where we, some of the research that we're doing got pulled into operational real time practice. So we've got a grid, it's called a Grid-to-Grid model. So it's a distributed model. On the left hand side there, you can see

you change your, you discretize your landscape into grid squares, and that's really useful for interacting with lots of spatial data sets, whether that's on the rainfall or on landscape properties. And we're configuring this model so that it's using these national data sets on things like soil, geology, so that we get spatial differences in how the model will respond to rainfall.

So this gives us a much better national picture of how flooding might evolve. And then it's really formed the basis now of lots of different forecasting approaches. So we've been using probabilistic forecasts, so we're using these ensembles, and we're also using it to drive hazard impact models.

And then it gets communicated through things like the flood guidance statement that you can see there in the middle.

So some real world examples. So this is from one of our partners that we work with, so SEPA, so the Scottish Environment Protection Agency, they run this model in Scotland. Say this is an event back in 22.

But there you can see some of the outputs from the Grid-to-Grid model. So you can see how it's starting to highlight certain rivers. And it's really interesting when you compare it to the rainfall forecast on the right, you can see how you need the transformation into river flow is really important to really understand what the impact might be in terms of flooding.

So it fed into them actually raising a red warning for their flood guidance statement. And it also allowed them, so that goes to the public and to others to help with preparedness, but it also allowed them to trigger some of the emergency satellite services to collect real time information on the flooding or near real time information on the flooding. So helpful for them in the response part, but also later on in the recovery and understanding what actually happened. It was really useful to have this additional information.

So I did mention impact based forecasting and this move from just thinking about the hazard. And this is something that's been UKCEH and the others and others in the UK have been at the forefront of. And it's really fed in now to WMO, so that's the World Meteorological Organisation say they support.

the whole world in advancing, you know, forecasting, meteorological forecasting and activities like that. So it's fed into their guidelines for impact-based forecasting. But the theory of it really is captured in this matrix at the bottom. So you've got a combination here of impact

along the bottom, so potential impacts, so how severe you might think the event

might be. And on the left hand side, you've got the likelihood of that occurring. So if you think you've got an ensemble of future projections of what might happen over the next few days,

each of those ensembles, you could then assess what the impact of that particular ensemble might be. So whether you think it would be minimal or significant, depending on the river flow and what might be impacted. And then because you've got this ensemble that's allowing you to calculate the likelihood. So

You understand how many of your ensemble members are predicting significant, how many is predicting minimal. So it allows you to start to use this type of matrix to communicate what you think the risk is.

And so, in the UK, one of the...

driving forces for this type of methodology was through something called the Natural Hazards Partnership. So UKCEH, we're a founding partner of that, but it's got all sorts of organisations in there, government departments and other research organisations. And yeah, it's really aimed at taking on impacts.

trying to help with this Sendai mission of reducing that risk, risk reduction and prevention, but also developing new services. So one of the big outcomes from that initiative was developing something for surface water flooding. So I mentioned the floods back in 2007.

And they, one of the big things in that was actually over half the properties that were affected were really from what you call surface water flooding. So it's not really rivers overtopping, it's sort of local drainage not being able to cope with the rainfall. So that was a bit of a surprise. And as a result, there's been a lot of input, a lot of investment in trying to improve forecasting for that afterwards.

Just to give you an idea of how this type of model might work, we've got these sort of existing bits of infrastructure. So as I said, we've spoken about the left hand side of the meteorological and the hydrological forecasts are available. But we also have national information on

receptors that might get impacted and population and very detailed sort of metre scale flood maps. So what we could do is we could get a real time hazard footprint from our hydrological model chain.

But then we could use these static data sets that we've got on, you know, design flood maps and these receptors to create something called an impact library. So what we can do is use our dynamic footprint with these static impact libraries to

really start to understand

what the risk might be and communicates it in different ways. So this is a tool that the Met Office run. And then they, that helps the forecasters and helps the forecasters inform the flood guidance statement. So this is, as I said, it's using that sort of flood risk matrix approach to help with it.

The bit that UKCEH were mainly on was that left hand side there. So this feeds into sort of bigger picture stuff. So whilst we're talking about hydrological data and impacts, we've been working through this partnership. We're actually looking at all sorts of impacts. We've got things on wildfire, we've got things on air quality and pollen, we've got temperature, we've got volcanic ash landslides. So the daily hazard assessment is something that's produced every day for the next 5 days and we're helping support the flood part.

But this is this goes across 99 sort of fairly big hazards for the UK, and it's aimed at government agencies, local authorities, emergency response community, and it's really to give them that heads up across these different hazards of what things they might.

might need to be concerned about. And it feeds into things like the Cabinet Office for how they brief government.

So here's just an example. This is the sort of communication that goes out to those responders. And it's so you try and have these high level maps that indicate the sort of key concerns over the next 5 days. And then there's more information as you drill down through the documents.

So we've been doing similar things, so we've been supporting that across Britain, and we've been doing similar thing with partners in Scotland. And this is just to give you an example of how the communication can help. So on the right-hand side, we actually run this model for them, and we have a web portal that we've developed for them. But it's really made this step change in operational forecasting that they've been able to do things they couldn't do before. So back in 2023, there was a big storm, Storm Babet. And because they had this information and they were working closely with local authorities and

Transport Scotland, they were able to actually do more proactive management rather than reactive management in terms of managing the flood. So, for example, Transport Scotland were able to close a road, one of their major A roads in advance, rather than waiting for the flooding to happen and then closing it and having to deal with the big tail.

tail back, so being more proactive. And similarly, it helped with evacuating some houses in a particular flood hotspot.

I'll go over this very briefly, but this sort of thing is great. We were working with lots of partners and SEPA are really good at engaging with these different users of this type of information and we're getting very positive feedback about the benefit of these types of systems.

I'll jump over this very quickly, but we're doing, we're not just applying it in the UK, we're applying it elsewhere. So this is an example of developing methods for India in the west, the sort of southwest coast, Kerala, where they have some

You may have seen this in the news before, but they suffer with, in the monsoon season, they can suffer with really quite severe events. And they have some quite steep, steep catchments there. They've got the Western Ghats and they've got mountains along that side, so very fast responding. So we're looking at impacts for all sorts of

receptors. And this is just giving you an idea of how a sequence of forecasts might look for that type of system. So you can see it's really picking out. We've got a sequence of forecasts. So as you move down the page, you're moving forward in time. So the first

The first line is giving you a three-day forecast on the 1st of July. The second one is a three-day forecast on the 2nd of July. So you can see how it's homing into the window where you've got to be most concerned. And we've been working with them to make web portals and to have it running on their operational systems in India.

So I'm going to realise I'm almost out of time, so I just get to show you something that we've been doing again in this international context. So we've been trying to support Australia and how they manage the Great Barrier Reef. So

It's on that northeast coast of Australia. But it can suffer from challenges with water quality and temperature that will bleach the coral. So we're able to use a sort of distributed modelling to help give them the fresh water inflows to the

To the sea, and working with partners, and you can.

On the left hand side there, we've got, you know, a sequence of, you know, years' worth of data going through the hydrological model, and you can see how the storms create great river flow, and then that contributes to the sea. And on the right hand side, they could do sort of detailed hydrodynamic modelling in the sea.

to see the different colours there are sort of telling them which catchment and which river is contributing to the flow at that particular location and that particular time. So

it moves over time depending on the flood events. This is giving a better handle of what changes they might need to make.

and where in the catchment to improve the water quality and the reduce the damage to the Great Barrier Reef.

If I've got time for one slide, Gianni, just say that we do stuff on the climate change scale.

And this is just to illustrate some of the things that we input from our, so we can run our sort of grid-based hydrological models and feed them into others that will do more impact-based assessments of that. But the summary is that you can produce these quite nice

plots to understand, right, what is the change in potential damages over time and under different climate change projections? So we've got the two degree increase or the four degree increase. And then we're looking at different epochs, so whether the 2050s or the 2080s.

And then the different bars are the different countries in the UK. So it's just to give you a sort of illustration of how this feeds into sort of practical information for others. But at that point, Gianni, I will stop because we've almost got to 9:30.

Yeah, hopefully that's given.

a bit of an overview of how we use some of this information, try and communicate it to help with decision making.



Gianni Vesuviano 28:17

Yeah, thank you for that, Steve. That's been a very interesting presentation with a very wide range of different types of communication we're doing all over the world and the real world impacts it is having. Always great to see. Katie, do you need to be anywhere at 10:00 or can we take questions?



Katie Facer-Childs 28:38

No, you can take questions, that's fine.



Gianni Vesuviano 28:40

Okay, if anyone has questions, either type them in the chat or raise your hand in Teams.

Okay, we'll go to Martha first and then Mayuran.



Martha McKee 28:56

Thank you. Yeah, thank you for that talk. That was really interesting. During your presentation, you mentioned that, well, some of your communication outputs are stakeholder workshops. I have to do a lot of those myself, but I'm kind of just in the early stages of starting to do them. And I'm just wondering, how long can it take from organising the stakeholder workshops, hosting them, and then rounding off with them to actually produce outputs. You know, I'm imagining it can really vary from quite quickly to taking a long time. And I'm just wondering what your experience has been with those.



Steven Cole 29:32

Yeah, no, good question. Yeah, sometimes I think it's always really useful to get that input from stakeholders of what they, let's just go back a second.



Steven Cole 29:49

Yeah, so these sorts of decisions on what's minimal, what's minor, what's significant, what's severe, what do you really mean by those? That's something that people at the Flood Forecasting Centre and Met Office and Environment Agency have done quite a lot of.



Steven Cole 30:08

both internally, so they can have sort of concepts of, you know, minimal like, you know, business as usual, really, and then trying to describe what minor significant and severe mean. So I can point you to some, I'll put a link in the chat, and...



Martha McKee 30:30

Thank you.



Steven Cole 30:36

So, in here, we're using like numerical models to try and assess these things automatically, so then you still have to make some decisions about what you know how many properties. you know, is it how many properties or is it the percentage of properties? And it can have a big difference depending whether you're in London or you're in a rural area.

So there's lots, it's a really interesting area. And actually there's been some work recently on a common alerting protocol.



Martha McKee 30:55

Yeah.



Steven Cole 31:12

They try to harmonise some of this language and some of the even the sort of percentages that are used for high, medium, low, very low, and that sort of likelihood scale. So, there's been again, I can I'll see if I can find a link to that, but that's something that's emerging at the moment that sort of...

thinking around those things to make it a bit more harmonised so that it, yeah, this is driven by the WMO and others as well, because in that international context, we want things to be

more harmonised, but also across different hazards. That's the other challenge that we've got. And Katie was at a meeting yesterday on that as well with me, where that language and communications are the thing.



Martha McKee 31:53

Yeah.

Yeah, okay, cool. Thank you so much.



Steven Cole 32:03

No problem, great question.



Gianni Vesuviano 32:06

Okay, and the question in the chat is, how is risk defined in the case studies? What are the indicators used?



Steven Cole 32:08

Ohh, I think, yeah, sorry.

Yeah, okay, yeah, very good. So, um...

That's another sort of case-by-case type question. So for Scotland, they were interested in roads and properties with their sort of their priority sort of receptors. So working with them, we can come up

we've come up with definitions of what we think might minimal, minor, significant and severe were for both of those. So it could be based on like the length of road that was impacted, for example. Then the risk bit is really using this, using the matrix that we've got here.

So these equate to percentages on the left hand side. And once you've got your ensemble and you know how many are severe, how many are significant, you can see where you are on each of these boxes. So I think

Let's see, I think, yeah, say here.

And...

We had it for different duration storms or different duration events of how severe you think the impacts are. So you could see actually, we'd colour this up orange because that was the highest, that was the highest risk. So the colour is the risk.

But you can see, you know, you're able to automatically fill this out based on the ensemble information.



Gianni Vesuviano 33:50

OK, thank you, Steve, for the presentation and for your answers to the questions. We now.



Steven Cole 33:56

It was.



Gianni Vesuviano 33:59

We're now going to move on to the second keynote, and that will be Telling Your Science Story, a guide to captivating talks and compelling posters by Katie Facer-Childs. Over to you.



Katie Facer-Childs 34:12

Hi everyone. Yeah, thanks, Gianni. So yeah, I'm going to take a step away from actual science and talk to you more about how to communicate your science. So I'm Katie Facer-Childs. I'm a senior hydrologist here at UKCEH and I do a lot of work on science communication and spend a lot of time on



Katie Facer-Childs 34:31

presentations to people with lots of users and particularly building posters as well.

So I can talk about the structure of your presentations, your oral presentations, your poster presentations, go over some design principles and useful tools. Now, I doubt you're particularly excited right now. And yeah, what I've talked about, it's not terrible what I've done so far, but I could already make things a lot more engaging. I've made a pretty classic mistake. I've told you what I'm going to talk about, but I haven't told you why you care or why you should be excited about this prospect.

So let's scrap that and start again.

This talk's pretty meta. It's a talk about giving a talk. So that made me instinctively think about Inception.

How do you plant a seed in someone's mind? How do you plant your science in someone's mind? The goal of a great presentation isn't about the information transfer, it's about idea transfer.

Now, I'm making the assumption that you've all seen Inception, the movie, but you might not have. So rule number one is don't assume your audience's knowledge. The more you can start from the very beginning, the better. People don't mind being refreshed, but they mind if they get lost. So Inception is a 2010 movie.

directed by Christopher Nolan, starring Leonardo DiCaprio. And it's about layered dreams, dreams within dreams within dreams, and about planting an idea so effectively in someone's mind that they think it's their own. And that's exactly what your science should be doing and your science talks should be doing.

So if Inception is our goal, how do we achieve it? And the movie industry has spent billions and billions of pounds on this and dollars. And this is a better version of the "what am I going to talk to you about today" slide. It's A roadmap. So you need to start with the spotlight. What's your big idea? Why am I talking to you today?

Then you need a story. What's the theme, the narrative? How do you find that story? Cut things down. You need less methods, less text and more meaning.

Have a go at some cinematography. Use pretty pictures, graphics, colours and visual design. I've got some tips for you.

And then special effects. What are the tools that you can use to really make your science bang?

how to get a good poster, how to get people through the door, and then ending with the kick, bringing people back to reality, ending with impact. An optional extra if you're giving a long talk or even if you're giving a short talk, I like to add a bit of a roadmap along the bottom. So this is a signposting bar. It can be at the bottom, it

can be at the top, but it will run throughout the whole presentation so people can get a sense of where you are and how much longer you're going to be talking for. So what goes in the spotlight? It's your job to decide what goes in the spotlight. And you say, I don't always know my results when I submit my abstract. That's all right. Your spotlight doesn't have to be your results. It can be anything. You need one idea. And your talk may include any of these things, but you need to decide what is that important message? What are you sending your audience home with?

It might be a problem.

It might be something like "uncertainty is really hard to quantify and to visualise". It might be a vision. We know we can improve our forecasts with blending, we hope. It could be a question. Can we simulate historic droughts accurately?

It could be a method. This is a really complex method and it's got really a lot of advantages over some simple ones. You might have a finding, you might already know that atmospheric indices can be used to better predict stream flow.

Or you might have an action. Something like hydroclimate services must be co-designed with users.

So now you know what your one idea is, you need to work out how to plant that in somebody's mind. And that requires a story.

Stop thinking about how to explain your science and start asking what is my science like? Is it about finding something? Are you a detective? Are you going on a treasure hunt? Are you building something? Are you following a certain recipe? Are you trying to puzzle something out, piecing it together? Or are you going on a journey and following a lead to see where it takes you?

Stories don't have to be fictional, they're just a familiar vehicle for you and your idea. So how do I find that story, that analogy? You can have a chat with your colleagues, chat with your friends, especially if they don't know much about science. They might help you pick it apart. You can chat to a large language model like Copilot, or you can just mull it over. Great ideas don't happen when you're at your desk. They happen when you give your time...

brain, time and space. So this is an example of a presentation that I needed to build, needed to give about building a forecasting system that works best for each time and each place.

And we had lots of different methods running and then lots of different ways of improving forecasts. And we didn't know which one we could choose. We had different methods, different places, different methods. Maybe it was a balancing act,

balancing the skill and the resources and reliability. Maybe it was something about time and place.

I was trying to build a matrix of which method has strengths and weaknesses. And then after a couple of days, bam, it's like pick and mix. The best forecasting system is a combination of the different methods chosen directly for that time and place. You can't use the same, it's not one-size-fits-all. It was a pick and mix in different times and places. So I made this poster about pick and mix.

And you better believe I took pick and mix sweets to Sweden and I shared them with my audience. And that went down a treat.

So, telling your story. A typical science talk follows introduction, methods, results, conclusion, boring. This is a report structure. It's not a story. Stories, as I said, they don't have to be fiction. They're structures that help people understand the information.

You need to build a story that's easy for people to follow, but hard for people to forget.

So starting with the conflict, what's the problem?

What do they need? Who are the users? Who are your characters?

What do they need? What's your journey? What approaches did you take? And then what did we learn? What's the recommendation or resolution? And then finally, what's that take home message?

Note how that introduction now spans three of these sections. The setting your scene is really, really important and why you're doing what you're doing is a really critical part of your story. So now you have a basic story, it's time to start editing it. you need to cut it. And the first thing to cut is the methods. We see slides like this A lot. I'm sure you see slides like this A lot. It's a lot of text. It's a lot of equations. It's very, very boring and hard to understand. But all of this really just basically translates to three points. We took some data.

We ran a catchment model and we assessed those outputs with KGE and NSE. And depending on your audience, you might not even need to say this. This might just be a given. You run a model. These are the steps that you take to run a model. People might already know that. You can just talk about it in your spoken word. So you definitely don't need a slide like this.

Unless your methods are really, really truly novel, in which case they are the bulk of your story, then you don't really need much on your methods. You can add to it if people ask and people can always ask you for more details.

Cut the results down. Again, we see a lot of slides like this. You've made nine graphs, they're very pretty, they're nicely formatted into a grid, but what is the message?

What's going on on this slide? People can't decipher 9 graphs on one slide. So go through them bit by bit, talk them through it, tell them the story. So

You might say something like, here's a graph of simulated river flow. It's got a range of model outputs in grey. A best model is given in black, and then the observations are given in red. We're focusing here on the uncertainty width. What is the range of those model simulations in grey? And we're looking at the containment ratio. What's the percentage of the time that those observations sit within that range of those grey model simulations?

This is an example of a flashy catchment. It goes up and down a lot and it responds quickly to rainfall. And this is an example of a slow responding catchment. It's much smoother, it runs more slowly. And we can see here

The models are much more certain in the slowly responding catchments. That grey range is smaller, but they're less likely to catch the observations. That red line is often falling outside. So slow catchments are more certain, but more often wrong. That's the story.

So cutting your results down, you need to have a go at being your movie editor. You might have taken loads of takes, you've run loads of analyses and then you've plotted a load of graphs. Edit them, pick some of the best ones that show something interesting and re-plot them. You might have picked eight that look interesting and then make sure they fit your presentation theme.

change the colours, change the backgrounds, make them nice. So maybe three have made that final cut. These are the ones that actually tell your story, the ones that are in your presentation. And that leaves you with that one memorable ending, that take home message. You've done a lot of work to get there, but your audience don't need all of the footage. They need that final cut.

And then you need to cut the story in general. The best presentations are quite heavily edited. I often generate 5,000 slides and then I go back and I delete a whole load and I swap the order around significantly and make the story flow. Sometimes it can feel like it's wasted effort, but it's important so you don't just dump everything that you know on your audience. You're really focusing on one idea, planting a seed in your audience's mind.

You can use the slide sorter view in PowerPoint and help you review and reorder your slides. What role is each slide playing in telling your story? Don't be afraid to

get your scissors out. This is a presentation I gave a couple of weeks ago and it could have used quite a bit more work if I'm honest. It had nice visuals, it was professional, but the story wasn't quite there. The first slide was doing too much heavy lifting. It was covering the problem, the need and the goal. I should have spent a lot more time going over that.

I also kind of rushed the introduction of my characters. I've got quite a few users involved and I only gave them a slide each to talk about what their user and their needs were. It wasn't really long enough.

I only had two slides on my methods, so that's not too bad. But then that left all of this results, things that I could have really cut down significantly. Cut that slide, cut that slide, cut that slide. That would have freed up some space for me to talk more in my introductions and more about my characters.

The other thing you might notice here is I've got a hidden slide at the end there. If you do make loads of slides and you like them, they're good slides, but they're not helping you tell your story, you can hide them and you can use them in a later presentation. Often we repurpose our presentations. And then you can also, at the end, you can keep slides unhidden, but

There are slides that you know are useful for if you're expecting a question to come up. So maybe you are expecting somebody to ask you more details about your methods. What can you tell me more about which models you use? And you can keep that slide ready after your thank you slide so that when you get asked that question, you can just skip forward and say, oh yeah, I made a slide about this in case you asked. And then you're ready and you're prepared and you have something that you can use as your prompt.

Cut the text down. Now this, I feel, is a bit of a balancing act. You want to reduce the text on your slides quite significantly, but you want to do that to make sure you have a clear story and you get better engagement. But you want to have enough text for yourself to use as prompt.

when you're talking, so you're reducing your ums and ahs while you're trying to remember what it was you were trying to say. And you also want enough information on there to make it useful for people looking back at it. Now, slides are nearly always these days shared with your audience. People say, can I have slides, please? And you say, yes. But if they're just looking back on a load of pictures with no context, that's not helpful. So bear in mind that people actually often use your slides twice: in the moment to get the story and also they go back and have a look at it for a recap.

So the best slides work twice, engaging your audience and still making sense later. So once your slide content is sorted, you need to make sure they look great and they're memorable and colours are critical in this. There are a variety of methods to choose your colour palette and there are loads of online tools to help you, just look up colour picker or something like that and you'll get lots of things that are available. Complementary colours sit opposite each other on the colour wheel.

and that gives them really great contrast. You can use a monochromatic colour scale that uses multiple shades of the same colour and that keeps things looking calm and cohesive and professional. You can use analogous schemes that use colours that sit side by side on the colour wheel and that could give a cool or a warm natural vibe. And then the triadic and tetradic schemes pick three or four contrasting colours and that gives balance, vibrancy and often playfulness. You need to limit your palette to two to four main colours, otherwise it's just crazy. You want to pick one dominant colour, a secondary colour and an accent and always consider your contrast for readability.

keeping it simple and consistent.

Similarly, fonts are equally important. You can choose one font and use it throughout. One font family can go a really long way, using it in big, in all caps or lower caps, in big, bold or lighter or even italics. And that keeps it really simple and consistent.

Or you can choose two fonts like I've done in this talk and add a little playfulness. But bear in mind if you're using a script font or a decorative font to make sure it's readable. Some of them are lovely, but people can't read them, especially from a distance on a small slide in the room or on a poster.

So to my favourite part, graphics. Use your graphics to tell your story, not just to decorate your slide. This graphic's pretty pointless. This slide's pretty pointless. So think outside the box. We want to be moving from graphics, from graphs to infographics, graphics that tell a story.

And I really, really love this book, if you haven't seen it before, by David McCandless called Information is Beautiful. There's a second one as well, I think, called Knowledge is Beautiful. I've got them both. They're really inspirational ways of rethinking how we plot data. And I've also discovered that there's a website now, this informationisbeautiful.net, where they have a whole team of people that are producing graphics of this type. So go and have a look. and use it for some inspiration.

I couldn't talk today without talking about football, although given last night's results, I'm feeling a bit nervous about talking about football. It's definitely not coming back towards the UK. But this, the economists are quite well known for being really good at doing neat, clean visuals. But actually, I think they often go a bit too far. So this is a graphic about football's centre of gravity. What is football's centre of gravity? What is this trying to show us? There's no mid-Atlantic island that won the football in 1931 and 41. I think probably what it's referring to are the countries in South America that have been bringing football successes away from Europe, but South America is not even on that map, that graphic on that map.

So what are they talking about? This graphic from Harris Saleem is maybe, it's much less abstract, but it's actually, I think, a lot more informative. It's understandable. So just be aware. It's very nice telling a story, but make sure you don't take it too far. Make sure it actually makes sense.

Your graphics need to be accessible. Colour blindness is a massive issue. It affects 8% of men that have some form of colour vision deficiency and 0.5% of women. And that's approximately 300 million people worldwide. So that's likely to be quite a large section of your audience that have some form of colour blindness. And this graphic shows

the different types of colour blindness and how that relates and how they can see those colours. We often reach for a rainbow palette, and I'm glad to say that it's rapidly being phased out across science outputs, but it does still linger in some places. This is an example of a map from the water resources portal that was historically always in rainbow colours.

and this is how it's viewed by red-blind colour blindness. You can see they can't really see much between that green and red colour scale.

So we've reworked it, we've made a new colour scheme that runs from red through to blue, but without the green in the middle, it's got a tan colour in the middle. It's still a bit more difficult for red-blind protanopia people to see, but you can see there's a range of tones in that colour scale, so it can still be red. Use strong contrast, add patterns and labels if you need to, and test your visuals. So these little charts that I've made have

and I uploaded these pictures to this Pilestone website and it simulated what they would look like. So test your visuals.

So what tools can you use to tell your story? What are your special effects tools? So in getting inspiration, as I said, you can chat to your colleagues, chat to your friends

and family, and you can use Copilot. I've used a lot of Copilot in this presentation. You can develop your slides or your poster with PowerPoint or Affinity Designer. Affinity Designer is basically a free version of Adobe Illustrator. If you want to start to learn how to get make some more advanced graphics, then yeah, you can use Affinity Designer. It's free and it's really cool. You can use Canva as well. And I found that Presentation Go, there are a few other websites a bit like Presentation Go, that's a good source of free slide templates. And it also has some really great conceptual kind of smart art style graphics that add really good value. And then you want to get your visual support. So you can use Pixabay or Unsplash for royalty free photos. You can use Freepik and Noun Project for different icons. You need to use the right tools for your message and for your audience. But actually Copilot can help you with a lot of these things. It can make really good icons, it can make really good infographics and it can help you with the inspiration element as well. So it can really help you throughout your storytelling journey. There's also a lot of tools within just PowerPoint itself. that you may or may not know about, little tips to help you. So such as the selection pane. I don't know if any of you like me have spent many a frustrated hour clicking send backwards, send backwards, send backward, bring forward, and then you've lost it behind something and you can't get it again. The selection pane brings up a little window with all of your individual items on your slide and then you can drag and drop them and move them around accordingly. The align tool, your visual story is going to look a lot slicker if things are aligned, or you can also use it to evenly distribute things across a certain space. So that's a really neat little tool. Crop to shape, if you want an image inside a circle or some other shape, then use that rather than trying to, yeah, fudge your way through. Use the slide master on the view window. So if you're working with a template or even if you're generating your own template, you can avoid repetitive tasks, make use, open up the slide master, have a look at what's there. You might also find that there's some sort of element on your template that you just don't want there. There's a picture you can't get rid of, then you can get hold of it in the slide master and move it there. I've mainly been using icons from Freepik until recently, but there are, they're free, but you do still have to attribute them. So you end up with a little bit of little text box at the bottom saying icons from Freepik. There's so many icons actually just natively embedded in this button on PowerPoint. I didn't realise how many were there. And

then SmartArt is also obviously a great.

Tool for a quick diagram.

In animations and transitions, the animation pane, similarly to the selection pane, it opens up a whole world of flexibility and options. If you open up that animation pane, then you can get into more details there. And then finally, morph. I've not used this before, but from what I've read, it's pretty amazing. Basically, if you want to move something around on your slide to show how things are changing, you can make a new slide and it will just magically seamlessly move things around. So I'm going to have a go at playing with that as soon as I can. It sounds pretty good.

So coming on to posters, posters are not given enough credit in science communication. A lot of people see them as kind of second fiddle to an oral presentation. You'd rather have given a talk, but you've actually been asked to give a poster and you're feeling disappointed about that. Don't give in to this attitude. Posters are awesome. You get so much more chance to actually discuss your science if you're giving a poster presentation.

You can have conversations with people. If you give an oral talk, you might get 2 questions, you might get to give a response. You don't get much of A feedback at all about people's opinions on your work. I often actively choose to give posters, not just because I'm artistic, but because they are often the better choice, especially if you're starting up your work or you're partway through your work and you want some feedback on a method or you want to engage people and say, I'm working on this lounge.

get involved. Posters are much better than oral presentations. I find oral presentations are better when you have that story, you're at the end of your journey, at the end of your story and you want to disseminate what you're talking about. Oral talks are very one way, posters don't have to be. So everything I've talked about so far with presentations applies to posters. You need a spotlight. You need one key idea. You need to tell a story, find an analogy, find a theme for your poster and build a narrative. You need to cut things down, reduce the methods, reduce the text and focus on the meaning.

You need good graphics, colours and visual design. You need excellent tools to help you make your poster. There are plenty around there and help you make it impactful. And you need people to walk away with a seed firmly planted in their mind.

This is Copilot suggestions of what we can do to make a standard academic poster

better.

What do you think about it?

It says tell a story, edit it, design graphics, use the resources. I don't know about you, but this poster doesn't fill me with much inspiration. It's not unique. It just looks a bit like a flyer. It's just the same sort of content reduced. Yes, things are a bit more obvious. The text is a bit bigger, but it's not telling me a story. We need a narrative. Remember to strike the balance. You're striking a balance between engaging people and making sure it's useful. Bear in mind if you're giving a poster presentation, you're not always there next to it for the whole time. People need to come over to it and see. So you do still need enough information for people to be able to read it and understand what you've been doing.

But you need a really good narrative. So this is a poster that I produced nearly a decade ago now. I think it was a pretty good story. It was a really boring, a really boring subject matter. Why do we want to run 500,000 model parameterizations on a high performance computer cluster when we can just run a quick automatic calibration that takes a few seconds? It's really boring, really dry stuff. So I was trying to think about the story that I could give around this subject. And I was thinking of making mountains out of molehills. I don't know if you know this phrase, but it's basically why would I make something more complicated than it needs to be?

And so my poster featured mountains and it featured a little mole in the corner. And it went down really well, actually. A lot of people didn't know the phrase, making mountains out of mole hills, but they still came over to me and said, oh, why is there a little mole on your poster? And that meant they came to me and they talked to me and I talked to them about my science, even though they would have originally probably just walked straight past because it was a really boring content.

But the story was there, so...

This poster wasn't perfect. It's easy to pick things apart. There is too much text on this poster. If you need to design your poster, print it A4, and if you can't read it, there's too much text.

So this was a better design. I cut the text down a lot better on this one. This was another poster that I gave. I used some diagrams to summarise information and make things a bit more visual. I had two colours. I had a nice big image on there. But it's looking very, very professional. But what's the story here? I didn't have a very good title. It was quite boring.

There's no real narrative in this. What I was going for was we want to be growing these networks, a bit like fungi, like networks of, yeah, of mycelium kind of things. But I didn't quite run that metaphor through properly. So my story didn't quite work and I struggled to present it in person. So even though it's a lovely, beautiful poster, I really like it. I think it's

It's nice. It didn't tell me that spotlight. It didn't tell the narrative. It didn't have a spotlight, a key message, and I didn't plant that seed well enough.

And my last example is probably my most famous poster. Yes, I am the crazy lady who knitted her science poster. And this was because I was trying to tell a story about knitting local and global systems together for seamless water resources assessment. And I'd gotten it inspired by the fibre artists at AGU in America. And I thought, oh, I've got four months.

I'm going to do that for EGU in Europe. So I did it and it was incredibly successful. It was a massive hassle to transport it, but I managed to make it work. So just don't be afraid to think beyond 2D. Get really creative, get interactive with your poster and give yourself time. This took some time to put together.

So I will leave you, hopefully, maybe, you've got a sense of my one idea. What's in my spotlight for my talk today? Tell a story.

I hope I've been successful with planting that seed. So tell a story. Your science is a story that's worth hearing. Thank you.



Gianni Vesuviano 1:00:56

Well, thank you, Katie. I really hope this talk has inspired the people here to make more captivating talks and more compelling posters. If there are any questions, either raise your hand or type them in the chat.

Okay, Martha.



Martha McKee 1:01:19

Thank you for that, Katie. That was really interesting. It's crazy how many times you have to, like we get talks like this over the years and you still, there's still stuff you end up taking away. So thank you for that. A question I had is that I kind of work, I'm kind of working in between 2 sectors right now and I'm kind of struggling to engage with audiences in either, or there's my audience in marine ecology that I can engage with fine because I know the kind of standard things that people want to see in poster presentations. But I'm also kind of transitioning to a marine engineering

sector and I'm finding it a lot harder to engage with people in that sector. And I think it might be to do with how I'm

 **Martha McKee** 1:01:57

presenting my work and trying to engage with them, I think there might just be slightly different steps. So I'm just wondering if you have any advice on how I can go about finding out how to better engage with different communities in a kind of umbrella field, if that makes sense.

 **Katie Facer-Childs** 1:02:13

Yeah, so I think I would say just don't assume any knowledge. Like if you're, if you're, yeah, as I say, people don't mind you starting at the beginning. Like, like we're talking about detailed hydrological processes and stuff. The hydrologist that I talk to might be from a different field of hydrology, so they might not know what

 **Katie Facer-Childs** 1:02:33

this type of model, how this type of model works. But people that do know don't mind being reminded. So I would definitely go back to the beginning, like see as much as you can about like if you were to give this presentation to your sibling or your parent or like really go back to the beginning and then you can put in details as you move further on, particularly in methods and things. You can dive more into the science, but

 **Katie Facer-Childs** 1:02:57

especially in the motivational section in the introduction, you need to really capture their interest and go back to the real grassroots. But yeah, definitely, definitely telling a story is important. That really engages them. Why do they care? And yeah, making sure that you don't go into technical detail too quickly without bringing people up to speed.

 **Martha McKee** 1:03:20

And I guess it would also be important to really highlight where the boundary is between the SA engineering sector and the ecology sector and why both sides should matter and kind of in merging that into the story rather than just focusing on

the things I'm comfortable with. Okay, yeah, that's great advice. Thank you very much.



Katie Facer-Childs 1:03:31

Yeah.

Yeah, like cross-disciplinary work is actually brilliant because you get to bring in extra features that other people have not really thought about before. So if yeah, if the engineers might not have really thought much about the ecology, so you're in the position where you can teach them why this matters and then vice versa, the ecologists need to understand where you're coming from from an environment.



Katie Facer-Childs 1:03:57

Engineering perspective, so yeah, like cross-disciplinary stuff is actually gold dust.



Martha McKee 1:03:59

Yeah.

Yeah, you're right. Yeah, no, that's great. Thank you so much.



Katie Facer-Childs 1:04:05

Yeah.



Gianni Vesuviano 1:04:06

Thank you. Next question will be from Sam.



Sam Tulloch (PGR) 1:04:13

That was really, that's like the best poster advice I've actually ever received. So I thought I'd start with that just in terms of it's nice to have actionable poster advice. It's not just, you should make a poster for that. How do you do it? Make a poster. My question's more about, I'm curious how



Sam Tulloch (PGR) 1:04:33

If you've got something a bit more controversial or something that's got either a bit of a taboo about it or say like it's dealing with like sensitive subject matter, how necessary, like how would you adopt these approaches to deal with something that needs a bit more like of a careful approach?



Katie Facer-Childs 1:04:55

So, so in terms, so in terms of communicating sensitive information or or just like, yeah, OK, so.

I would just, yeah, maybe be a bit careful about giving too much opinion and make sure what you're saying is actually factually correct. But you can still tell stories about it and actually bringing things into a more abstract space can actually remove a lot of the sensitivity. So you can, and a lot of the projects that I'm working on, like abstraction data or hydrological information because they're transboundary rivers is quite sensitive. So that's why we've kind of, we've created these indices of data to see what's normal or below normal or above normal, as opposed to saying there's this many cumecs in the river. So you can make things a bit more abstract in that way.

if you're communicating the actual information in data. In terms of taboo subjects, I've not had much experience of it. I guess obviously talking about drought and we get a lot of information of like, oh, who's just, whose fault is it that we're in a drought right now? And it's like, well, I'm not going to broach that subject.

That's not my field of, you know, it's not my position to say to say that. So just make sure you hold your ground in what you're happy to talk about and what you're not happy to talk about.

I don't know if that answered your question very well.



Sam Tulloch (PGR) 1:06:16

Yeah, that's great. Thank you.



Katie Facer-Childs 1:06:18

But yeah, also, the top tip number one, also be happy to say in your questions, I don't know the answer to that. Sorry.

is also fine. Yeah, I always get scared that someone's going to ask me a question that I don't know the answer to, but I think the more I do, actually, the more refreshing it is to hear people say that, yeah, that's a good point. We don't, I don't know.



Gianni Vesuviano 1:06:40

Thank you. We got another question from Victor.



Gianni Vesuviano 1:06:44

Go ahead.



Víctor Malagón Santos 1:06:46

Thanks, Katie. Thanks so much for the great talk. So next week, I'm going to a conference, and I've been given an oral talk. But I've realized, yeah, I'm quite early in my project, so I may not have the final message of my research just yet. So I've been realising this week that, in fact, it would have been better to have a poster presentation to have more interaction and feedback from



Víctor Malagón Santos 1:07:07

from other people. So, what would you suggest to get more feedback in another presentation in, yeah, in this situation? Like, would you make it more engaging or would you encourage people to ask questions afterwards during a coffee chat?



Katie Facer-Childs 1:07:22

So there's different ways you can go about it. So you can give, so in your talk you can really highlight we're at the first stages of this, this is our ambition, this is our vision, this is our goal and you can focus your project, your talk on that. I don't know if you have, like obviously one thing is you can have your e-mail address or your social media contact on every single slide to make sure that if people pick pick, have time to pick that up, especially if you run a little bit over time and there's not much time for questions. People might think, oh, I want to contact that person, but I can't find their e-mail address. So I often, yeah, I used to put my Twitter handle at the top of every slide. You could, it depends on how confident you're feeling in the in the conference and how big a conference it is, but you could use something like a Mentimeter survey or poll during your talk. So you could let people go through that and you could do that. You give, you know, you could have your whole talk being about some engagement and feedback. But yeah, it depends on whether that's kind of allowed within a session or whether it's going to be a



Katie Facer-Childs 1:08:24

much more presenting things. But yeah, there's lots of ways you can go about it. The other thing you could do is you could set up a survey online and you could have a

slide with QR code on it. I've had that a few times and say to people, I'm at the beginning of this project, or you could end with your QR code on there. I'd love to get your feedback on these questions. Please scan this QR code and fill this in. whenever you get the chance. That's another way of doing it. So yeah, you could definitely get some engagement from your audience still. But yeah, definitely really like focus on the introduction to your work in your in your in your presentation, why are you doing it?



Víctor Malagón Santos 1:08:55

Yeah.

Yeah, OK. Yeah, thank you.



Gianni Vesuviano 1:09:08

Thank you.

Just like to close the session. Oh, Steve, would you like to say something?



Steven Cole 1:09:16

I was just going to, I was just going to follow on with what Katie is saying. I think that most conferences and most audiences understand that people present things at all different stages of projects, and especially if you're a PhD or a junior researcher. they're normally really receptive and helpful. I mean, you'll always get the odd person that may be a bit difficult to deal with. But most people are really supportive and helpful. And I think like what Katie is saying, I'm sure you'll get if you put an invitation for some

Feedback, you'll get people, people very kind often, and we'll we'll.

give you a bit of time, either come and talk to you or send you something.



Gianni Vesuviano 1:10:09

Yeah, that's true. That's a very good point.

So closing the session now. Thank you to both our presenters this morning. The next session after the break will be creating fair outputs. It will be a workshop that will be at 10:30 our time, so in 16 minutes time.

As always, after the break, it's a new Teams link, so please check your emails for that. And thank you. Have a good break. See you at 10:30.

- **Gianni Vesuviano** stopped transcription