Chapter 4
Communicating Research

The value of research is lost if it is not communicated to others. The extraordinary insights of Leonardo da Vinci remained locked in his mirror script in his notebooks for centuries, and so did not influence subsequent events in the way that they could have, had they been published.

The scientific paper appearing in a recognised journal remains the primary mode of distributing research results. The form is evolving rapidly in the transition from paper to electronic publishing, but still retains elements from its historical roots. Peer review was introduced for the Philosophical Transactions of the Royal Society of London in the 1670s by its first secretary Henry Oldenburg. Such review remains the principal filter on what is published, and the process can be public in some newer open-access journals. The role of journal editors varies significantly between journals, but ultimately they mediate the review comments and make decisions about publication.

The other important way of disseminating research results is through conference presentations. Oral presentations at large meetings are commonly brief – so that care is need to convey the key messages succinctly and effectively. The alternative mode of a poster can provide more space, but again presents challenges for clear communication. A longer seminar gives more scope to develop ideas, but is often given to a more diverse audience so in this case it is important to provide adequate background.

Many projects now have a web presence, and this can provide a useful vehicle to present a broader range of materials. There are many styles employed for web pages, but as with other forms of communication, it is important to take account of the group of people to whom it is targeted. The balance of imagery and text, and the general style can make a significant difference to the appearance and effect of the same material.

The style of scientific communication changes with the years, and it can be useful to look at important papers in the field to analyse how they conveyed their message. Would the same type of approach work today?

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The main way in which the results of a research project are communicated to the scientific community is through articles in scientific journals. The article can provide information on the methods and techniques employed, together with information on how the conclusions were reached. In principle, with the aid of the paper, it should be possible for other
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researchers to follow and reproduce your work. The value of an article is enhanced by good organisation, a good writing style, and clear figures.

4.1.1 Preliminaries

Before you start to develop the structure of a journal article it is worth spending some time on thinking about the aim of the paper, and where is the most appropriate place for it to be published.

Target of paper

A scientific report prepared, for example, as an intermediate product of a project may largely consist of a compilation of the work that has been accomplished, and the details of the way in which it has been carried out. In contrast, a journal article is intended to convey clearly the reason for the work, the way in which the scientific questions have been addressed, and what has been learnt. The paper should aim to build a coherent picture of the endeavour. It is always best to be able to end the article with firm conclusions or results, but do not force the issue to produce strained conclusions that are not substantiated by the earlier parts of the paper.

Not all projects produce the desired positive outcomes, a method may fail in some circumstances or the basic hypothesis may be flawed. Such negative results are of importance for the development of a field, since they help to define the boundaries of successful activity. Yet, it takes some care to present such negative results in a publication in a way that establishes their significance.

Choice of journal

There are huge numbers of scientific journals ranging from the general to the highly specialised. For your publication to have impact it needs to appear in a place where it will be encountered by other interested researchers. The research resources assembled at the beginning of a project should provide a good guide to the range of journals in which relevant work has been published. This list can provide a starting point for your choice. The individual journals tend to develop styles and specialisations that influence the type of material that they receive.

You need to have a good idea of the material that will appear in the paper to be able to assess the appropriate journal to which it should be submitted. Assess your target audience for the results you want to communicate, and then judge whether such people would expect to look at a particular journal. An important test is to ask yourself whether you would you look at this journal? If not, is it the right place for your paper?
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Once you have an idea of potential journals it is worthwhile reading a group of articles from each one, so that you get an idea of the style expected for the journal. This will help when you come to craft your own paper.

Sometimes there is pressure to publish in a prestigious general journal such as *Science* or *Nature*. These journals have high rejection rates since they receive far more papers than they can publish. Also the review process and necessary revisions to meet detailed journal specifications can take far more time than in a more specialised journal.

Length requirements

It is often tempting to think that a particular result warrants a short paper, submitted to a specialist letters journal. However, working within a restricted length is not necessarily easier than a longer paper. You need to write concisely and informatively, while making judgements about the specific material that must appear. The choice of figures can take on considerable importance, since there will not be space to devote to a lengthy explanation of a complex figure. Frequently reviewers of short articles will request the inclusion of further details to make the story more complete. It can be hard to balance such clarifications with the length requirements.

A short paper can be an effective way of drawing attention to one aspect of a larger work, and it can be beneficial to work on both in parallel, at least at the beginning. Once the broader context is clear then it can be easier to focus attention on the facet addressed in the shorter work.

Where several authors collaborate on a short paper, stylistic jumps are likely to occur because short segments are being grafted together. It is desirable for one author to go through the whole paper endeavouring to provide a nearly uniform style before submission.

### 4.1.2 Constructing the manuscript

The process of successful scientific writing is not simple. A paper needs to be interesting and clear if it is to make a significant impact. A crisp and concise style avoiding ornate language is desirable, but too restricted a word usage can create a dull impression.

You are trying to encourage others to take up your ideas, and so you need to make an effort to explain the important points. It can be very effective to pitch your presentation at a level of knowledge slightly lower than you expect from your readers, so that you lead from explanation of the known into the new concepts. It is tempting to make full use of the technical jargon of your field, or employ acronyms to reduce length. Nevertheless, explanations in plain language and variety in description can help encourage the reader to follow your ideas.
Where there are a number of authors then the responsibilities of the members of the team need to be clear from the start, to avoid unnecessary duplication of effort. Many authors will be writing in other than their native tongue, and may be tempted to transfer phrases and constructions with which they are familiar into their writing. Unfortunately, the meanings may not transfer readily and the writing may seem stilted, even if not ungrammatical. Common problems in English come from the use of the definite article ‘the’ and the indefinite article ‘a’, particularly for those whose own languages do not employ such articles. It is good practice to get material checked by a native speaker of the relevant language ahead of submission to a journal, this will improve the perception of reviewers and enable the content of the work to be appreciated. It is difficult to assess what is being said when sentence construction is contorted or incomplete, and good work may be turned down because its quality has been obscured by poor language.

Organisation of material

The structure of the paper needs to guide the reader through the important points. However, even well written material may not have the desired impact. It can therefore be beneficial to get a paper read by someone who is not a member of the writing team to see if the logical construction works before the paper is sent to review.

Even experienced authors can be disappointed by how their papers are perceived, since they have got too close to the material and so have a fixed view about how it should be organised. On occasion I have been surprised how a careful presentation may be misinterpreted, or regarded as disjointed.

It is often useful to prepare a skeleton structure of headings as you begin to write a paper. The combination of section and subsection headings allow you to organise the subsequent development. You can add material under the headings to capture the main points you wish to make before writing connected prose. I commonly employ an initial approach with dot points for the main ideas, which then get expanded as the composition proceeds. Figures play an important role in the presentation of ideas and it is useful to have reasonably well-drafted versions early in the writing process so that the overall structure is apparent. As you write you may find that you need to modify the figure to enhance the way in which you express an idea.

Many journals provide templates for manuscript submission for common word processing software, or LaTeX used extensively in mathematics and the physical sciences. It is advantageous to use such templates from the beginning of manuscript construction, since the paper will then conform
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to the requirements of the journal and minimise issues at the time of production.

The style of journal articles is changing with most scientific journals now appearing dominantly in electronic form. This means that more dynamic information, such as movies of simulations or animations can be included, commonly in the supplementary materials. Yet, most users will download the paper as a PDF document to be read offline and only rarely is the supplementary material automatically provided on download.

Title and abstract

This is your chance to grab readers’ attention since the title will be the first thing that they encounter and, if sufficiently interesting, they may move onto the abstract. A title should be succinct and informative. Long titles may attempt to capture the full character of the work, but tend to become very cumbersome and lose readers’ attention. In general, it would be difficult to reduce as far as the title “Q” used for a study of seismic attenuation by the late Leon Knopoff. Nevertheless, a memorable title may encourage citations.

The abstract is a very important part of the paper, particularly with electronic publication since it is likely to be used to determine whether a paper will be downloaded. The aim is an informative précis of the important aspects of the work and conclusions, not a catalogue of the contents of the article. There are too many examples of abstracts that do not emphasise the principal results and their significance.

At the end of the abstract it is common to include a set of keywords that play an important role in both indexing within the journal and the activation of electronic notifications. Often these keywords have to be chosen from a set supplied by the journal, and do not always have as a direct a correspondence to your paper as you would like. Further developments that form part of the evolution of the paper in the electronic age include a ‘mini-abstract’ in the form of a set of dot point highlights, and visual abstracts incorporating a key figure.

Introduction

The aim of the introduction is to make sure that the reader has a clear idea of where the paper is leading, and how it relates to previous work. There are many different styles employed in different fields. The length of the introductory material expected can also vary considerably. Thus it is important to have a look at a number of papers in a field to get an idea of the style required before getting to far into the writing phase. This is particularly important in interdisciplinary or multidisciplinary work
where the journal to which the work is being submitted may have a rather
different expectation to those of your home discipline.

The introduction is not just a list of what has already been done. It should
provide the motivation for the study and lead into the specific aspects of the
work being described. The introduction can also be useful to foreshadow
the main outcomes, particularly where these are at variance with earlier
work.

Body of text

This is the place where you present your specific approach, results and
interpretation. The way in which this is done will vary substantially
depending on the character of the field, and the nature of the work. Highly
theoretical work will have a distinctly different style to experimental or
computational studies.

It is worth noting that a number of journals have developed specific
requirements for description of Methods and Data sources, and you need
to be aware of such journal requirements as you write. For example, a
Methods section may be dispatched to supplementary material for short
articles.

Discussion and conclusions

You need to make your ideas count, so this portion of the paper has
considerable importance. This part should not be just a reiteration of
the interpretation, but an attempt to put it into context and develop the
ideas further. The discussion should bring in and expand on issues of
the reliability of your results, and the way that they may depend on the
assumptions employed, both explicit and implicit from the approach itself.
It is legitimate to include some speculative component provided it is clear
that this represents ideas for the future.

References

You should follow the journal style as you construct your reference list.
There are many formats employed in different journals, and it can become
quite cumbersome to adapt material from one convention to another. For
example, one may have to convert from a case where initials precede the
name for all authors after the first to another in which initials follow, but
names are in small capitals. The necessary editing is tedious and prone to
introduce errors or omissions.

Many such complications can be reduced by organising a database of
references in a standard archive format such as Refer or BibTeX. The web
resources Web of Science and Scopus that were mentioned in Chapter 1, allow
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exports of bibliographic information in such standard formats or as text. Appropriate software, such as EndNote, can extract the references from the Refer database in the desired form for the journal for use with word processing software. Similarly BibTeX can be used with LaTeX and a journal class file to give the desired reference structure.

Preparation of figures

Figures represent a compact way of conveying information, particularly for the results of multiple experiments and analyses. Summary diagrams of processes can also be effective. Informative figure captions are important, but do not neglect the need to link to the main text with appropriate explanation so that the content can be appreciated.

Modern computer software offers superior presentation tools than were readily available using pen and ink. However, the quality of figures has not improved as much as might have been hoped. One factor is the temptation to include too much information in a single figure. Another is the use of inappropriate colours; standard yellows disappear against a white page, and red/magenta can often be difficult to distinguish. It is also worth remembering that a significant proportion of men are red/green colour-blind and so may not be able to distinguish lines of different hues. Physiological tests indicate that the eye is much more effective at separating tonal information than colour alone. For map-like plots it is tempting to use the rainbow colour schemes provided as default by much software. Not only does such a scheme suffer from red/green ambiguities, but it is typically uniformly bright. For single-sided information a simple grey tone progression works well, and can be colour tinted to distinguish between different classes of information. Where both positive and negative values have to be presented, two sets of graded tones away from a neutral colour are very effective.

Sometimes general purpose software is used to generate figures, for example, the use of spreadsheet charts. In general, this approach does not give adequate quality. It is better to transfer the information into a drawing package.

Figures should be created and stored at high resolution. It may be necessary to compress resolution to reduce file size, but retain the high quality original. A particular problem comes from the treatment of lettering when saved as an image. The PNG format preserves the character of fonts better than JPG. Where possible information should be saved in vector form (e.g., EPS or TIFF). You should follow the instructions from the journal, since the publication process may favour certain formats for the figures.

Although it tempting to use a single figure for multiple purposes, you
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need to bear in mind the different ways that they will be viewed. Larger lettering is needed for effective use on a distant screen presentation, and so figures from presentations are generally not immediately suitable for a journal article. If the original format is available they can be modified, but if only an image is preserved the results are unlikely to be satisfactory.

Supplementary material

In a print journal it was necessary to include all pertinent information in the article. The switch to electronic presentation means that additional information can be included. Indeed reviewers tend now to ask for more information than before because it can be placed in the supplementary material.

The role of the supplementary materials is to add to the main content and enhance the main paper. As far as possible one should avoid duplicating material, but it may be necessary for some explanations to be repeated to make the supplementary material easy to understand. Well chosen movies can be an excellent way of conveying information, but it is helpful to provide information on what is being presented and how this bears on the main arguments of the paper. Because supplementary material is not automatically downloaded with the article it can be irritating to the reader to find it being discussed in the main paper without having immediate access.

**Exercise 4-1:**
*Preparation of a Title and Abstract*

Write an abstract of up to 250 words on your current work (or a topic of interest to you). The abstract should have a suitably informative title and provide a succinct account of the most important aspects of your work. You should choose the most general conference in your field as a target and aim to produce an abstract that can be read by non-specialists.

4.1.3 The editorial process

The dominant mode of submission of material to a scientific journal is now fully electronic via an electronic portal system that assembles the material you have prepared into a package, which can be viewed and assessed by the editors of the journal. Your manuscript and figure material will have to be uploaded and reviewed before the package is completed. This process can take a fair amount of time, depending on the speed of internet linkages or demand on servers. Do not compress figures too far in an effort to speed upload – figure quality is important at the review stage and poor figures are likely to trigger a negative response from reviewers.
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In some cases you will be able to suggest the editor whose knowledge of the field makes them the most suitable to handle the material. Frequently though it will be the keywords or classification tags attached to the article during the transmission stage that will determine which editor receives the paper to handle for review.

A number of models of editorial structure are employed by journals. There may be a group of editors who are empowered to make independent decisions, or a principal editor who assigns papers to associate editors who handle the review process. The ultimate decision on the fate of the paper will then usually be made by the principal editor.

You will be frequently be asked for suggestions for suitable reviewers for the paper you have submitted, and indeed for people who you would not wish to review with reasons. The suggestions you make will be taken into consideration by the editors, but are likely to be supplemented by their own perception of the work, and search systems exploiting your keywords or classifiers. You may find it is not easy to make suggestions, nor will it be for the editors. Often a number of people will have to be asked before an adequate number of reviewers can be found. The policy of the journal will determine how many reviewers will be sought.

The continuing increase in the numbers of papers being submitted for publication, places considerable pressures on the editorial process. The editor has to judge between the opinions expressed on a piece of work, and does not always agree with the assessments by the reviewers. In which case they may make an independent judgement or seek a further opinion.

In most cases the editors of scientific journals are working scientists, who fit in their editorial duties around the other demands of their busy lives. Securing reviewers can be a difficult process, and slow response to review is regrettably not uncommon. In consequence, a paper may take much longer to get back to an editor’s desk for decision-making than they, or you, would like. It is legitimate to make a query to a journal when the process seems inordinately slow, but harrying an editor is likely to be counterproductive.

A new style of editorial process is beginning to emerge in some open-access journals where the review process is public and the submitted version of the work, the review comments and response are accessible to view. The revised work then appears in the journal of record. Further evolutions in the process can be expected as more journals cease any form of print publication.
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4.1.4 Reviewing

The task of the reviewer selected by the editors is to provide a judgement on the quality of the work and presentation. This may well involve completion of a checklist of assessments of different aspects of the manuscripts accompanied by an explanation of the reasons for the recommendation made to the editors. The review report can include confidential comments to the editors as well as material to be transmitted to the authors, which could include an annotated manuscript. Even if you invoke anonymity as a reviewer, it is likely you will leave clues to your identity in the style of your review.

The reviewer will normally be approached by e-mail and need to access the journal system to download the material for assessment. They will then choose how they handle the material, fully electronically or with a hard copy. Lengthy material is likely to get a slow response in any case. As a reviewer you have an obligation to the community to complete your review in a reasonable time. Think about how annoyed you will be for a tardy review of your own work! It is better to decline a review because you are too busy, than drag it out over an excessive time period.

4.1.5 Revision and resubmission

After some time has elapsed, you will receive from the journal a review package normally comprising an editorial comment and the reports from the reviewers. You should take time to digest this material before making any reaction. Indeed you have worked hard on the paper to make it clear, and yet the reviewers have misunderstood your intentions! Despite your efforts you may not have been sufficiently clear, or the reviewers have recognised an aspect of the work that escaped your attention.

Treat the reviews as constructive criticism and work to incorporate as many of the suggestions as you can. You are not required to agree with everything suggested by the reviewers, but will have to justify the way you have undertaken the revision in a response to the reviews, which is submitted with the revised version. Pay particular attention to the most critical comments or suggestions, since these tend to assume greater significance with pressure on journal space.

The revised version will need to be resubmitted through the journal system, with replacement of files. The new version and your response to the reviews will be seen by the responsible editor. In the case of minor, or moderate, revision the editor may choose to accept directly. Where major revision was requested, you can expect that the revised version will re-enter the review cycle. Occasionally new issues emerge with the revision that could have been, but were not, raised with the original version. This
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is annoying, but you have changed the paper so it will be perceived differently.

4.1.6 Post-acceptance issues

Once the paper has been accepted by the journal it enters the production phase, and the interface switches to the publisher. The first step is the finalisation of the manuscript and figures to incorporate any final minor changes, and queries from the production staff. Then the process of conversion into the electronic forms for archive and presentation begins.

With a variable delay you will receive notification of the availability of electronic proofs, commonly with a request to return in a very short space of time. The proofs will be accompanied by questions raised in the typesetting process, such as ambiguities in the text, and missing or inconsistent references. These questions need to be answered and mistakes in the proofs rectified – remember what the world will see is the product of your checking. A common place for errors to appear is in figure captions, which are often missed in manuscript checks.

Exercise 4-2: Critique of a recently published paper

Choose a recently published paper in your field, and subject it to your own review. Does the paper clearly express its goals, and does it achieve them? Are the title and abstract adequately informative? Is all necessary information given to allow the development of the results and the conclusions? This exercise is valuable for recognising weaknesses in one’s own writing.

4.2 Seminars and conference presentations

For all classes of presentation of your scientific work you need to think about the nature of the audience on the particular occasion. The same visual material can be used for different styles of talks with little modification, provided that you adapt the way in which you talk about the science. In all cases you need to make sure that you bring your audience to the point where they can understand your material. Try to pitch the presentation just below the level of preparation that the audience can be expected to have, so that you can carry them with you into the more complex parts of the material.

It takes time and effort to produce a good talk, so do not leave preparation too late. Remember that figures may need to be drawn or at least modified from the form used for publication to achieve the maximum impact in a visual presentation. Images are important in conveying ideas, but do not
neglect the value of some words on screen, particularly in reinforcing the message of a figure. In the days when 35 mm slide projection was the norm, dual slide projection was very effective with pictures on one screen and complementary words on the other. The balance is not as easy to achieve with computer-based presentation, but interleaving of text and graphics can be effective. Many conference presentation systems now use a 16:9 aspect ratio for the image on the screen. This configuration can offer the possibility of well balanced parallel figures and text, which tends to be too cramped with the older 4:3 aspect ratio. Do not be tempted to reduce the size of text to include more material on a slide. Can you read the text on the slide when you stand a few metres away from your computer screen? If you cannot, then increase the size and cut down on the text, your audience will appreciate being able to read without straining their eyes.

The visual material seen by your audience should act as a guide to the important points that you want to convey. You should vary your wording from just that on the screen, otherwise you might as well be silent and let people read! In all presentations it is important to package your message and not to try to cram in too much detail. Fewer, well-chosen slides with a limited number of important points well conveyed is much better than information overkill.

Always check your material carefully before you use it for the first time. Spelling errors are particularly annoying to you and your audience; though experience suggests at least one will probably creep in, however careful you have been.

The way in which you present material will be dictated in part by the time available. For a short conference presentation you can only hope to make a few points. In a longer seminar you can be more discursive, but still make sure that your message is clearly packaged.

### 4.2.1 Short oral presentations

The time slots allocated to oral presentations at major conferences tend to be rather short and so it is critical to make the best possible use of your allocation to convey your message. Clear, uncluttered slides will aid you to capture the essence of your work in an easily digested way. Your talk may come at the end of a session, when the audience is thinking of lunch or the coffee break. You need to be able to gain their attention so that they remember your work in a positive way.

For such a short presentation the timing and balance of material is critical. A practice talk given to a mixed group of specialists and general listeners can help iron out issues with the timing of delivery and clarity. You can get feedback on both content and intelligibility, and acquire some confidence to face a new audience.
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It is natural to be somewhat nervous before you give your presentation, but this can be helpful in helping you to project your message on the day. Do not rush – it is better that you present less more clearly than go too fast. If timing of your talk starts goes go wrong (which can happen even with experience), and you are facing the orange light with only a short interval to go, you must know in advance which are the key points that must be made. Simply make these points and stop. You will thus make the best impact you can.

4.2.2 Poster presentation

Poster presentations have become a major component of large scientific meetings, and are preferred by some researchers as being less stressful than giving an oral presentation. They should not, however, be regarded as an easy option. A well designed poster can convey the essence of your message effectively, and may well be able to stand alone without a presenter. But, you need to be present to answer questions and provide further information and can find that you have given the equivalent of several oral presentations during the course of a session.

The instructions for a meeting will include the allowed size of a poster and its orientation. You need to find out how much space you are allowed well ahead of time and design to the specification. All too often people turn up to a meeting with a poster in the wrong configuration that cannot be mounted appropriately.

A good poster has to be well planned so that the results are conveyed clearly and effectively. The material should be kept simple, and well organised by sections with a logical flow, whilst making full use of the space. The style should be consistent throughout. The title is important and should be clearly visible. It is useful to provide an abstract that can be easily read and digested to attract further attention to the work.

The poster needs to be able to be digested from some distance away, particularly if the session becomes crowded. This means the standard text needs to be in a relatively large size (e.g., 24 points or more of a very legible font such as Times). Sans serif fonts are best reserved for headings. Use colour sparingly for emphasis, and avoid the use of prominent and complex background material that distracts from the rest of the poster contents.

When you have finished a draft get it reviewed by others, and see if they grasp the major points that you wish to convey. Avoid public embarrassment by always checking your spelling before you print.

At the session you need to position yourself so as to encourage people to view your work, so do not stand in front or too close to the poster. Allow visitors to digest your work and ask you questions. Even when discussing
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detail with an interested group try to allow room for the material to be seen by your next customer.

4.2.3 A formal seminar

A full seminar of typically around 50 minutes duration presents a different set of challenges than a short presentation. You will often be speaking at a different institution than your own, and may be in a stressful situation such as a seminar attached to a job interview. You therefore need to understand the nature of your audience and their expectations, and adjust the way in which you talk accordingly.

In all cases, you need to engage your audience and carry them over a considerable time with you as you expound your ideas. Do not be tempted to cram in too much material, a moderate number of slides is adequate. You need to justify to yourself why you need more than one slide every couple of minutes. If you aim for the equivalent of an animated image, then do this explicitly rather than rush on to yet another slide.

Even where you anticipate considerable expertise in the topic among your audience, it is worth providing some general introductory material so that your particular approach can be appreciated by the whole group. It is also useful to take a little time to give a clear exposition of the goals of the work before you start to present the detail. The attention of the audience is sharpest at the beginning of the talk, so it is a good idea to flag the main results early on.

Not only should you explain what you have done, but also why. You will have made choices about, for example, analysis techniques that will influence your results, and you can share your insights with the group. It is worthwhile emphasising the innovative aspects of your work and where they may lead. You should consider breaking up your talk into sections with appropriate lead-in material. The divisions help to provide variety and re-engage the attention of your audience. Bring the talk to close by capturing the main points in a few concluding slides. In this way you can reinforce your message.

Once again, timing is important for a long seminar, and prior practice is useful. It is much better to stop short and leave time for questions than overstay your welcome.

4.3 Project web-pages

An important vehicle for providing outreach for your project is via web pages. Once again you will need to consider what audience you are trying to reach. Generally it will be your scientific colleagues, and
so uncomplicated presentations with text supplemented by well-chosen figures with clear explanations can work well.

It is desirable to have a project home page where the goals are outlined and, for larger projects, to have separate pages for the different strands of activity. Make sure that all members of the project group are recognised on the site, so that they can feel ownership.

Often you will have to work within institutional design requirements, and then build on this framework. Where you have a group of related pages it can be advantageous to create pages that share a common structural ‘wrapper’. Then insertion of new pages just requires adjustments to the wrapper rather than editing each page individually. Do not neglect to keep the pages up-to-date after they have been created. Out-dated or incomplete material can leave a bad impression.

4.4 Studying classic papers

The styles of scientific communication continue to evolve, and it is useful to look back at classic papers in your field to see how the ideas were presented in their original form. The importance of some critical concepts are recognised immediately, but in other cases the ideas may be so novel or unfamiliar that they take time to influence the broader field. For example, the significance of Albert Einstein’s 1905 paper on special relativity became most apparent through the advocacy of Max Planck, who was able to recognise the critical shift in viewpoint associated with the assumption of the invariance of the speed of light.

It can be particularly valuable to undertake a group exercise whereby a number of important papers are discussed, with one individual acting as the reporter for each paper with a short presentation of the key results and a subsequent group critique of the results. Keypoints that can be considered are:

- Does the science still hold?
- Are the arguments convincing?
- Have developments since changed our perception?
- How could the paper have been improved?

Delving back into the literature often reveals that concepts that seem contemporary existed in a recognisable form at an earlier date, but were not exploited because experimental or computational resources did not exist. You will also see that trying to deflect the course of a field is hard, it takes time for entrenched positions to be overturned.