UK Centre for Ecology & Hydrology

Visual storytelling using National Capability data

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Date 28/04/2021

UK-SCAPE
UK Status, Change and Projections of the Environment

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Contents

Summary

UKCEH held a visualisation-training event with three aims:

(i) Increasing capacity in UK-SCAPE and in HEIs for scientific staff to create engaging visualisations from their research

(ii) Fostering awareness of UK-SCAPE data and knowledge

(iii) Supporting collaboration between staff funded on UK-SCAPE and researchers in the Higher Education Institutions (HEIs).

The training was attended by 23 UKCEH and 17 HEI staff

Attendees were invited to join a series of 5 workshops. These workshops covered design principles, using design software, designing infographics as well as how to bring data into design software. There workshops were complemented with a frameing workshop at the beginning, a practical ‘drop-in’ workshop, and an evaluation workshop at the end.

Feedback from participants highlighted:

(i) An increased awareness of UK-SCAPE data, particularly amongst HEI participants

(ii) Self-reported increase in design skills, knowledge and confidence

(iii) Lack of time is a common barrier to producing visualisations, that still needs to be addressed

(iv) Lack of access/knowledge of the right tools for visualisation was no longer reported as a barrier for any of the participants at the end of the course.

1. Aim of training

The overall aims of this short training course were:

1. To increase capacity for visual communication with a short training programme aimed at researchers from UK-SCAPE and staff from stakeholder HEIs.
2. To co-create a range of visual outputs communicating UK-SCAPE research.
3. To explore methods of improving data visualisation using design software, and mapping workflows between various statistical computing and graphics packages such as R or ggplot.
4. Two-way engagement between UKCEH and HEIs focused on National Capability funded data and activities
5. Engage end users in UK-SCAPE research and data products.

2. Recruitment and selection process

The course was advertised to UKCEH staff and HEI staff within the UK-SCAPE community via Task leads (Appendix 1). In total 48 applied (Table 1).

Table 1 – Thematic area and number of attendees from UKCEH and HEIs.

	UKCEH	HEI
Participation		
Expressions of interest	29	19
Registrations	21	14
Drop-outs*	1	6
Drop-out rate	5%	43%
Attendees	24	13
Attendance rate	86%	69%
Thematic area		
Air	4	2
Soil	5	1
Biodiversity	4	7
Water	9	3
Other	1	1

*most drop-outs' places were filled with UKCEH staff on the waiting list, or last minute requests to join from HEI staff.

Drop-out rates and attendance were worse amongst HEI attendees compared to UKCEH attendees and, despite reaching out to a similar number of people, expressions of interest were lower amongst HEI stakeholders. It is not clear why this is the case, but it may be that UKCEH staff were more comfortable attending a course organised by UKCEH, and felt less comfortable reneging on a commitment to their own organisation. Regardless of the underlying cause, future training events that bring in HEI participants should note that drop outs are likely to be higher and factor this into their recruiting strategy. Additionally, co-badging the event with an HEI stakeholder organisation, may make the event more appealing to the HEI community.

The balance of representation of domains across the UK-SCAPE themes was reasonably good, though water was over represented amongst UKCEH staff and biodiversity over represented amongst HEI staff. Some imbalance is to be expected, though future courses might wish to target specific UK-SCAPE tasks, or HEI stakeholder groups to redress this.

3. Training

1.1 Prior to course commencing

In August 2020, participants who had confirmed attendance were invited to a dedicated Slack channel. Slack is a free team working tool, which focused communication and discussion into one place.

The HEI colleagues were invited to send 100 words describing their work. In total 13 complied with this request, which is all but one of the HEI colleagues who attended the course.

In general HEI colleagues described their reasoning for joining the course was both to learn about visualisation of data as well as learning more about UK-SCAPE research. Some were already familiar with UK-SCAPE data, while others were working in a similar field and wanted to learn more.

1.2 Workshop 1 – Project framing workshop – 2 hours

The aim of this session was to discuss broadly the experience, challenges and barriers from the perspective of the attendees. Issues such as

- Why do we need better visualisations?

- Who are our audiences?
- What are our greatest barriers to visual communication?
- What common issues can we identify around visualisations?
- Are the needs of the four research sectors (air, water, soil, biodiversity) different?

The software package MIRO was used as an interactive tool (Fig 1). The attendees each expressed their opinions over a series of tasks (Table 2).

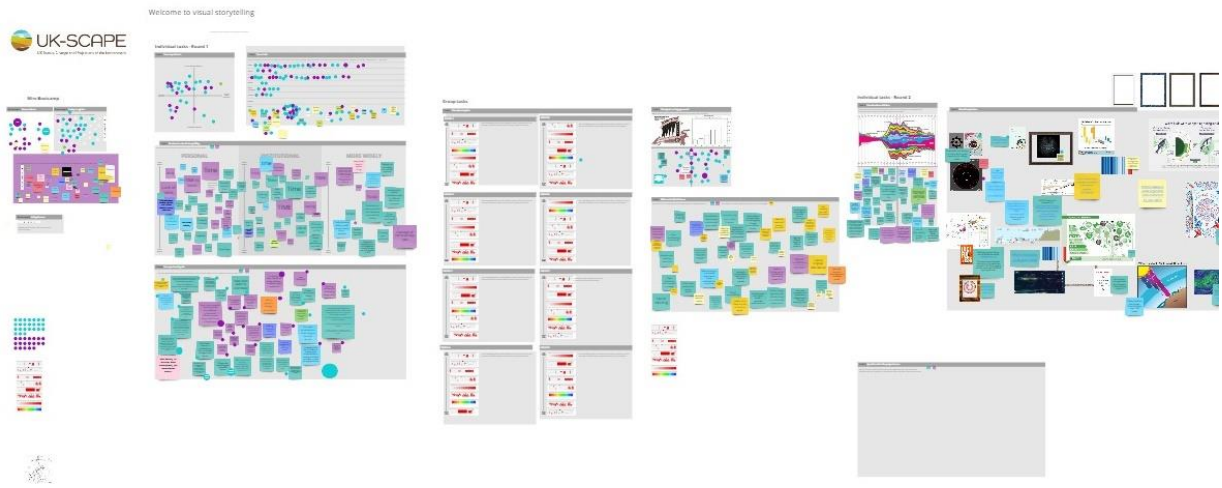

Figure 1 - Screen shot MIRO board with the results of tasks

Table 2 *Participatory sessions conducted in Project framing session*

Activity	Tool	Response
Your Experience	Two-dimensional matrix (x-axis Design experience, y-axis Data visualisation experience	A wide variety of experience (see figure 2)
Your Tools	List of tools	R, Excel & PowerPoint most popular.
Barriers to Visual Storytelling	Virtual post-its in three sections	
	Personal	Time, Skills, Lack of creative ideas
	Institutional	Time , Lack of recognition, Licensing costs & access to software

	More widely	Multiply audiences, Visualisations not valued by funders or managers
Your personal goals	Virtual post-its	Various, written from personal perspective to overcome barriers mentioned above
Ranking types of visual perceptions	Breakout groups discussing common scales, length, area, volume colour etc of visualisations	Groups varied – discussed advantages and limitations
Chartjunk or Engagement	Ranking between two form of graph	Depends on audience – many aspects discussed
Risk and ethical issues	Virtual post-its with risk- link to solution	Simplification – ensure link to further details. Data protection, copyright of image –GDPR training. Build in bias – seek opinion of others

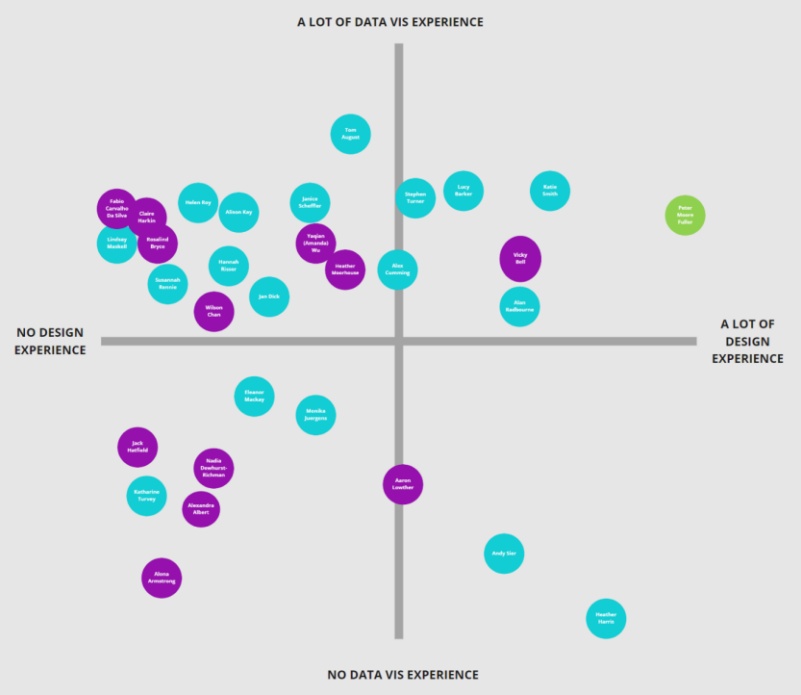

Figure 2 – self-reported experience at the beginning of the course. Blue dots are UKCEH staff, purple are HEIs and green is the facilitator

1.3 Workshop 2 - Design principles and software training – 4 hours

Two identical sessions of the workshop were scheduled on two different dates to ensure the ‘class’ size was small enough to allow effective interactions and discussions. Participants attended the session which was most convenient. This also made it easier for attendees to fit all of the sessions around their existing work commitments.

Aim of session

- Examining key concepts in design - composition, type, images, colour and more.
- Basic training in Affinity Designer, professional design and illustration software

The session commenced with a lecture on the key concepts in design and was followed by an interactive session using the software Affinity Design. Following basic instructions the attendees attempted individually to draw a ladybird using the skills acquired in the session (Fig 2).

Figure 2 Individual ladybirds drawn in Affinity Design software by attendees

1.4 Workshop 3 - Designing an infographic or visual abstract – 4 hours

Two identical sessions of the workshop scheduled on two different dates – participants attend session which is most convenient.

- Brief history of visual communication
- Supervised work session putting skills from workshop 1 into practice to create an infographic or visual abstract

The session commenced with a lecture on the history of visual communication starting with the earliest cave drawings. The remainder of the session was supervised work on creating an infographics. Three design briefs were created using UK-SCAPE research and data. Participants selected a brief, identified their audience and message, sketched an idea, and started work on the design in Affintiy Designer (Figure 3).

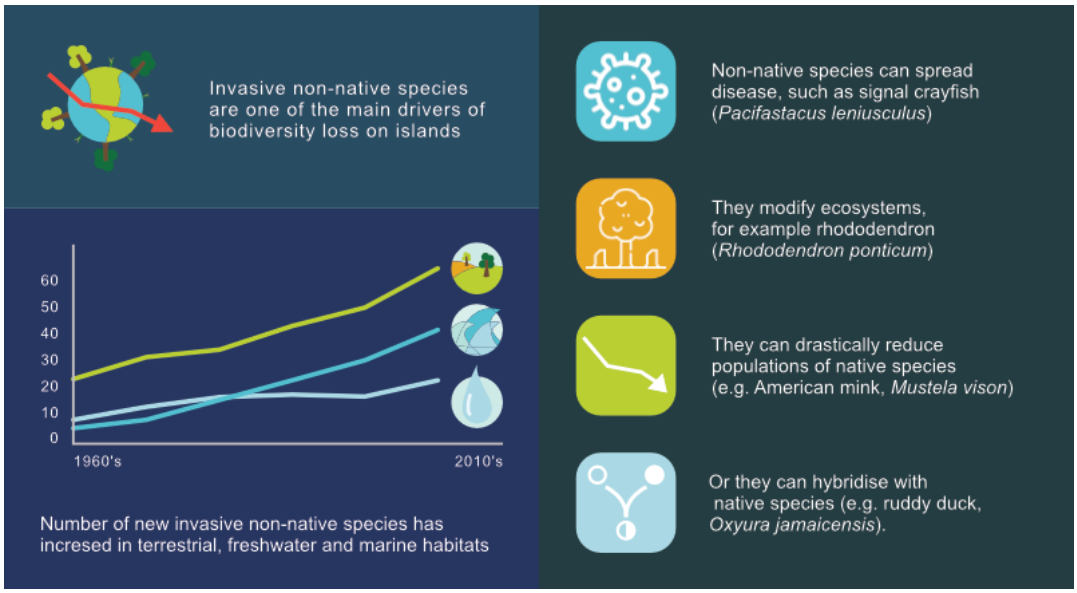

Figure 3 – an example infographic from workshop 3 based on a UK-SCAPE news story about invasive species.

1.5 Workshop 4 - Bringing data into design software – 2 hours

Two identical sessions of the workshop scheduled on two different dates – participants attend session which is most convenient.

- Demonstrating methods of working with data visualisations in Affinity Designer
    - Importing data visualisations from statistical computing and graphics packages
    - Creating new data visualisations
    - Integrating data visualisation with other design outputs

We provided attendees with graphics produced in R and saved in vector format. This is the common format in which researchers already create their visualisations.

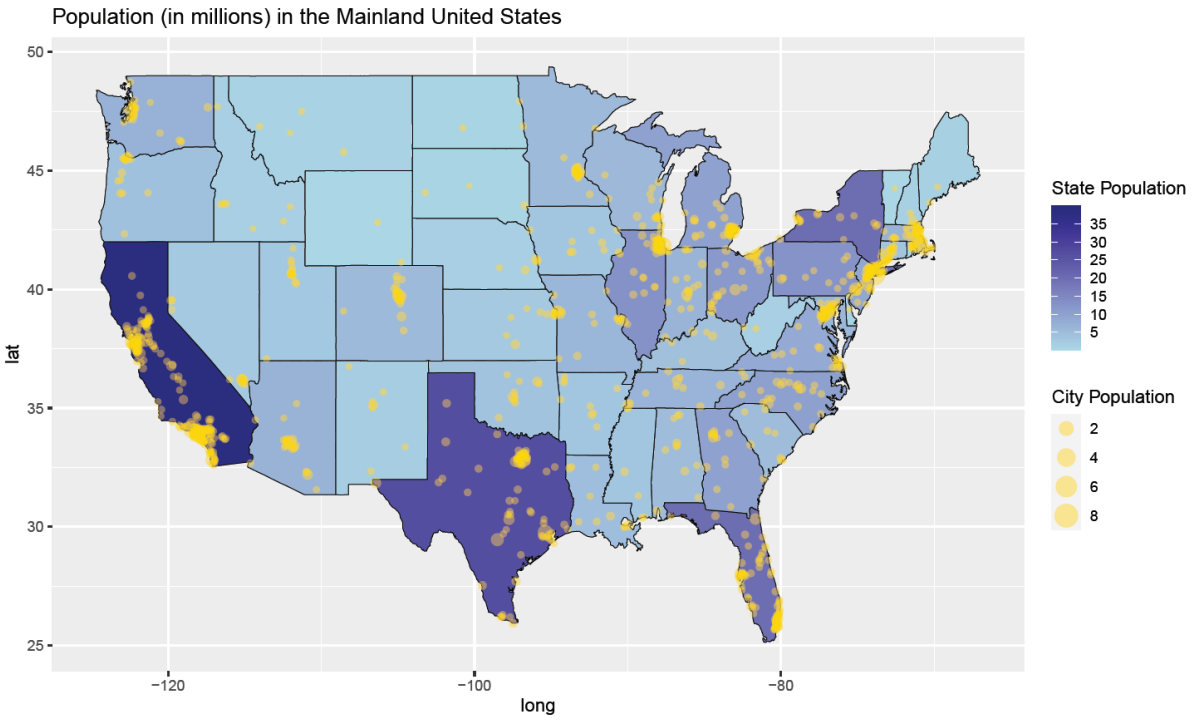

Figure 4 – R figure provided to participants

In this example we provided participants with this map of the population of US states and cities and asked participants to use affinity designer, and the theory they had learnt, the improve the figure.

Participants took a range of approaches to improving this figure, and in so doing learnt how to bring figures created in other software (such as python and R), into a design environment.

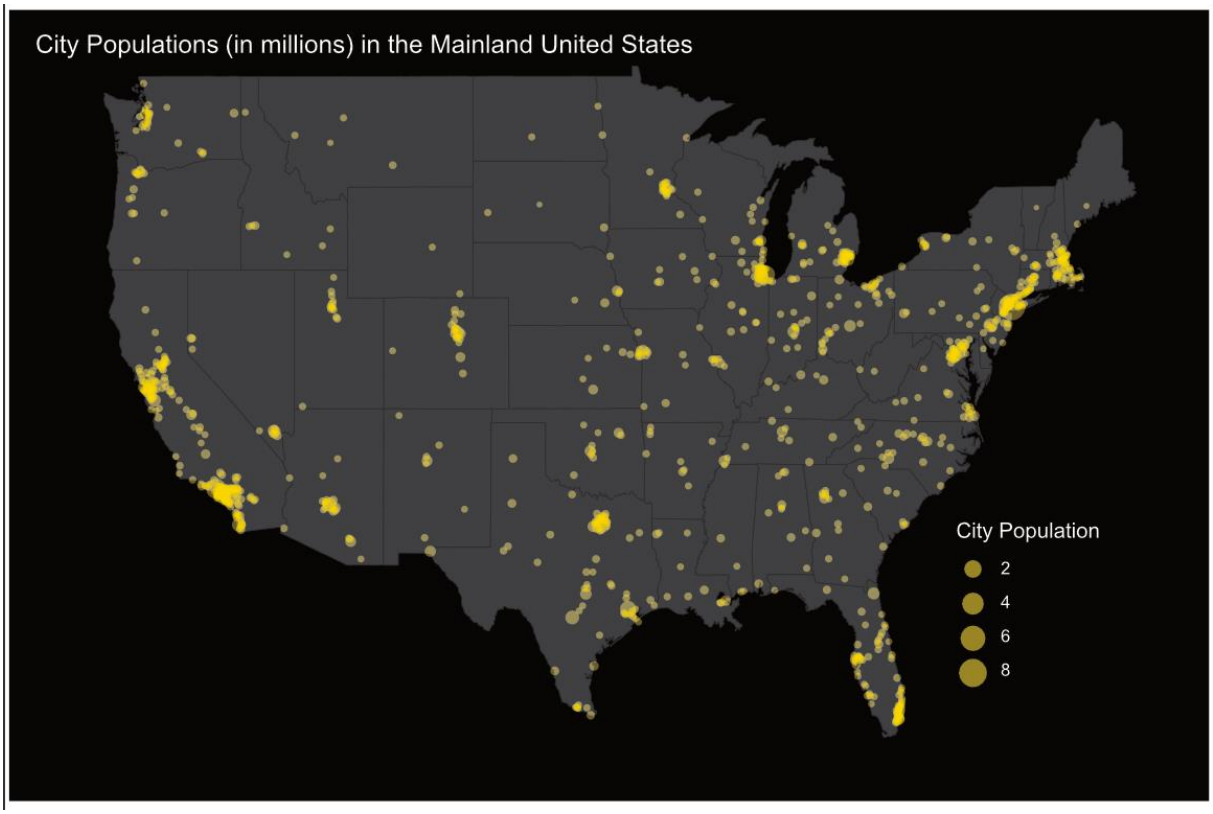

Figure 5 - adapted by Katie Smith

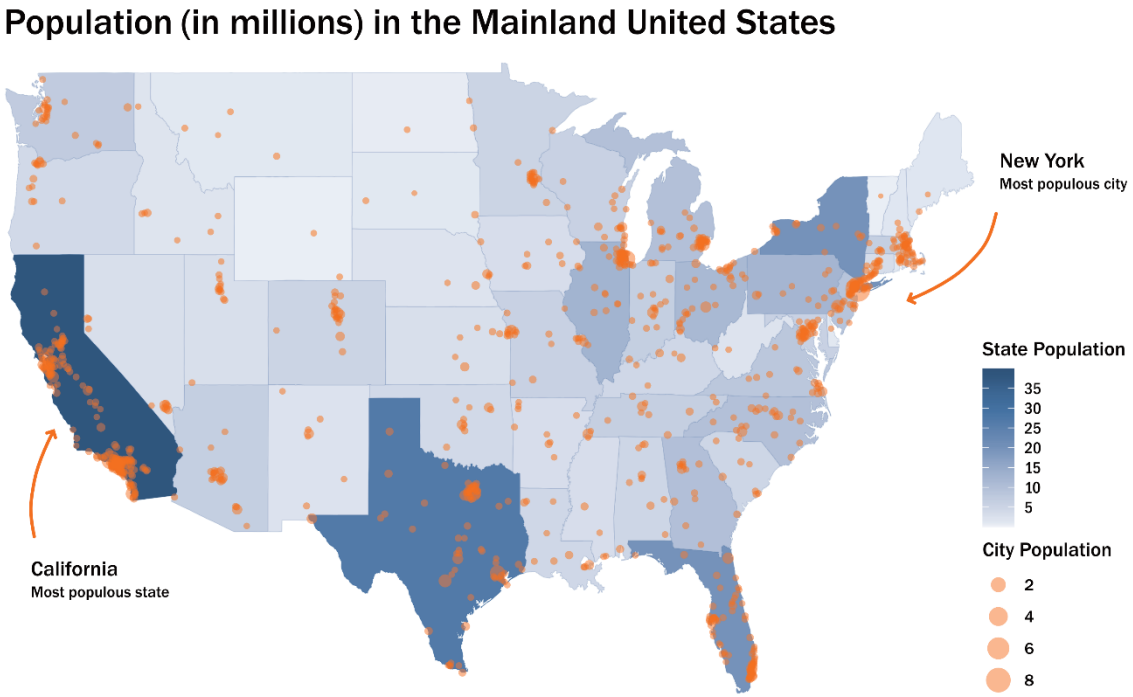

Figure 6 - adapted by Stephen Turner

At the end of workshop 4 participants were encouraged to set themselves a design project relating to their own work that they would work on over the following two weeks. A slack channel was set up for participants to share their project ideas and to facilitate collaboration and feedback. In total 20 project outlines were added to this channel. While people gave feedback to each other on their project ideas, there was little collaboration.

1.6 Workshop 5 - Practical drop in session – 6 hours

The drop-in workshop was an opportunity for participants to get feedback from the facilitator and others, on their visualisation projects. The drop-in session ran all day and participants were able to join at a time that suited them, and for as long as they wanted. The session varied as the day went on, at times focussed in helping an individual participant, with the facilitator and other participants making suggestions, and at other times developing into an open discussion on a topic of interest. In total 22 participants joined the drop-in session for at least part of the day.

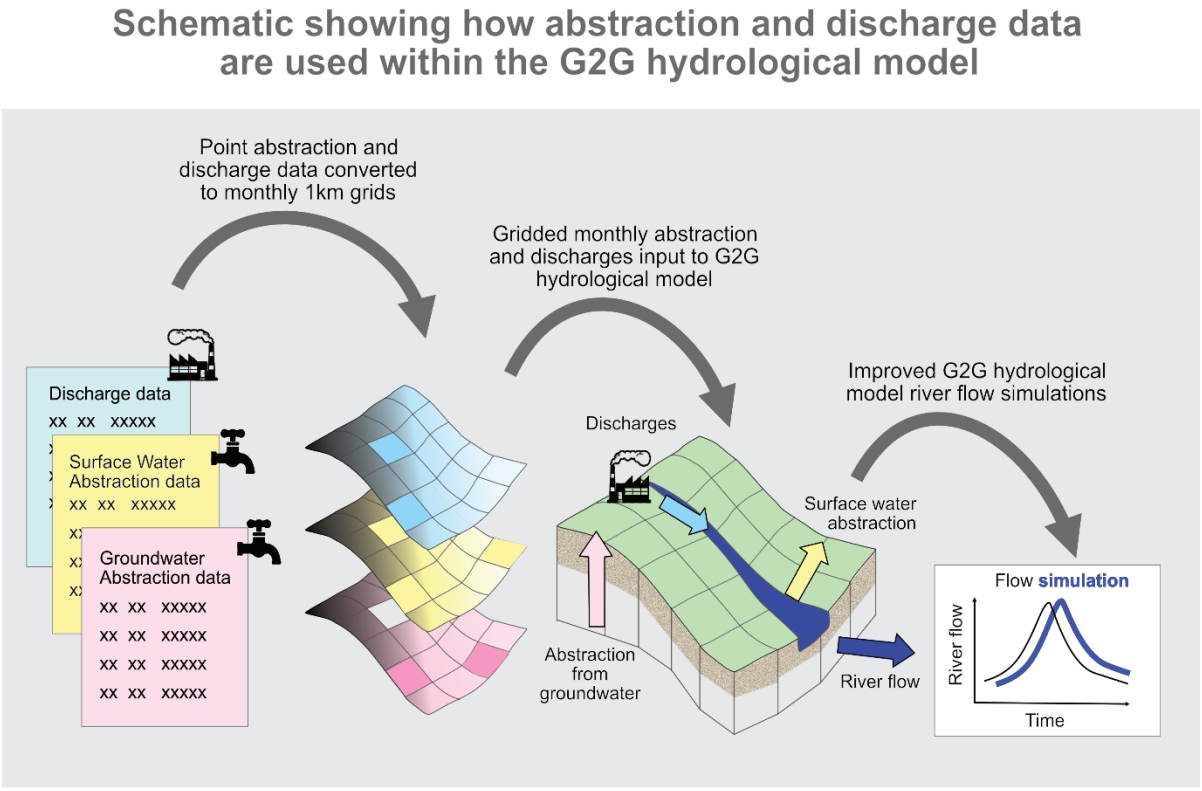

Figure 7 – Vicky Bell infographic of hydrological model. Some participants shared their ideas as sketches, or as raw data, allowing us to see how they progressed their designs over the course of the day.

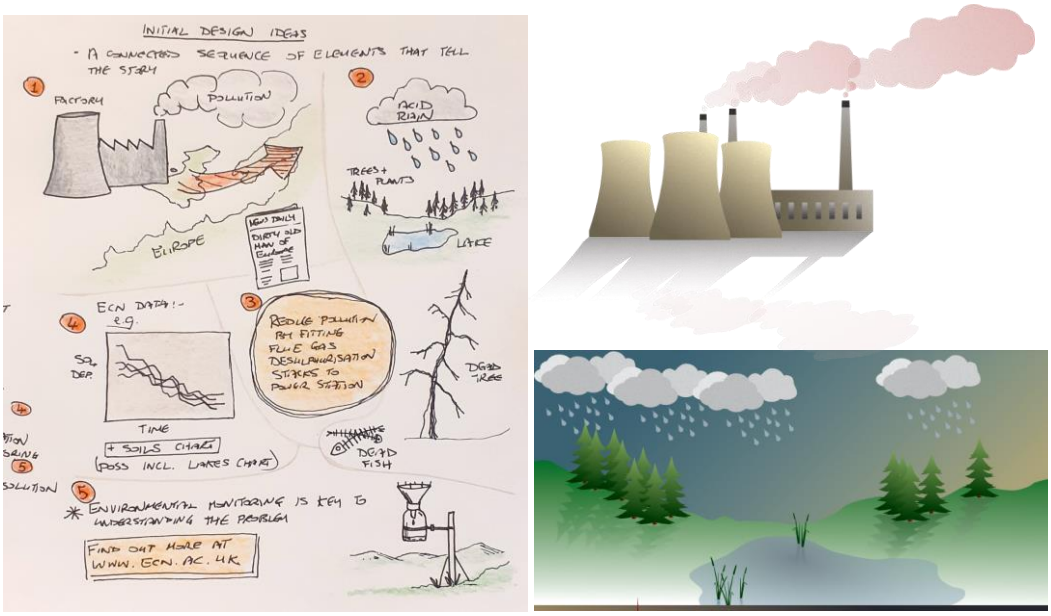

Figure 8 - Sketches and designs produces by Andrew Sier

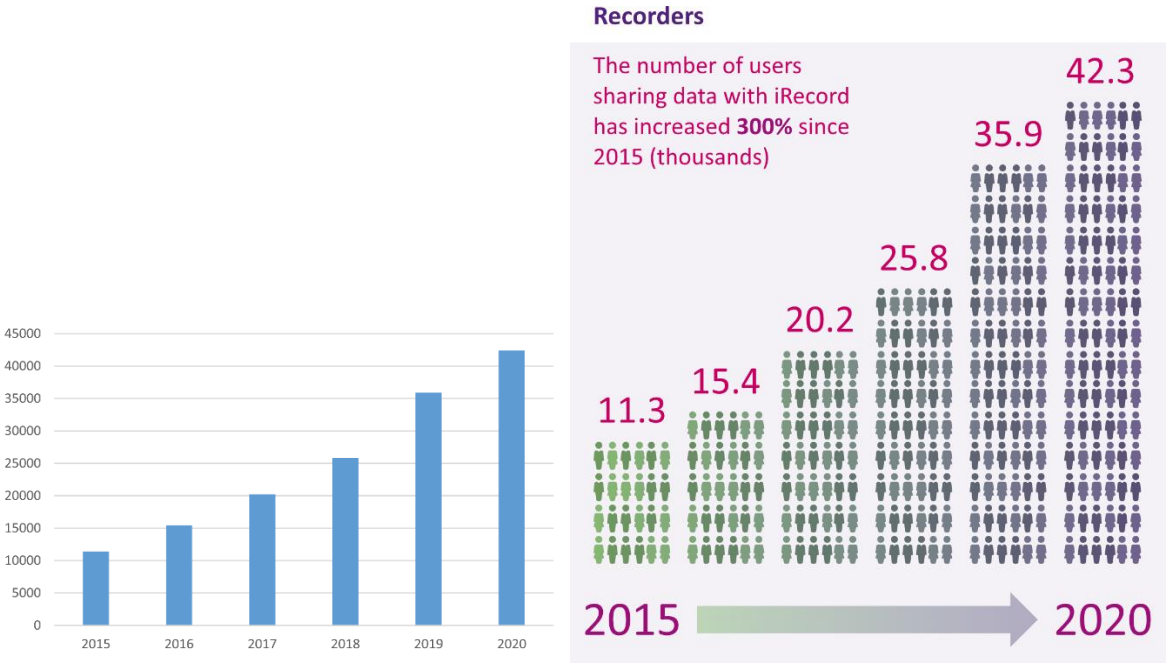

Figure 9 - Initial data and final design by Tom August

After the drop-in session further discussion and support was given via slack, though engagement from participants was fairly limited.

4. Participants' feedback

A final evaluation session was run to evaluate whether our learning objectives had been met, and to understand participants' future learning needs in this area. At this session there were significantly fewer attendees than at the opening session, most notably amongst HEI participants. This was to be expected given that this session mainly provided benefits to the project team, rather than the participants, and no sessions were compulsory. This does meant that interpretation of HEI responses is difficult.

Participants self-reported in increase in design experience (figure 3, compare to figure 2).

Figure 10 - self-reported experience at the end of the course. Blue dots are UKCEH staff (17), purple are HEIs (6). Right-ward shift compared to figure 2 shows an increase in design experience from the course.

When asked **"What was the most useful thing you learnt on the programme?"** participants highlighted that the training in Affinity Designer and design principals had given the knowledge and tools necessary to produce engaging visualisations (aim 1).

"Design principals and introduction to affinity designer"

"Talking as a group about what makes a graphic better. Learning from others."

"Learning how to use affinity designer to create images and infographics as well as edit figures"

During the production of visualisations the slack communication channels were used by participants to show their visualisations and to get feedback from one-another (aim 2). Participants reported that this was valuable, and that they would like to keep using the slack channels beyond the end of the course to get feedback. However, the online nature of the course made it difficult for truly engaging co-creation of visualisations that would have come more naturally in an in-person workshop (aim 4).

"While I didn't collaborate with someone I got loads of really valuable feedback in the slack channel and drop-in session"

"I think it was hard, given the time frame, to learn skills and spend time collaborating. However I think we benefitted from working together on Slack."

"I learnt a lot from others but not as collaborative as I had hoped but time limited"

Participants reported improvements in their design skills and knowledge which resulted in improved ability and confidence. Many people reflected that one of the elements of the training that was most helpful was the practical training in Affinity Designer, and the session that explored how to import figures from other tools (such as R) and edit them (aim 3).

"Gaining knowledge on how to bring graphs from excel into Affinity Designer has been a game-changer for me"

"I'd still use python for maps/plots but can now edit them in Affinity Designer to make them more interesting"

"I'm much more open to take a graphic from R and make it more exciting [using Affinity Designer]"

Overall there was an increase in awareness of UK-SCAPE data and research. This was helped by including UK-SCAPE data in the design briefs in workshop 3 which gave people the opportunity to get to know some UK-SCAPE activities in more detail. Perhaps surprisingly UKCEH participants fed back that they were not always aware of the breath of UK-SCAPE activities and enjoyed the opportunity to learn more (aim 5).

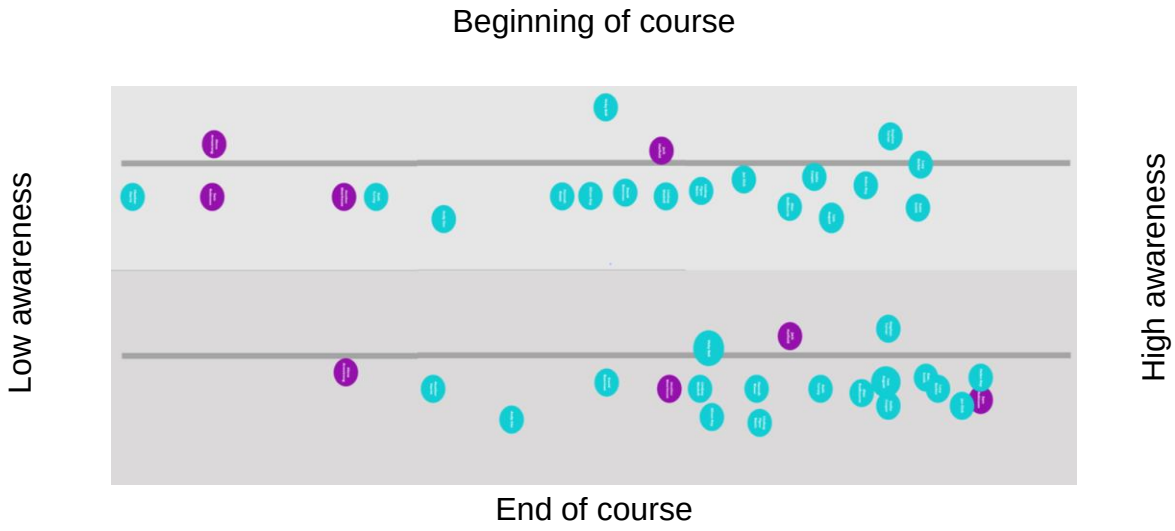

Figure 11 – Awareness of UK-SCAPE datasets showed evidence of improvement (rightward shift), between the beginning of the course (top), and end of the course (bottom). Individuals are represented by coloured dots, blue are UKCEH staff and purple are HEI staff.

At the end of the evaluation workshop participants discussed how UK-SCAPE might improve its visual storytelling and what activities participants would want to be seen run in the future. Suggestions for UKSCAPE focussed in three areas; communication, networking and time.

"Can we at UKCEH make better use of the comms channels that already exist, both internal and external (in grapevine and yammer)"

"Maintain our network! E.g. maintain the slack channel"

"Time! Talk to group leaders, get it integrated into project proposals"

UKSCAPE should consider what channels it has available to communicate the visualisations that researchers have produced, and may go on to produce in the future. This should include websites, social media, as well as on-site displays. Networking has been shown through this training programme to be important for both stimulating ideas as well as iterating designs. We plan to keep the slack channel open to facilitate this in the future, but activities such as hackathons or brainstorming sessions focussed on visualisations may help UK-SCAPE produce visualisations in the future. Finally, many participants highlighted time pressure as a significant factor that limits their ability to create engaging visualisations. UK-SCAPE has acknowledged this pressure, which was part of the rationale for running this course, but in order to reap the benefits space must be made for these activities.

"We are given time for training [in data visualisation] but not for implementing what we have learnt"

"I though [the course] would save me time when creating visualisations, but I'm just getting better outputs for the same amount of time I put in"

"I'm still short of time but have realised perhaps things may not take as long as I expected"

5. Sharing lessons learnt

In order to widen the dissemination of the lessons learnt through the course, and as an additional opportunity to share information about UKSCAPE data sets used though the process, we arranged a webinar, open to all. The webinar presented the context for our course, a brief overview of the course content, and then spent the majority of the 2 ½ hour session hearing from course participants about their visualisations and research.

In total 176 people registered for our webinar but only 158 left a name and/or email address. Using the email address the organisation of the participants were identified when possible. It was therefore possible to identify the organisation of 90% of attendees. The following statistics are from these 90% of attendees with an identifiable organisation.

A third of participants were affiliated to a higher education institution (33.5% 53/158) primarily UK institutions (Table 1) but there was also eight representatives from Spain (1), Malaysia (3), Ethiopia (2) and Zambia (1). In total 23 UK higher education institution where represented.

Participants from non-departmental government bodies and government agencies where well represented with 27 and 14 participants followed by charities (8) and commercial organisations (4). Just under a quarter of participants were affiliated to the host institution, UKCEH (22.8% 36/158).

Table 3 – The number of participants from each organisation represented at the webinar

Organisation	Number of participants
High Education Institution	**53**
Birmingham City University	1
Cranfield University	1
Heriot Watt University	1
Imperil College London	3
London School of Hygiene & Tropical Medicine	1
Newcastle University	3
Northumbria University	1
Open University	3
Solent University	4
Strathclyde University	2
University of East Anglia	2
University of Aberdeen	1
University of Bangor	1
University of Cambridge	1
University of Cardiff	1
University of Edinburgh	1
University of Glasgow	1
University of Leeds	6
University of Leicester	2
University of Nottingham	3
University of Reading	2
University of St Andrews	2
University of York	2
Universitat Politècnica de Catalunya, Barcelona, Spain	1
Universiti Teknologi Malaysia	3
Copperbelt University, Zambia	1
Arba Minch University, Ethiopia	2
Addis Ababa University	1
Non-Departmental Government Body	**27**
British Antarctic Survey	1
British Geological Survey	19
National Centre for Earth Observation	1
National Oceanography Centre	1
Natural Environment Council	3
Science & Technology Facilities Council	2

Government Agency	14
Forest Research	7
JNCC	3
Natural Resources Wales	2
Public Health England	2
NGO	**8**
Earthwatch	1
Practical action	1
Plymouth Marine Laboratory	5
Royal Horticultural Society	1
Commercial	4
Infohackit	1
Institute for Environmental Analytics	1
Studio Liddell	1
Timber Strategies	1
Independent intergovernmental organisation	**1**
European Centre for Medium-Range Weather Forecas	1
Museum	**1**
National Museum Wales	1
Unknown	14
Host Institution-	**36**
UK Center for Ecology and Hydrology	36

Very few participants of the webinar dropped out early with the majority (73%) of them staying for over 2 hours (figure 12). We did see some drop off as we moved from presentations into a discussion session at the end, which is to be expected.

The chat in the webinar was used to field questions and for participants and audience members to share ideas and resources. We also received feedback on the webinar through the chat.

"Got to say that the quality of the Infohackit course is one of the highest of any training course I've been on"

"Thank you for such a useful day - it has been hugely useful for planning my future science story telling"

"Thanks for this great presentation today. I have learnt enough to go away and produce better graphics. Thanks"

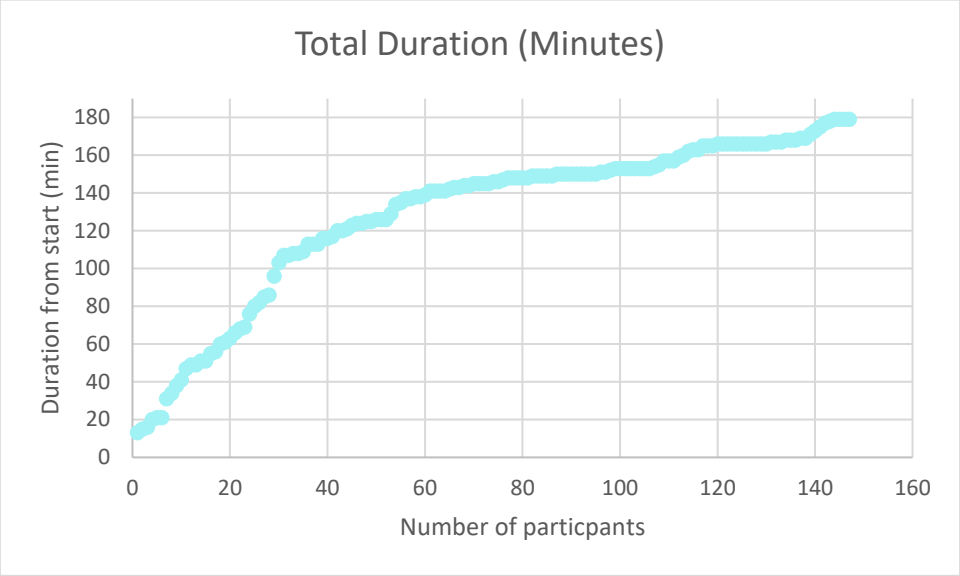

Figure 12 - The duration each participant was on the webinar for, sorted from shortest to longest

The webinar was recorded in full and the video is available on YouTube for anyone to view. This, along with some of the visualisation produced on the course will be shared on UKSCAPE webpages currently in production.

Appendix 1. Email invitation to UK-SCAPE task leads

From: UKCEH learninganddevelopment

Sent: 31 July 2020 11:09

To: UK-SCAPE Task leads (addresses omitted to protect personal privacy)

Subject: Visual Storytelling

Dear Task leads

UKSCAPE (WP5.2) is running a Data Visualisation training course for UKCEH staff and accompanying HEI staff members who work on data sets and analyses linked to UKSCAPE. This training will include a total of 2 days training on the theory and practicalities of creating engaging visualisations e.g. complex diagrams, posters, visual abstracts using design principles and half a day of workshops sharing best practices and challenges, details below. Training sessions will be spread over several days (course dates to be confirmed).

Staff time is also available for UKCEH attendees to work on visualisations beyond the end of the training course so that they can be shared on the UKCEH website. At this stage we are asking UKSCAPE task leads to forward this to members of their task who might be interested in attending the training and to contact and nominate members of the HEI community who work with UKSCAPE data sets or collaborate on UKSCAPE projects, and would also like to attend.

Objectives

1. To increase UKCEH capacity for visual communication with a 2.5 day training programme aimed at researchers who need to communicate their science.
2. To produce a range of visual outputs communicating UKCEH research outputs e.g. graphs, charts, and informatics
3. To explore methods of improving data visualisation using design software, and mapping workflows between various statistical computing and graphics packages such as R or ggplot.
4. Engage end users in the HEI community and wider in UKCEH research and data products

Training session 1 - Design principles and software training – 4 hours

- Examining key concepts in design - composition, type, images, colour and more

- Basic training in Affinity Designer, professional design and illustration software

Training session 2 - Designing an infographic or visual abstract – 4 hours

- Brief history of visual communication
- Supervised work session putting skills from Training Session 1 into practice to create an infographic or visual abstract

Training session 3 - Bringing data into design software – 2 hours

- Demonstrating methods of working with data visualisations in Affinity Designer
- Importing data visualisations from statistical computing and graphics packages
- Creating new data visualisations
- Integrating data visualisation with other design outputs
- Assignment
- Discussion and support via dedicated Slack channel

Training session 4 - Practical session - 6 hours

- Supervised working session for working on advanced drafts of design outputs
- Presentation of individual projects
- Finishing off period
- Further discussion and support via Slack channel

We would ask all those attending to bring research findings or data summaries with them so that through the training staff can both learn the skills needed and create their own visualisation which can be used afterwards in UKCEH communications and publicity around each research project.

Training Workshops will be conducted using Zoom, and communications will be managed via Slack. Design training will be given in the software Affinity Designer. Workshops will be led by Peter Moore Fuller (infohackit) and Dr Tom August (UKCEH).

If you would like to take part in these workshops, please register your interest by contacting learninganddevopment@ceh.ac.uk. Thank you.

Soraya Fawcus
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