membership during the commission. Michael Wilford points out that sometimes the changes in personnel in a client body can result in the architect being the only one who has followed a project right through and can remember why decisions were taken. As client personnel change there may also be a temporarily diminished level of commitment to the project which the architect must survive.

> As a result of that you can sense the project languishing on the back burner with nobody agitating it.

## Design as a group activity

Critics and commentators will probably continue to present design as the product of highly talented individuals. There is certainly a little truth in this image, for our studies of creativity have suggested that a relatively small number of people are highly creative. However the day-to-day reality of design practice is much more one of team work. Even the enormously talented and creative individual owes much to those who must work to realise the design. Barnes Wallis is quite sure that 'good design is entirely the matter of one single brain' (Whitfield 1975) and this may be true for some people and some projects. It may also be the case that a combination of team and individual work may be more powerful. Moulton, the designer of the famous bicycle, values group working in commercial product design, but only after a technical concept has been originated by an individual. On the other hand Robert Opron, the designer of Citroen and Renault cars, believes in team work from the outset. Opron (1976) however also recognises the inevitable tensions here between the creative individual and the group.

> The real problem is to find executives who are prepared to accept discipline and to subordinate themselves to the interests of the final product.

The great architect and engineer Santiago Calatrava must surely rank as one of the most powerful minds at work in architecture in our time, and yet he finds no frustration in having to work in a team. In fact it seems that it is precisely the need to communicate and co-operate which makes designing so rewarding for him. He explains this by telling a joke about the great painter Raphael. If Raphael had lost both his arms, says Calatrava, he might not have been able to paint but he could still have been a great architect. 'The working instrument of the architect is not the hand, but the order, or transmitting a vision of something' (Lawson 1994). It seems that we take a great

deal of satisfaction from successful collaboration whether it is on the sports field, in the musical ensemble or the design practice. Sharing and understanding a set of design ideas and then realising them together can be extremely frustrating, but is also ultimately extraordinarily rewarding. This is reflected by the engineer, John Baker, who developed the design and build organisation IDC, who tells us that 'working in this completely integrated team is as thrilling as any experience I have ever had'.

## Design process maps revisited

It is time now to return to the maps of the design process that we explored much earlier in the book, but this time in terms of how the process works not inside a single head but when teams and organisations are involved. In Chapter 3 we saw some of the tricky methodological problems that inevitably arise when we try to study the design process. First we looked at prescriptive views of the process in the RIBA and Markus/Maver maps. These apparently quite logical maps suggest we should be able to see clearly defined phases of work at quite different tasks such as briefing, problem analysis and solution synthesis. We have seen empirical evidence that suggests such maps turn out to be unrealistic in practice. We looked at quite abstract laboratory studies of the design process. Then we found that senior design students adopted a strategy that differed from novices and students who studied other subjects. More realistic experiments tended to confirm these results and suggested that designers do not separate out the activities of analysis and synthesis into discrete stages as we would expect from the logical steps that we would predict based on the prescriptive views of the process. Then we found from interviews with designers that even briefing may not be a discrete stage but an activity carried on throughout the whole process.

So which of these pieces of evidence should we find most convincing? In general it seems preferable to have empirical data rather than supposition. However such a view tends to drive us into a more controlled laboratory situation which in turn distorts the process we are trying to observe. Perhaps the interviews are more reliable since such a research method leaves the process untouched and examines it in retrospect. Of course this simply exchanges one distortion for another. How do we know if the memory of the designers we interview is accurate? Perhaps they