

Imperial Visualisations: working in partnership

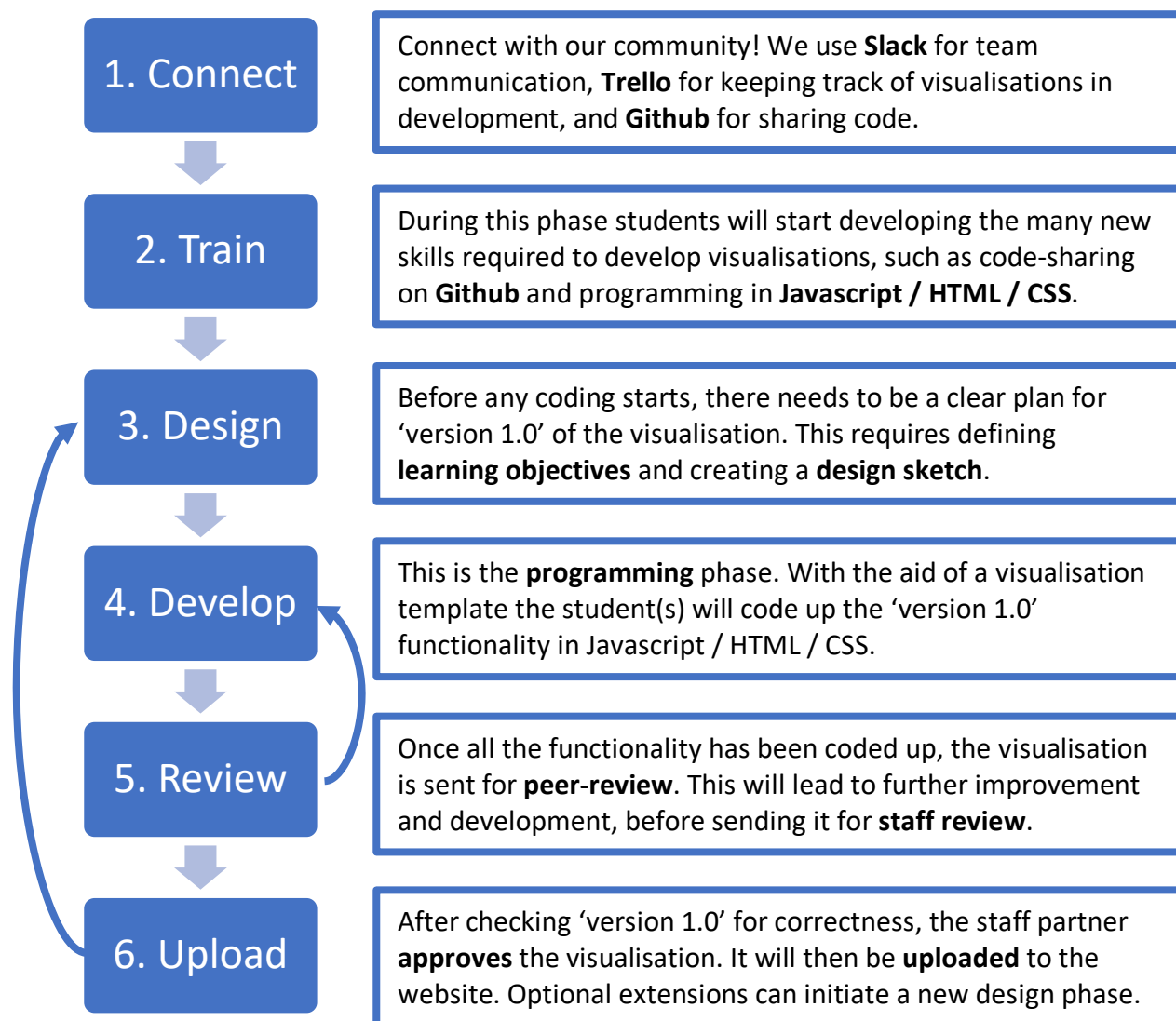
Welcome to the Imperial Visualisations community! We are excited that you are planning to create interactive visualisations for use in your STEMM lecture courses – they form an excellent learning tool to enhance students' understanding of abstract concepts.

All our visualisations are created in staff-student partnerships. What does 'working in partnership' mean? There are three guiding principles of partnerships which we value particularly, and which set them apart from mere student participation or a student-supervisor style relationship.

1. The partnership is based on mutual respect and draws its strength from **equally valuing the expertise of staff and students**. Staff are experts in teaching as well as in their subject-specific domain; students have the expertise of being learners. During the project, the students will develop expertise in coding in Javascript and HTML.
2. A partnership means a **joint ownership of both the development process and the final visualisation**. Therefore both staff and student(s) contribute to the decision-making of how to work on the visualisation as well as the functionality and the look of the visualisation.
3. The responsibility for the visualisation and its development is **shared, but not equal**. It is up to the staff and student(s) involved in the partnership to jointly define exactly who is responsible for what, in particular during the design process. Generally there is an expectation that the student is responsible for the coding process, and the staff member is responsible for the correctness of the final product (e.g. the Maths / descriptions etc).

The development process: from initial idea to implementation

The development of the visualisations follows 6 essential steps, which are outlined below. Each of the steps are described in more detail in later sections.



There have been purposefully no timelines included, as these will differ for each visualisation. The students are working on this project as an extracurricular activity. It is therefore important that there is no pressure for them to deliver during busy times - their academic work should always be given priority! Conversely, academic staff often work under strong time pressure, and cannot be expected to make themselves available at all times.

Throughout the entire process, experienced staff and students are on hand to discuss and help the development of the visualisations. Our community meets every Wednesday in term time from 12 pm in our drop-in Code & Crisps sessions – this is a great opportunity for staff and students to come in, have a chat, and have a go at developing your visualisation. Further detail on each of the phases is given in the sections below.

Connect

- **Slack:** Our workspace on Slack is at: <https://impviscodecrisps.slack.com>. If you have not got an invitation link to the workspace yet, you need to request one by contacting Caroline Clewley (c.clewley@imperial.ac.uk). Slack is most effective if you download it to your computer and/or phone and set the notifications so that you will be alerted when a new message is posted (this can be done separately for each channel or private message). Once you have started developing a visualisation, it is recommended to create a private channel for all the partners to discuss the visualisation development. The main open channels to monitor are:
 - #drop-in sessions: for news and info about Code & Crisps drop-in sessions;
 - #learning_materials: for links to useful material in order to learn the relevant programming skills;
 - #visualisation_ideas: for posting new ideas for visualisations, plus the invitation link to edit the Trello board of visualisations in progress.
- **Github:** we store and share our visualisations code on Github. The first repository to look at is <https://github.com/Imperial-visualizations/Tools-for-Developers>. Here you will find visualisation templates, some example code, and a number of useful guidelines documents.
- **Trello:** We keep track of our visualisations in progress at <https://trello.com/b/mR6L3TtH> (anyone can view this, but to edit it you need to follow the invitation link on Slack). Each visualisation is represented by a list with its status, staff partner, student partner, department / course, and description. To create a new visualisation list, it is best to copy an existing list and edit the details. The status needs to be updated as the visualisation progress and is colour coded:

Green:	Looking for student partner(s)
Yellow:	Looking for staff partner(s)
Purple:	In development
Dark blue:	Under review
Light Blue:	Being improved (further development after review)
Navy:	Live (uploaded to website)

When you click on the status, you will also see a check list for each phase of the development process: these need to be ticked off as they are completed.

Train

There are many different skills needed to create a good visualisation for education, e.g. design skills, pedagogy knowledge, subject expertise, and coding skills (such as Javascript, HTML, CSS, ...). Nobody in our community is an expert in everything: instead we find out what we are good at as we learn, and we continually help each other out where we can.

We've gathered as much of our experience on Slack and Github as possible: look at the #learning_materials channel on our Slack workspace for tips on how to get started on learning Javascript / HTML / CSS, and have a read through the guidelines documents and templates on our Tools for Developers Github repository. Most importantly however, it helps to work together. Drop in during our Code & Crisps sessions, every **Wednesday in term time 12 – 2 pm in the Digital Learning Hub learning space (Whiteley Suite, RCS building)** to join us. There will always be mentors on hand who have worked with us for a while who can help you along.

Design

When you have an idea for a visualisation, you can post a message in the #visualisation_ideas channel on Slack to find a partner (staff or student). Next, create a list for your visualisation idea on the Trello board: <https://trello.com/b/mR6L3TtH>. To do this, follow these steps:

1. Copy the 'Visualisation Idea Template' list (click '...' and choose copy) and change the title of your list to the name of your visualisation.
2. Edit the 'Status' card at the top of your list. First change the label to indicate whether you are looking for staff or student partners. If you have already formed your partnership, change the label and status to 'in development'.
3. Add as much information as possible where you find the <> brackets in the individual cards in the list. Add as many extra cards as needed to insert any extra ideas or extensions.

In order for your visualisation to become an effective learning tool, the design is all-important. Before you do any coding, you will first need to phrase the **learning outcomes**: what are the key points students should learn from the visualisation? Make sure to write these down in the "Learning Outcomes" card.

After writing out the learning outcomes, decide on the following visualisation elements:

- Graphics: what will you *visualise*?
- Interactive elements: what will the students be able to *do* with the visualisation?
- Explanations: what *information* will the students need with the visualisation (this can be a combination of text and maths)

The three visualisation elements all need to be designed based on the learning outcomes. Do not add in any complexity unless it is needed to obtain the learning outcomes – it will only lead to confusion.

You now have the design for **version 1.0** of your visualisation. Sketch it out on paper, take a picture, and attach it to the 'design' card on your visualisation idea list on Trello. Also tick off any stages you have finished under 'progress' in the status card of your visualisation.

Develop

This is where the coding starts. You will need to code up all the visualisation elements of version 1.0 – keep coming to the Code & Crisps sessions to talk to us!

During development, keep **version 1.0** in mind at all times: it is very tempting to keep adding in more functionality, but you will never have a final product if you keep getting side tracked. If you have any further ideas, add them as extra cards to your visualisation list. You can add these to your visualisation as extensions once version 1.0 is complete and delivered.

Review & Upload

Once you have completed version 1.0 of your visualisation, set the status of your visualisation to 'under review'. Your visualisation will need to be reviewed by peers (you can choose students on the course you are targeting; also ensure some experienced ImpVis students have a look at it). They will give you comments for improvements. Once these have been implemented, the staff partner will

need to review the visualisation thoroughly ***and vouch for its correctness***. The staff partner can tick off 'signed off by staff partner' box in the status card of your visualisation list on Trello.

You are now ready for your visualisation to be uploaded! To do this, talk to the team and we will help you get it on the website.

You have achieved a milestone! If you had any further extensions in mind, you can now go back to the design phase. Are your extensions part of new learning outcomes? How will you incorporate them: upgrade the existing visualisation (if no new learning outcomes) or – for additional learning outcomes - create a new visualisation, possibly as a new section?

If you have any further questions, reach out on Slack or get in touch with Caroline Clewley at c.clewley@imperial.ac.uk. We hope that you will enjoy the process and that your final visualisations will prove to be of good use!