
Successful Professional Reviews for Civil Engineers

Fourth edition

Successful Professional Reviews for Civil Engineers
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Chapter 1

The role of the profession

On behalf of its members and in its capacity of acting in the public interest, the Institution of Civil Engineers continues to take a leading role in the debates on the environment, green energy, climate change and what has become known as ‘sustainability’ – ‘meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987, p. 43). Note the use of the word ‘needs’, not ‘wants’ or ‘desires’. In highly developed parts of the world, it is easy for people to forget what we actually need, as distinct from what we believe we deserve.

With this increasing emphasis on sustainable development, the civil engineer, with the ability to take the broad view and positively seek acceptable compromise, is well placed to make the distinction between the needs and the wants or desires of an increasingly affluent society – a developed world which has progressed far beyond the basic necessities of clean water, food and shelter and which rising economies, understandably, now seek to emulate. Can we, for example, help these emerging economies to avoid some of the serious mistakes that developed countries have made?

Much of our society has vested interests – what former ICE President David Green described as ‘single issue politics’ – manifested in the uncompromising pressure group. Civil engineers can rise above these vested interests, to ‘utilise scarce resources, care for the environment and protect the safety and health of the public’ (ICE Royal Charter 1972). We have moved away from former perceptions – no longer ‘predict and provide’ but ‘target and manage’, and must persuade the public of the validity and good sense of our pragmatism.

So, the emphasis of the profession continues to move further towards the maintenance and the efficient and better usage of existing assets; towards revolutionary and sustainable solutions to ever-greater environmental, social and geographical problems, well beyond what has been considered traditional (‘design and build’) civil engineering.

The range of abilities which the public, society and clients need in professional engineers today is very different from those which were required only a couple of generations ago. There are engineers becoming professionally qualified through the Reviews who are

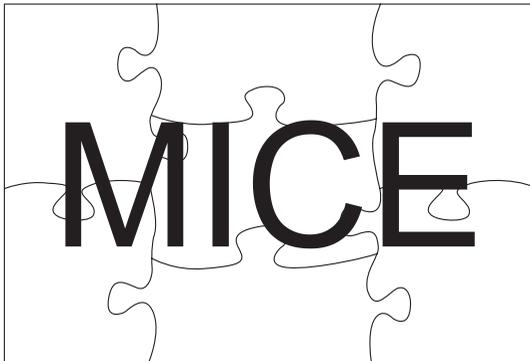
Chapter 2

The jigsaw concept for Review preparation

When Mac was helping his young grandson build a jigsaw, he realised that they were doing exactly what every candidate for Review must do – construct a jigsaw. It was no good trying to find a piece with the correct shape; what they had to do was find a piece which added to the picture. Each piece had to be examined in detail to see how the part picture on it interlocked with the bits of picture on the pieces alongside. Continual reference had to be made to the picture on the box to see the position of each piece in the complete picture. It was no good picking up pieces which looked as though they might be the correct shape without looking at the picture on the box, just as it is no good picking a particular piece of experience because it appeals to you or because it seems to fit the space. The process mirrors precisely the system which we recommend for compilation of your Review.

All the components of the Review, the documents making up the submission, the interview and the Written Exercise, are each an essential part of the whole picture. They form the pieces of your jigsaw, but the size and shape of each piece will vary from candidate to candidate. All the pieces are important; none can be omitted. Everyone remembers how frustrating it is when one final piece of a jigsaw is missing or is a bit mangled; you must not leave any possibility that the Reviewers might feel that same frustration.

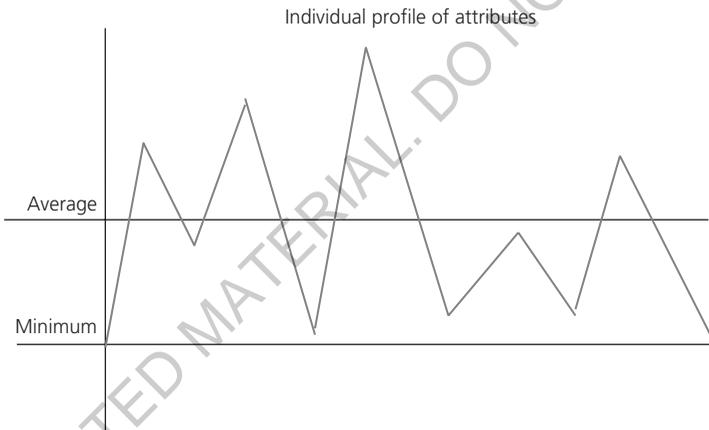
The picture is similar for everybody – either MICE or AMICE, as indicated here:



driving test says that the examiners are told to sit through the test, and decide at the end whether the person is safe or not. If that decision is 'No', then they have to think through why they made that 'instinctive' judgement and list the reasons. A very similar methodology is used by your Reviewers. Their first question when you leave them could be summarised as, 'Is this candidate safe to let loose on an unsuspecting public?'. After all, you could put a brass plate on your door and be a sole practitioner the day after you get the successful result.

There is no weighting; one part of the Review is not more important than any other; no one Attribute takes precedence over any other.

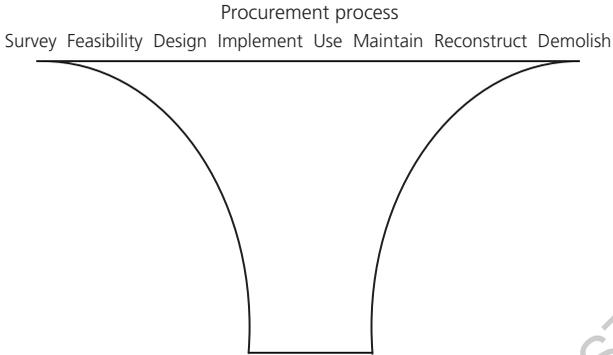
However, adequacy in every Attribute is unlikely to be enough. You must demonstrate that you have more to offer in some areas; the median is not the minimum, but is well above it.



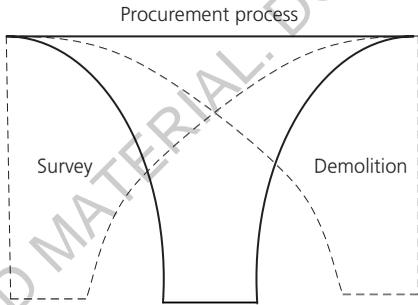
The Attributes which pull the average up are specific to you, based on your social background, education, available experience and personal preferences. No two profiles will ever be the same.

This means that it is possible (and it *has* actually happened) that while one aspect may have been found less than acceptable, the person has satisfied the Reviewers that, overall, they are perfectly capable of discharging the responsibilities of a Member in their particular circumstances. We recommend you ensure that you demonstrate that you are adequate in every respect.

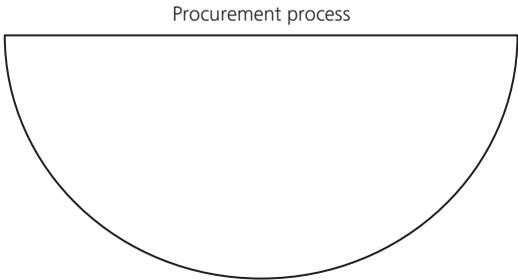
Each individual profile will be different across the range of Attributes, but the average is the same for all.



You are very competent in your role, know and understand how it relates to those working close to you and have some idea of how your work fits into the entire process. The area of greatest expertise will clearly swing from one extreme to the other. Someone working in feasibility surveys, for example, will swing well to the start of the procurement process; someone in demolition will swing to the right, the end of the process.



As a candidate for Chartered Membership, you are expected to have developed a greater depth of understanding of the whole procurement process, gained partly by reading widely and partly by experience. So you may not perhaps have quite such a depth of expertise in any particular specialisation; your profile might look something like this:



estimates or quotations so that you demonstrate your understanding of how the rates were adjusted to suit your particular job, or what a rate includes – item coverage. You would not have to be a professional engineer to copy previous rates into a new bill, but we are not at all sure the result would actually be realistic.

The job for which the cost estimate is compiled need not necessarily be a construction project; it could be, for example, the manufacture of apparatus or equipment, or a proposed traffic count.

Other possibilities might include:

- the substantiation of a claim
- the estimate for a variation requested by the client or their agent
- the build-up of an estimate for a proposal
- an estimate of design costs, including the build-up of rates.

Illustrations

Use drawings throughout your submission to save words – ‘one picture is worth a thousand words’.

Another example:

I was temporarily seconded to this site as the Supervisor. The works at this site were part of several ‘Advance Works’ contracts for major improvement works to a busy road junction over and adjacent to the Metro system. These particular works consisted of the construction of a pedestrian/cycleway ramp and associated retaining wall from an existing bridge over the underground lines to an anchored sheet pile wall at the entrance to a future subway under a road adjacent to the works.

Can you visualise the site? It is crying out for a diagram. Not a copy of the highway map, which would present far too much detailed information, but an outline sketch.

And look at the wasted words: surely a secondment can only be temporary? And there are no less than five references to ‘the works’ in only two overlong sentences – the candidate obviously never read the report aloud! A sketch and drastic editing could release many words for telling the Reviewers how the candidate benefited from the experience at this complicated site.

As mentioned above, many candidates still make the mistake of using contract drawings. We believe it is much better to use simplified extracts from them or the sort of simple diagrams favoured by those who prepare publicity material. After all, contract drawings



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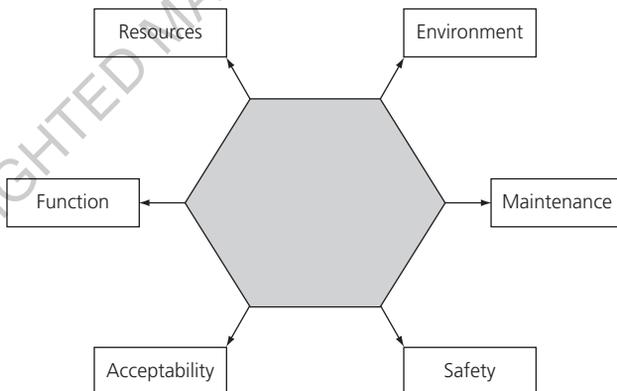
Our profession is not solely involved with the application of rules and formulae, but is one that is reliant on judgement and a broad understanding of so many facets of the natural world and the aspirations of mankind.

Civil engineering is a logical process of making judgements, which are based on some fundamental laws, rules and concepts. It is, by no means, an exact science, so the manipulation of actual or contrived facts, using equations and formulae, cannot alone provide adequate answers. Mechanistic analysis, often based on published previous best practice in codes and standards, is a fundamental tool in the design process. However, it is only a small (albeit critical) part of the whole procurement process. It is where we satisfy ourselves that the solution we are proposing will work satisfactorily under predetermined conditions.

Judgement

The majority of the procurement process involves judgement, and this requires a deep and comprehensive understanding of the many factors that influence those judgements. Engineering is a balancing of many conflicting parameters to achieve a workable solution to what is usually a complex problem. This balance can be simplistically likened to an infinitely flexible three-dimensional membrane, being pulled in all directions by a whole range of conflicting considerations (Figure 2.1).

Figure 2.1



Each of these considerations is, itself, another membrane of conflicting parameters.

- 'Function' means that the chosen solution must work (i.e. it must do what it has been decided is required – a decision that is, in itself, another membrane). This is where analytical calculations are needed. But this consideration is now of far

The ICE training scheme

The training scheme can be used by anyone who is applying for membership of ICE (MICE). As a trainee, you will enter into a training agreement with your employer. This agreement formally sets out the responsibilities of you as the trainee, your employer and ICE. An approved mentor should be assigned to you by your company; who is known as a supervising civil engineer (SCE) and plays a very important role in the scheme. Sometimes SCEs delegate some of their duties to delegated engineers.

When you join the ICE training scheme you are entering into a professional agreement between you and your company, but it is not a formal contract. The agreement sets out the responsibilities and commitments of everyone involved in the scheme.

For the duration of your IPD you are required to document your progress routinely to ensure that you focus on gaining the experience necessary to becoming a professional civil engineer. You need to produce a regular (quarterly) progress report to record your development and maintain your online development record, summarising how you are progressing with respect to each of the attributes. You will also record your development through the annual maintenance of your CPD.

Those training under agreement must now use ICE's *IPD Online* tool (Figure 4.3); more details about this can be found on the Institution's website. This records your training progress toward the nine attributes.

Figure 4.3 (Source: ICE IPD Online tool)

Initial Professional Development Online

The screenshot displays the ICE IPD Online tool interface. On the left is a user profile sidebar, and the main area shows progress and attributes.

User Profile (Left Sidebar):

- Name: Mx. Grad.
- YOUR ROLE: Trainee
- CURRENTLY TRAINING FOR: IEng (You are eligible up to IEng. This is related to your education level.)
- ATTRIBUTE LEVELS COMPLETED: 0
- YOUR SUPERVISING CIVIL ENGINEER: Mx. S.C. Engineer

Main Content Area:

Navigation tabs: Summary (selected), My skills, Document this, My company, My values.

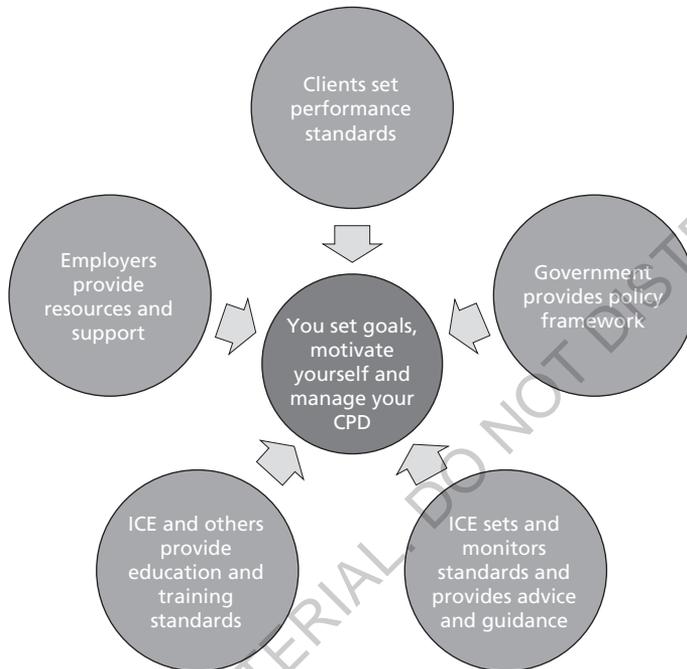
Your progress

- Pieces of evidence submitted this year: 0
- Attributes completed to IEng level: 0
- 0/27 Attribute achievement levels completed (27 to go)

Your attributes

1. Knowledge and Understanding of Engineering	0/3 IEng levels complete	AI
2. Technical and Practical Application of Engineering		AI

Figure 13.1 (Source: ICE (2017) *Continuing Professional Development Guidance*, Version 1, Revision 3, p. 5. ICE, London, UK)



up to date with technology, the law and public attitudes must surely be essential to our defence in this scenario.

The impact of external factors on our CPD is shown in Figure 13.1, again taken from the *Continuing Professional Development Guidance* (ICE, 2017e).

The Institution also requires members to anticipate what they might need to know in the future, by drawing up a development action plan. For those in the early stages of their career, this requires them to decide on their ambitions and career plans – what they need to learn for the next stage of their advancement, as well as keeping up to date with developments in their current role.

CPD will usually be at least partly supported by your employer, but the onus here is on the trainee and the progress made by you should be self-evident through CPD records. Just attending the courses your company arranges shouldn't be sufficient; it is surprising how many are still in 'school mode', expecting things to be arranged or sorted out for them. Prospective members of the Institution should be able to show that they actively

Mentoring for Civil Engineers

Waterhouse, Patrick

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Patrick Waterhouse

Bowdon Consulting Ltd

Waterhouse, Patrick

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Chapter 1

Introduction

What are trainees and their mentors trying to achieve? And why?

A previous version of this book, under a slightly different title, was published in 2001. At the time, the civil engineering industry worldwide was facing challenges of new technology and the need for suitably capable people to use it. Fast forward 19 years and little has changed in some respects. The graduates recruited in 2001 will now (I hope) have become professionally qualified and will be the focus of this book, seeking, as it does, to support those leading the development of professional engineers. The raw graduates of 2001 will now, as with those of earlier generations, be advising today's graduates, based partly on their own experiences at a similar age.

So will the learning experiences of 2001 be of any use today? Or indeed, those of 1991, 1981, 1971 etc.? I fervently believe that that answer to this question is a resounding 'yes'. I hope that readers of the present text will conclude that their own learning experiences are relevant, but certainly not in isolation.

I have relied on the support of a panel of people to assist me with the ideas in this book. They represent a cross-section of the industry, in terms of both their career positions and their employer types. I have been helped by many graduates and recently qualified engineers and also by those responsible for mentoring later in their own careers. While some tell us that the 'millennials' now coming into the profession have very different demands from their forebears, my research suggests that the differences are very much in the detail and not the substance of such things.

The desire to obtain professional qualification remains strong in today's graduates, possibly more so than, say, 30 years ago. The 1990s and 2000s saw significant merger and acquisition activity in the UK engineering industry. Many of the new investors were engineering companies from abroad and from cultures where gaining professional qualification through institutions such as ICE was not the norm. Some of those countries have state registration of engineers, others confer respect on professional engineers through their academic qualifications and subsequent careers, but not in a measured way. Some of the new owners were quick to question the value of professional qualifications but over time the acquired organisations' commitment to these things has continued. The semi-automatic 'conveyor belt' approach to qualification is not as prevalent as it once

David Cartwright (2017) summed up the importance of learning and development:

The fundamental purpose of learning and development is to create a skilled and confident workforce, by giving people the tools to perform to their best within their role and to develop their potential to fulfil future roles. We won't know the exact nature of these future roles but we can assume they will require a growing level of commercial and leadership acumen. In developing engineers to be at [their performance] capacity we are in effect making businesses stronger and more resilient to future scenarios.

Cartwright neatly describes how tomorrow's engineering leaders have to be developed to deal with problems that we cannot yet foresee. This precisely reflects ICE's attributes.

Learning through experience

Learning is the outcome of curiosity, a desire to know why something happens, why more-experienced people make certain decisions, why some people are prepared to take greater risks than others. Here are some methods of learning, with brief explanations

<i>education</i>	being told
<i>research</i>	finding out from books, Internet
<i>enquiry</i>	asking someone
<i>discussion</i>	talking about it
<i>observation</i>	watching someone
<i>practice</i>	having a go.

Graduates come into the workplace with most or all of these skills, but with the more highly developed abilities concentrated at the top of the list. What mentors should do from an early stage in the trainee's career is to encourage a reversal of the order, with trainees becoming most proficient at discussion, enquiry, observation and – within the strict limits of operational efficiency and risk – practice. Very little of what graduates learn after graduation will be taught.

For trainees to progress and to develop the skills and abilities needed to fill more senior and responsible posts, they need to look at the decisions the holders of such positions take, particularly how and why they decide on certain courses of action. In this way, they will gain experience before it is needed and, hopefully, make fewer mistakes. Of course the decisions witnessed may be wrong and that too provides learning opportunities. The engineering mistakes that led to the collapse of bridges in Miami and Genoa could and should provide learning opportunities for the entire profession. But what also of financial disasters such as Carillion? The decisions taken by the senior management of that company must have puzzled people at the time; they certainly

rapidly'. It identified that soft skills and team working were increasingly important in civil engineers. It also said that civil engineers should embrace digital technology.

What business objectives drive senior civil engineers to develop talent?

My panel of consultees included several senior engineers from major global consultants, international contractors and materials suppliers and smaller organisations. I was also fortunate to hear from several public sector clients in the rapid transit and waterways industries. Despite the diversity of backgrounds, they agree on why their organisations are willing to fund and support the development of professional civil engineers.

- Competition. All organisations want to have good people but, in a competitive market, we want ours to be better than our competitors. That is a repeated refrain, particularly from private sector consultants.
- Organisations want to stay up to date. Bringing in graduates and developing them to ICE's standards is perceived to add value to this process. Many consultees recognise and respect the level of technical knowledge that recent graduates bring to their jobs. In the current environment, they perceive that younger members of staff are more proficient with ICT.
- Sustainability as an organisation. People elsewhere in the organisation will continue to resign, retire, get fired and leave gaps that need filling.
- New graduates tend to provide the 'engine room' to a lot of activities after their initial training, thus assisting productivity in the organisation. This is important because learning and development needs to pay for itself in the long term.
- Most of my consultees referred to the public interest role of ICE and the profession. Their organisations want to serve customers and society, particularly those in the public sector. Employing and developing young people contributes to those objectives.
- Retention and motivation of employees relies heavily on support for professional qualifications. Most ambitious graduates look for the offer of support when considering where to apply for jobs. The level of support has become competitive, with two of my consultees, both consultants, telling me that they extol the virtues of their respective training systems to potential employees. Almost all of the trainees on my panel reinforced this view; most had looked at the provision of support when considering where to apply. Their considerations were wider than just support for ICE qualifications. They asked whether the potential employer had a culture that encouraged learning and questioning and whether the company would welcome an inquisitive, curious mind. One consultant spoke of wanting to allow employees to develop a career with that firm, implying a longer term commitment.
- Consultants particularly speak of the greater fee levels that can be commanded for the work of professionally qualified engineers when compared with their

trainee, for example. By challenging the trainee to look at other solutions, the mentor can start the process for the trainee. The mentor might also ask how other people might view this challenge.

The *movement* stage involves finding solutions to the problem and setting a plan to turn these into firm results. Of course, setting out what the results might be can be difficult in some respects. The development of communications skills sufficient to pass an ICE professional review is something that many trainees have to work on. Setting tangible targets may not be easy. Here, the strength of the relationship will be important in discussing and agreeing targets. Each target needs to be time-limited and, where appropriate, the role of third parties should be decided.

GROW

GROW (Alexander, 2006) is a simple tool, named as an acronym.

Goal	What do you want to achieve?
Reality	What is happening as the backdrop to this situation?
Options	What are the possible solutions or ways forward?
Will	What will happen, what is the way forward?

Some commentators refer to this model as 'TGROW', with the additional letter standing for 'topic', i.e. what is to be solved.

It is a tool that you might want to use once the mentoring relationship has been established. Most trainees' progression is not a straight line and setting goals as the sole activity is probably wrong. But where goals can be set, this is a model that can work.

Engineers tend to be structured thinkers, so tools such as this one can fit well with current processes. But, as before, don't stick to the model if there are good reasons not to.

What should we do if the trainee says 'no'?

A trainee may choose to do something their own way and not do what you, the mentor, expected. Your instant reaction may well be surprise, even annoyance, but it is important to consider whether the trainee's method is equally (perhaps even more) valid than your established one. The desire to 'do it my way' is critical to a trainee's self-belief, because it respects the trainee's uniqueness. Doing something the mentor's way lessens the trainee's involvement, perhaps by the avoidance of thought or abdication of responsibility. It may even prove to be an uncomfortable method for the trainee to follow. Trainees should be encouraged to adapt the mentor's help to their own situation and style, thus enabling them to wrestle with the details, try different approaches and discover their own strengths and talents. An effective mentor lets go, being careful not to control or direct the trainee;

Waterhouse, Patrick

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Chapter 13

Mentors' responses to development reports

The written word will form an unavoidable part of the communication between the mentor and the trainee. The reports will provide a record of each party's view on the trainee's progress. Care must be taken by the mentor when commenting on reports. Unlike an ill-judged spoken slight, one made in writing leaves an indelible record that can allow resentment to be created or reinforced.

Comments on development reports

The success of mentoring in ICE's training system is hugely dependent on the response to development reports and the general attitudes and trust that the process should engender. Once again, it is not only the process of writing comments, but predominantly, the spoken dialogue that takes place, that is vital. I see far too many reports where the mentor has merely 'gone through the motions'; the worst possible example is a tick and dated signature on the last page of the report. This is mere compliance with a perceived system.

Each submitted report should trigger a discussion shortly after delivery. Immediacy is essential, since trainees are on a very steep learning curve and things are soon forgotten in the surge onwards. Development reports that sit for weeks in someone's email inbox, and are then dealt with rather cursorily, are a huge disincentive to a trainee, suggesting strongly that the SCE or DE does not value them. This discussion should definitely not be the mentor telling the trainee their understanding and knowledge, but must rather be probing questioning, trying to get the trainee to work things out for themselves. There are various ways of providing this feedback on the report itself. The use of Word or PDF files suggests an electronic method of commentary; some mentors prefer to print a physical copy of a report and write comments on it by hand. The mentor and the trainee should work out the best method between themselves, but the likelihood is that the final, commented, version will be electronic for ease of storage. If the outline questions are written on the report, and the trainee subsequently responds in kind, then maximum value, and a training record, is assured. Time is always pressing but doing it this way is an efficient use of time and requires only a short meeting subsequently.

The trainee should never rewrite a report, however desirable this sometimes seems. The only exception I could possibly think of might be the naive revelation of a commercial or