The CVS's Guide to Leading a Lab

This guide has been generated by the CVS Research Integrity Team as a template for research groups ethos and research aims and to define the groups responsibilities and expectations. Moreover, it is designed to highlight key points about managing a laboratory. The guide is likewise not meant to be prescriptive. It is a collection of opinions, experiences, and tips from CVS Research Integrity Team.

PIs are encouraged to discuss ideas in the guide with colleagues, mentors, and share them with lab members. The PIs are encouraged to supplement the information in this guide from other resources, as well as the articles mentioned in each part, and personalize it for their own group.

Lab Philosophy and Aims

- Identify key scientific questions.
- Answer them using the most appropriate technologies and sound scientific methods.
- Keep the focus on the scientific goals (distractions are everywhere in academia!).
- Group/lab discussion to clarify the scientific goals.

Scientific Strategy

- From human disease to basic science or vice versa: constant cross-referencing of the basic research and back to human disease and human biology.
- To be ambitious in seeking the best systems and methodologies to address the mechanistic questions that arise from human studies.
- Strategy: a mix of high risk–high impact projects and low risk-high publishable projects. It is essential to have the right balance based on people and resources.
- To allow the contribution of early-career scientists in the group to express their ideas; however, the PI takes the ultimate responsibility for the work in the lab and for delivering funders' objectives.

Reading: "Picking a Research Problem – The Critical Question" Kahn CR, NEJM 330(21), 1530-1533

Health and Safety

- The PI is responsible for keeping a training record of their staff to ensure that they have completed all mandatory training and when they have reached competency to work independently. The HSE could ask to see these at any time
- Group members are responsible for adhering to the rules and regulations. The HSE could ask to see your training record, so it is best to keep your own copy.
- PI is responsible for having all necessary H&S permissions in place for the research conducted in their name.
    - Genetic recombination RAs: Allows you to work with and generate animals, cell lines, bacteria and yeast which have been genetically modified.
    - Biological agent: States the risk of working with; human, mouse, fish or fly tissue, samples and cell lines, bacteria and yeast.
    - Procedural risk assessments (RA): All experiments and equipment you use is required to have a RA. This is especially important when there is an incident as the HSE can ask to see them.

    - Animal licence: You are only permitted to do what is written in the Project licence; any deviations will be investigated by the Home Office.
- Group members are responsible for making sure that they know what they can and cannot do within the risk assessments written for the group.

Teamwork and Good Relationships

- The PI is responsible for discussing and resolving the tensions within the group. Dialogue with the members of the group is crucial.

- Talk about good lab citizenship with people of the group.

- Studies show that if we are happy, we work better and are both more creative and more productive. Seven steps towards health and happiness in the lab:

    1. We are people before we are scientists
    2. We are all in control of our schedules
    3. My lab members work with me
    4. Everyone is doing a job just as important as everyone else's
    5. I never expect anyone to do the same as I do
    6. I never compare anyone with anyone else
    7. We all have deadlines

Reading: How to grow a healthy lab https://www.nature.com/collections/pmlcrkkyyq

Career Development

- Annual review (P&DR) to establish personal career aims is valuable but not enough.
- Lab members should be free to discuss personal target and progress informally with PI (mentorship style discussion).
- Support meeting attendance and training courses that bring new skills to the lab.
- Refer to Guidance for P&DR with work allocation model [see form].

Paper Writing and Authorship

1. Build your writing team wisely
2. If you take the lead, provide leadership
3. Create a data management plan
4. Jointly decide on authorship guidelines
5. Decide on a writing strategy
6. Choose digital tools to suit your needs
7. Set clear timelines and adhere to them
8. Be transparent throughout the process
9. Cultivate equity, diversity, and inclusion
10. Consider the ethical implications of your co-authorship
    Authorship should be by consensus, not imposed by a PI!
11. Publications from CVS should adhere to the CMVM fair publication policy concerning core facilities and contributions of technical staff to research publications

Reading: CVS Authorship guidance CVS Authorship Guidelines

Ten simple rules for collaboratively writing a multi-authored paper
https://doi.org/10.1371/journal.pcbi.1006508

CRediT Taxonomy: https://acmedsci.ac.uk/file-download/95261296

Defining the Role of Authors and Contributors: http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html

Funding

- To be mindful of the motivation of the funders in providing money and take care to make sure that we achieve good outcomes that we can report back.
- Support members of the lab in pump-priming grant applications.

Lab Meetings

"The best way to boost research quality is to discuss it often and freely in lab meetings".

The elements of the meeting that we should include are:

- Informal updates on bench projects, giving everyone the chance to contribute about troubleshooting or new ideas that may accelerate progress. This is very much round table and informal, with/without a few rough data slides. Where an area of work is new or unfamiliar to some in the lab, PI may ask for a slightly longer presentation with background.
- Discussion of significant papers that anyone has come across that are relevant to our projects.
- Updates from the PI about new developments or plans for the lab.
- Lab management issues.
- From time to time, lab meetings can also be a good chance for lab members to rehearse external presentations.
- Essential papers that anyone has seen that are directly relevant to our work should always be flagged briefly in lab meetings.

Reproducibility and Open Science

- To discuss reproducibility as part of lab meetings in the context of different projects, everyone should be able to justify their stats carefully and to include a final slide in lab meeting presentations describing where data is deposited.
- Open research isn't all or nothing and doing even one thing on this list is better than doing nothing.
- Discuss with colleagues how to make research more open where appropriate to help improve all of our work; if unsure, ask someone for their thoughts & advice.
- These practices improve Reproducibility and Openness in research, though there are others:
    - Sharing Grant Proposals (E.g., riojournal.com/).
    - Sharing reference libraries (E.g., zotero.org/)
    - Writing and sharing detailed protocols & methods (E.g., protocols.io).
    - Keeping an electronic lab book, sharing as appropriate, (E.g. Rspace, openlabnotebooks.org/).
    - Pre-registration of studies (E.g. osf.io).
    - Ensuring statistics are understood and applied appropriately.

    - Continually seek valid critique of, actionable feedback from, and try to find flaws in, your work from colleagues.
    - Submitting draft manuscripts to pre-print servers (E.g., biorxiv.org).
    - Publishing in Open Access journals/ repositories (see doaj.org).
    - Saving files in accessible file formats (E.g. Spreadsheets as CSV files).
    - Sharing code (E.g., github.com) and data (E.g., zenodo.org).
    - Sharing posters & figures (E.g., figshare.com).
    - Using Open Peer Review (E.g., pubpeer.com).
    - Communicating research through Social Media.
    - Publishing with open Creative Commons licenses (see creativecommons.org/licenses/).
    - Comment openly (E.g., hypothes.is).
      This is not an exhaustive list.
- Attend sessions on improving reproducibility and Openness in Research as appropriate, and speak to research integrity advisors, who avidly follow these topics.

Lab Website, Social Media and Public Engagement

- Improve lab website [add lab website here]
- Use (and not abuse) of Twitter [add Twitter links]
- Support Public Engagement initiative in the lab (such as STEM ambassador, science festival etc.) https://www.ed.ac.uk/research-office/winning-research-funding/develop-idea/engagement-and-impact/public-engagement-with-research

Data Management Plan

- Others have generated available data sets which could help inform questions we have without needing to run additional experiments; similarly, we can generate datasets which may well be useful to others. Sharing our datasets & accessing others' is in everyone's best interest.
- Keeping good quality meta data is extremely useful, for ourselves and for others.
- Log everything done, even if it's seemingly unimportant.
- Have a consistent file naming storage for file storage, usually grouped by project ID, throughout the lab.
- Have a consistent data naming system for data storage throughout the lab, and include the following fields when naming data:
    - Date of creation
    - Name of researcher/ team/ lab associated with data
    - Project ID
    - Description of content
    - Name of creator
    - Version #
- Best practice for saving excel spreadsheets is to save them as CSV files.

File storage: https://doi.org/10.1038/sdata.2016.44

Data organised into spreadsheets:
https://www.tandfonline.com/doi/full/10.1080/00031305.2017.1375989

Data management & Meta data (MANTRA, Edinburgh's online data management course): https://mantra.edina.ac.uk

Clinical data access and handling:

You should have a clear plan on how you will use and handle clinical data before starting any research. Permission to use clinical data can vary with each project, so make sure you have the appropriate ethical and governance approvals in place. It is useful to state under what permissions you are using the data. If you are unsure about your permission to handle data, you should discuss with a senior colleague and seek advice from the sponsor/NHS R&D office. You should consider the risks of handling data and handle data with care in line with the data protection policy and protocols. When research involves personal data, a Data Protection Impact Assessment should be carried out and researchers should complete the online Learn module called "Research and data protection".

Useful tool: https://www.ed.ac.uk/data-protection/data-protection-impact-assessments