

5

Problems in Teams

We have talked so far mostly about problems that emerge from an individual client, but there are also times when a helper is called upon to work with a team of clients. This may be because no one individual feels he has the knowledge to put himself forward as the person who tells the helper about the problem, or it may be because no one person in the team is trusted by the others to do a good job of describing it. More frequently, however, it seems to be because several members of a team share a feeling that there is a problem, something which they would prefer to be a bit different from the way it is. This does not mean that they can articulate it enough for it to be summarized to a helper. They do not feel that they know what the problem they want to work on is. They do not necessarily think they could all agree on a problem. They probably think that it is complicated enough to need all or at least several of the members of the team to be able to talk about it and give its context together. For these or many other reasons, the helper ends up talking to a team of people. The helper does not usually get to know which of these reasons, or what other reason, lay behind the members of the team taking an interest in that problem, and asking for help in doing so.

We have often found that teams get more from looking at problems together as a team effort than they do from any individual help. For this reason we quite often suggest to our clients that, even if they have brought a problem to us individually, they might prefer that we have a look at it with them and the other members of their team together. The response that we have had to this suggestion, and the effectiveness that has ensued when it has been carried out, leads us to think that this is a form of help which might frequently be taken up enthusiastically by clients if it were more widely offered.

At present, members of a team tend to think of their problems and their teams in a way which is not conducive to thinking of the former in terms of the latter. Many forms of help that are offered purport to start by pin-pointing the 'real' problem.¹ If an expert can come in from outside and tell people what their problem really is, there may not be all that much benefit in talking with the whole team about how they see the situation, rather than just talking with one

or two members. However, the perspective which we outline in Chapters 1 and 2 suggests that you might get quite different views and conceptions about a question by talking with several members of a team rather than with only one, and the view you end up with might be more robust in attempting to solve a problem in that team than would a view culled only from the person who first happened to talk to the helper.

At the same time, there may be some cynicism to be overcome as to whether anything good can ever come out of working in a team. The arguments for and against working in teams need not concern us here,² because of the different perspectives, concerns and interests that different members of an organization have, we would expect working in a team to be frustrating (and plenty of team members are willing to confirm that for us) but fruitful. The strength, frustration and indispensability of teams stem from one of the facts of present-day organizational life, that people share power but have conflicting interests.³

There are two fields of endeavour that should be able to make a contribution to the understanding of problems in teams, and we have been concerned to bring these skills together as a way of producing the most practical interventions in teams. In the recent past (although many of the elder statesmen tell us that it was not always so, and a rereading of some of the early texts confirms their claim), operational researchers and management scientists have tended to concentrate most on developing their model building skills, and to concern themselves less with trying to improve the way they go about collecting the data that they model. This has resulted in their working mostly with simpler, more quantifiable, cleaner sorts of data — the very last kind of thing that you can expect to get out of talking with most client teams about problems that they care about.

At the same time, using a different body of expertise derived from the applied behavioural sciences, there are 'Organization Development' consultants⁴ who have spent a lot of time working with teams, handling mucky data, looking at illegitimate issues (though they too have tended to shy off the organizational politics); in general they have been much broader and more sensitive to uncertainty and confusion in their data collection for their clients. Unfortunately, however, at least by the standards of explicitness and consciousness that are employed by operational researchers, they do not seem to have had very much in the way of ideas about how to lay out and represent back to their clients the data that they collect. Clearly in the case of successful organization development consultants they are doing something helpful and useful with their data, but in most cases this is done at too intuitive a level for others to be able to

² The arguments against using teams are well rehearsed and popular; "a camel is a horse designed by a committee". For some arguments in defence of teams see Galbraith (1974).

³ Allison (1971).

⁴ For a good introduction to this field see Bennis (1969). For a more recent account of what happens in this style of consultancy, see McLean, Sims, Mangham and Tuffield (1982).

¹ See Slee Smith (1971, p. 102) for some examples of 'real problem' type statements made by helpers, and which Slee Smith advocates.

learn the secret of their success, or indeed for the successful consultants themselves to build as much on their success as they might otherwise do.

Over the last few years we have been adapting the methods that we have talked about in previous chapters for use in teams. We find that they help us to do more than we could otherwise do towards getting the best of both worlds. They give us the explicit models to manipulate and work with that are a great strength of operational research. They also enable us to collect and use the sensitive and more varied data about whatever it is that is concerning the client, which has been more the province of organization development.

In the remainder of this chapter, we shall look first at some of the things involved in managing the social dynamics of modelling problems in teams. After that we will look at some of the difficulties that arise in aggregating different perspectives in a team about a problem, and consider why this is a difficult thing to do. Finally we shall turn to consider the management of ideas and problems in project teams.

THE SOCIAL DYNAMICS OF MODELLING PROBLEMS IN TEAMS

Any helper working with a team has a choice which can continuously be made and remade about how much to dismantle or disrupt the normal social dynamics that pertain in that team.⁵ The more the helper intervenes in these dynamics, by causing people to stop and consider what they are doing in their dealings with other members of the team, by pointing out where people are being ignored, and so on, the less likely it is that powerful members of the team will feel that the team is achieving anything during that session, even if they are in principle all in favour of an intervention; however, a skilled helper may be able to make quite major interventions without losing the support of powerful members. At the same time, by intervening in the normal and unconsidered processes of the team, the helper brings the team to see other possibilities of ways they might go about doing their business; if the helper is successful in doing this, and the team discovers from it some different process which they then go on to practise and institutionalize, then an important and lasting contribution has been made.

Even if the helper does not manage anything as grandiose as that, it can be very valuable in problem definition for a team to have a helper present. By being there, asking questions which are probably out of the ordinary for most of the team members, and making suggestions of how they can go about their discussion, they are likely to achieve three things. Firstly, they are likely to enable members to think of points which they would not otherwise have thought of (in this respect, acting as a device for increasing creativity and lateral thinking). Secondly,

⁵ The concept of disengagement (Mangham, 1977) is quite helpful about this; to what extent does the helper wish to disengage his clients from their world-taken-for-granted?

they are likely to hear points which other members make which would not usually be heard or taken seriously (in this respect, acting as a device for improving listening). Thirdly, they are likely to enable people to say things which they might otherwise have thought of but not said (in this way acting as a more general 'permit to speak'). The reader should remember that the 'helper' we are referring to is not necessarily an outsider to the team. Sometimes a chairman in a team may be particularly well placed to undertake these tasks, although the occupant of that role will often be too enmeshed in the content of the problem to be able to undertake them properly.

We expect, when working with a team, to find a lot of different and even conflicting concepts from the different team members, but also quite a lot of common concepts, or concepts that are similar enough that we can put the maps together in some sort of an aggregation. Very often the team members have all spoken to us separately, and so there is less risk of 'perceptual set' than if we had talked to them all together; by this we mean that there is more likelihood that what each person says to us about the problem does not constrain or influence what the next person says about it. This means that we collect together what often turns out to be a very large amount of separate and partially conflicting wisdom from different members of the team. When they see it all put together, it can be a revelation to them as it explains some of the funny things that have been happening in their discussions about this sort of issue, sometimes for years. The aggregated map can then be presented to the team; if, as is usual, it is by this time a fairly large map (perhaps a couple of hundred concepts or more) the presentation needs to be a careful, deliberate and lively process. There is so much content, there are so many new ideas, so many new possibilities opening up, and new relationships between problems and sub-problems appearing, that if people are not highly stimulated and excited by the presentation, they will probably be swamped by it. Indeed helpers also risk being swamped, unless they have made use of something which helps them to organize the concepts of the map, such as the grouping procedure described in Chapter 4 or the computer assistance described in the Appendix.

Sometimes it is expedient to meet the team all together rather than to begin work with the individual members separately. Building a model in this way can often be more exciting for the team than individual model-building sessions. However, it is much harder with this process to enable points of view to emerge which are of no interest to, or which are actually disagreed with by, the powerful members of the team. However much those powerful figures may intend to be open and receptive to others' views, there will still be those to whom they are accustomed to not listening, and those points which they may have dismissed for some long forgotten historical reason. In some cases one of the skills by which they gained, hold and retain power in their team is the ability effectively to write off some particular people or points in a discussion. When helpers do build their models away from the clients, they may choose to present some of

the less-valued contributions in such a way that the power-holders are more inclined to take note of them. This is quite separate from any considerations of whether power should or should not be equalized; it is done in the interests of increasing creativity. It may also be done in order to equalize power if the helpers' values lead them to want to do that. Whether or not they set out to do so, helpers are inevitably intervening in the power relationships in the team. Their mapping, and the selections they make in what they map and how, are bound to have some influence over the power of different contributors.

It is not only in matters of power, but in other factors which are involved in selective perception, that helpers may want to assist in making listening less selective among members of a team than it would have been in their absence. For one thing, including a concept on a map changes it in a way that seems to make people more willing to build on it than to reject it. Also, one of the great incentives to rejecting other people's thoughts is diminished, and that is the threat of finding oneself with a paralysing number of different things to think about – a swamping complexity. It is our experience that when our clients are less anxious about forgetting something vital, or losing their train of thought, they are less dismissive and selective of each others' ideas than they have previously been.

Another thing that often happens when ideas from team members are coded to become part of a map is that members do not just accept each others' ideas they claim ownership of them. Frequently, we have found that a concept which came from only one member of a team is believed by several (sometimes all) members to be something that they said. In some cases, clients have told us that one or more concepts on the map show great insight on our part, because that was what they meant, but they had never found a way of saying it. When we tell them that this concept came from one of their colleagues, they sometimes do not believe us. Whether or not they believe us, and whether or not this affects their attitude to that colleague, it usually assists their thinking and their contribution to their team.

One thing we have noticed with starting the process of modelling a problem in a team is that quite often, if the modelling is done with the team all together, some of the individuals present may wish to take the jointly produced model away and elaborate it for themselves. In some of our recent work we have encouraged teams to do this, and then we have gone round talking to the individuals about what kind of elaborations they have made of their models, with a view to bringing these elaborations back and putting them together in the team. Where this is possible it seems to be a very good working compromise between the two different approaches to initial mapping that we have described.

AGGREGATING PERSPECTIVES ON A PROBLEM

However the helper goes about managing the social dynamics of modelling

problems in teams, at some point there will be a need to put together the views of different persons about problems. Now as we said in Chapter 3, the definitions that individuals have of problems, the views they take of them, are a very idiosyncratic matter. One person's serious problem is another person's intriguing puzzle, and to another person it is not noticeable at all. So how can we go about aggregating these different perspectives?

We all see the world in different ways. There is so much around us that we cannot possibly see everything. Our perceptions and non-perceptions are quite selective. Whilst we could multiply examples of differences in perception, it is worth noting that if we really thought perceptions were totally idiosyncratic, we would not have any reason for talking about them. We assume that there is enough agreement about the meaning of words and the nature of objects that we can, most of the time, reckon that we know what each other are talking about. "Regardless of the philosophical bases of the following two positions, we find the notion that individuals are separate and alone, each inhabiting their own subjective reality, to be, in its extreme form, almost as unhelpful as the opposing notion that the world is a place of facts which can be proved or disproved, and about which we can all be expected to agree."⁶ Instead it seems more helpful to take what we call an 'intersubjective' position; what we know about and perceive is basically a subjective matter, but for most of us most of the time there is a great deal of agreement about this knowledge and these perceptions; there is a large area of intersubjectivity, which to all intents and purposes behaves like an objective world.

This begins to give a rationale for producing an aggregated model of a problem. Different people see problems in organizations in different terms, and indeed they are paid to do so. Nobody (apart from, possibly, the personnel officer) wants the accountant to start seeing everything in the same way as the personnel officer; someone has to watch the accounts. Different people see problems in different terms, but to do anything about those problems, they will usually need to act in concert with other independent individuals, and will therefore need to take some account of how those individuals see the initial problem. Thus although it may often be too abstruse for them to think about it in these terms explicitly, many people in organizations find that the way their colleagues see a particular problem is a part of the way they see the problem, even if they disagree with, or disregard, some of the particular points made. So it often happens that members of a team will accept an aggregated model of a problem as being, for each one of them individually, a model which they are more happy to own and to think about than they were with just their own model, however far they had developed that. Models, after all, are not meant to take over the business of thinking, but only to serve as an explicit, manipulable and usable

⁶ This quotation is from Eden, Jones, Sims and Smithin (1981), where this topic is dealt with more fully.

tool. These tools should assist with thinking about matters so complicated that it is difficult to think about them unaided, and should also act as an aid to communication between the team members about such complicated matters.

In the next chapter we shall consider some of the more detailed practical questions that arise in trying to build intersubjective models to help teams in the consideration of problems.

Case Study

Jenny was glad that things were going so well with Alan. She had got to like him during their sessions together, and was beginning to find his enthusiasm for potential developments in the technology of taps and stopcocks quite infectious.

But she was also getting a little bit uncomfortable. Her original client had been Ian, not Alan, and she felt she should make sure that she was not being seduced into changing product and client unless there was some very good reason for it. Was there such a reason? — she asked herself. On the whole not — but it is very difficult if you are empathizing with a person in a client organization, and listening carefully to what they say, not to get to see things so much through their eyes that you feel that theirs must be the only valid way to look at what is going on.

Jenny decided to talk this through with her boss, because something she did not want was to end up with a project that she was pleased with, but that did not satisfy his interests and his strategic objectives. She was not particularly looking to her boss for advice or directives, but then he had been around in the consultancy and advice-giving business for long enough that she could be pretty confident he would not give her either of those. What she wanted was someone to listen to what she had to say about the project on her behalf, because she could not listen while she was talking!

“The trouble is”, she said, “that it looks to me as if Alan might well be right. But Ian’s got us there to produce some facts and figures to demonstrate to Alan that he’s wrong, at least partly. Now even if he were wrong, and I suppose I’m not qualified to judge that, I don’t think there’s any way that Alan would or could accept himself as having been proved wrong by this rather oblique new product exercise. So what Ian’s got us doing may well be a step in the wrong direction, but in any case, I can’t see that it would be likely to work.”

Jenny’s boss, Arthur Morris, was a reflective man who always liked to pause to think about things before responding. “So you think”, he said, “we’ve got several different perspectives here without the people who’ve got the different perspectives realizing it?” “That’s right”, said Jenny, “and all the perspectives are well enough organized and argued in themselves that nobody is going just to abandon theirs. I think if I’m going to do anything there that is of any use to them — including being any use to Ian — then I’ve probably got to do an exercise with the team as client, so that some of their idiosyncrasies get a bit of an airing

and sharing. It could be a bit tricky, because I’m not sure that they’re much predisposed to accept one another’s peculiarities at the moment. But at least I’ve got a start, because I’ve got a well-developed map of Alan, and rough maps for Ian, Justin, Peter and John. The trouble is, that is not what they asked for.”

Arthur knew this dilemma only too well; a consultant knows something which they think will help their client, but a client may not ask for what the consultant thinks will do them good, either because some possibility has occurred to the consultant that has not occurred to the client, or because the client knows something the consultant doesn’t — often about either the politics of the situation or about their own values.

Arthur also knew that Jenny would be thinking along similar lines to this. She was. “Perhaps what I’d better do”, she said, “is to go and put it to Ian that as well as the modelling project that he asked for, I would like to do something that surfaces some of the different ideas that may be around on new products, and existing ones, in a way that is a bit less constricting, and gives rather more freedom for some of the ideas that people aren’t quite sure about than does our market modelling. He’s a big boy — I don’t think he’ll have any trouble saying no if he doesn’t want to do that.”

“Make sure that he knows it’s only an optional extra, won’t you?”, said Arthur.

Now Jenny wanted an appointment with Ian to talk this over with him, and to try and sell him on the way she wanted to go about it. Although she wanted to make the appointment as soon as possible, if possible she would prefer to avoid getting into conversation with him until she had had a chance to think out how to put the idea to him that there were different ideas and approaches within his team, without her actually giving away any confidences. If she did give anything away, she could be quite sure that would be the last she would hear about what they were all thinking.

She rang Ian’s secretary. “I’m afraid he’s not here at the moment”, said Linda. “Oh, never mind”, said Jenny, hoping the relief did not show in her voice, “but has he got any free time next week?” “No, he’s off to Switzerland with Justin all next week, looking at Sultans’ bathrooms”, said Linda, “but I tell you what, he’s going up to head office this afternoon, and I think he’ll have a bit of time. Shall I get him to drop in on you?” “Oh yes, that would be great. I’ll be in all afternoon.”

Jenny did not actually think it would be all that great. She was trying to finish off a report on some work she had done in Septic Tanks, and she would not have as much time as she would like to think out how to sell Ian on the change of emphasis. But still, she felt that some of the data she had been getting was important, and she did not want the project going cold on her. She had found that clients do not much like to give important data and then to have it dragged up ages after they had given it. She quickly looked at the doodled map she had done of what Ian had said to her; it reminded her of what he was like and what he was concerned about. She did not think he was likely to be too

difficult, because he seemed to be quite interested in new ways of looking at things; it should be all right to play it by ear. She then immersed herself in Septic Tanks.

When Ian turned up he seemed more relaxed than he did in his own office. He admired her office, told her where he was going in Switzerland; "Perhaps in a few years, if we get our new product direction sorted out", he said, "they will be coming over here to see what they can import from us, and I'll have to look for a new excuse to go swanning off abroad! Now, what did you want me for?"

Jenny started off by giving him a quick run-down on where she was with the market modelling project. It was going according to schedule, and he seemed very pleased, if a bit surprised, by this. "But I've been thinking", she said, "that there seem to be a lot of people around with different ideas, but nobody knows how, or if, these ideas fit together."

"Hmm", said Ian, "that's my job, isn't it?" Jenny wondered if she had just blown the project, although he did not look offended. "Well, not necessarily", she said. "You quite often find a lot of ideas, when you go round like I have been doing, which everyone assumes everyone else has thought of, but in fact no one else has. That is the kind of thing I think would be worth looking at next with the marketing managers plus Justin and Alan. I think it might help people to be more sensitive to the overall picture", she said, vaguely. This ambiguous sentence was taken by Ian to mean that there were some signs of Alan falling into line. He did not check whether this was what she meant (it was not), because he reckoned that she and he would have both thought that rather improper. "Yes, that sounds useful", he said. "I would be grateful if you would carry on with that line. Are you getting all the access you need?" Jenny realized she had been misunderstood, but could see no way of correcting the impression, and perhaps it did not matter too much anyway if Ian believed what he wanted to believe. Soon afterwards, he went on to the meeting he had come up for; they were both reasonably content with their chat.

6

Model Building in Teams

Clearly, when working with a team rather than an individual client, the problem-helper is dealing with significantly greater complexities. He has to cope with the social dynamics which occur among a group of individuals with different personalities, styles of interaction, power, 'internal' political concerns with respect to one another, beliefs about others' competence levels, and so on. He has also to try and understand the several different ways in which the members of the team give meaning to any overall 'problem label', and a variety of beliefs and expectations about the team/helper relationship. The problem helper will need to be aware of these social dynamics, evolve strategies and tactics for handling them. To build a model which the team members find convincing and useful he will need to facilitate a process by which a team can come to negotiate about a problem definition which they can work on together. This chapter raises some of what we have found to be the more important practical issues surrounding the use of the techniques in this book when working with teams.

ESTABLISHING EXPECTATIONS

The procedures that we have found to work best may start in one of two ways, either with the team members individually talking to the helper about the problem as they see it, or alternatively with a meeting of the team run by the helper for the purpose of their telling the helper about the problem, and at the same time making their ideas open to their team colleagues. What typically happens is that one or more members of the team approach the helper and ask for his help. Arrangements may then be made to meet the rest of the team together so that everybody knows that a consultant is going to come round and talk to them, and knows the rules that will be followed in this procedure. For example, issues of the confidentiality of what is said to him need to be raised at this juncture, as do expectations about how much time he will require, where the meetings should be held, whether they will be tape-recorded or noted in some other way, what 'problem label' will be used as a starting point, how much freedom the members of the client team have to depart from that central point in discussion, and perhaps most important of all, what sort of model the consultant intends to present back to the team of the data that emerges. This last point is crucial for team members who are unsure about how much they can

afford to reveal. Whether or not such a team meeting is held, these are critical issues which need to be taken seriously by the helper, and which will need to be discussed widely within the team.

INDIVIDUALS OR GROUPS

There are distinct advantages to initial individual meetings. One simple yet extremely important advantage is that spending time with individuals first of all reinforces the problem-helper's position as wishing to take into account and work with the views of every member of the team. Most importantly, even taking into account that the individual will be selective about what he is prepared to reveal, the problem-helper will learn far more about that particular person's personality, beliefs, concerns and interests in the situation than can be learned when talking to a group. This is not simply a matter of 'air time'. However well the problem-helper manages to ensure that each person has his say, it is impossible to avoid some kind of mental set acting as a boundary to the discussions that occur in a group, with thoughts being channelled by the ideas that have already been expressed by their colleagues.

If the problem is seen by the group members as complicated we find that initial interviews much less than an hour long tend to be rather limited. Shyer or more nervous clients can sometimes take quite a while to settle down and start talking freely, although they may be quite capable of filling up the meantime with platitudes and whatever statements are the equivalent in their organization of speaking in favour of motherhood and apple pie. If the interview is longer than one and a half hours, we find that the attention of both client and consultant tends to flag, however interesting the issue, and however good the interview. So we would usually spend an hour to an hour and a half with each person in the team. Either as they are talking, or subsequently from a tape-recording (often both), we make notes in the form of a cognitive map, in the way we have described in Chapter 4. If we know the client reasonably well, and both he and we are relaxed, we make those notes in a form that he can see and respond to immediately. Sometimes we would take those notes away, tidy them up, and go back to see the client with them in their cleaner form, as soon afterwards as practically possible. Sometimes, for example, it seems important to get back within 24 hours. The longer you leave it, the harder work it is for the client to climb back into what he was talking about, and so the longer the second session needs to be. At this stage we invite the client to elaborate anything that he feels he left out previously, to correct any mistakes that he thinks we have made in coding and representing what he said and tell us about any bits that, while they might be fair representations of what he said, he does not want to see revealed to his colleagues as being what he said.

However, constraints of time, the problem-helper's energy levels and in some cases money, may mean that the problem-helper chooses to work with the

whole team from the beginning. In this case, the process may start with the consultant in a team meeting which has been called to discuss the nature of the problem. We often try to make this something outside the normal run of activity of the team, for example by taking them away from their usual meeting place and by making sure that it is a helper and not the team leader who is in the chair: this last point may, as we said in Chapter 5, be influenced by how much the leader is inclined and able to play a helper-like chairman role, rather than being embroiled in the content of the discussions of the team.

MANAGING THE FIRST MEETING

If it is necessary to work with the team as a whole, or a sub-group of it, then the problem-helper has to consider how to ensure, as far as possible, that something is learned about the way each individual sees the situation which they are brought together to discuss. One way of providing a structure to help in this, is, at the beginning of the meeting, to ask each member of the team to write down on a card those things which he sees as most important, or is most 'fussed about', when he thinks about the particular problem label which the helper will have been given already by those with whom the intervention was arranged. This activity can be explained to the team in terms of different members of the team seeing the problem label in different ways and that it is important to try and discover the concerns and beliefs of each member of the team.

Then, each person, in turn, on a round-robin basis, is asked to call out one of the statements or concepts he has written down and the helper writes these up on a large flip chart in a circle around the central problem label. As each person calls out what he has written down, the helper can ask for an elaboration of its particular meaning through requesting the psychological opposite. In Figure 6.1 is an example of part of a concept map around the problem label 'more successful new product development'.

Drawing a concept map in this way gives the helper some understanding of similarities and differences in the concerns and beliefs of the members of the team, and also reduces the domination of the direction of discussion by one or two vocally powerful individuals.

In the example a helper could construct certain clusters from the ideas represented on the map, e.g. about team working, the concern with existing business, and the lack of direction from senior management. Often helpers will see clusters of ideas that they think represent shared areas of concern among some of the members of the team, albeit with different or conflicting beliefs. One such topic area can be the basis for further discussion, and a good idea is to start with one mentioned by several members of the team. Choosing one of the constructs within this topic area, the next stage is to ask people to talk about the significance of this particular aspect of the situation.

During this process we would recommend the problem-helper to code and

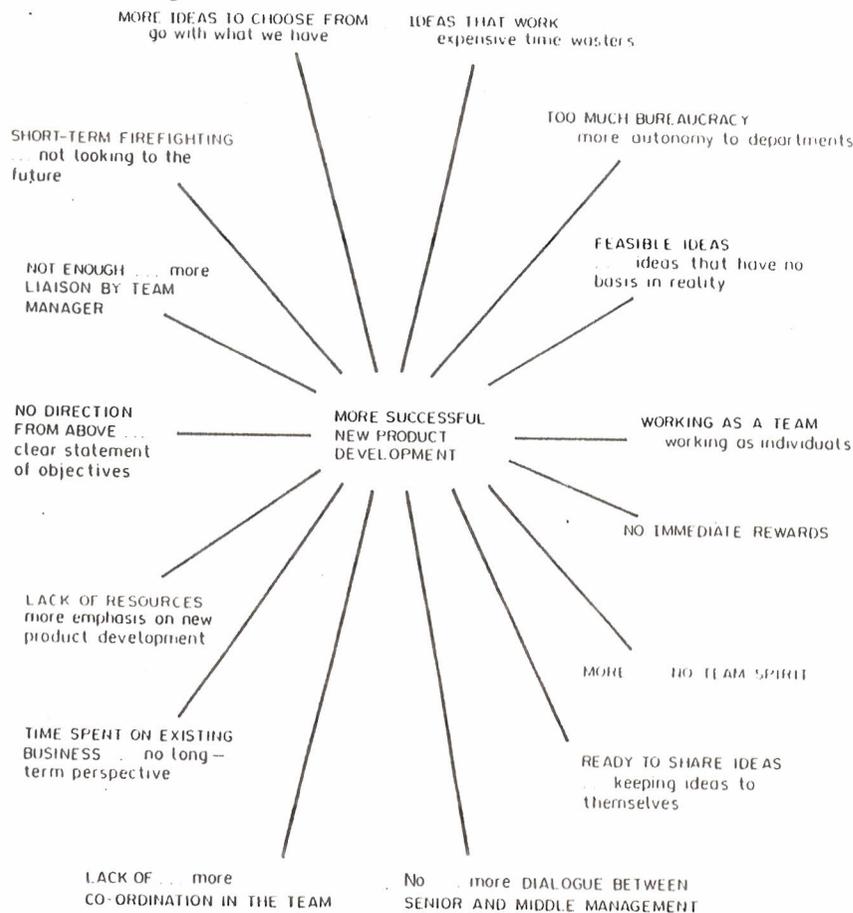


FIG. 6.1.

represent theories as they are being articulated. It is bad enough trying to keep hold of the complexity articulated by one individual in a meeting. With a number of different individuals where the diversity of ideas is likely to be greater and the theories of one individual spark off more ideas from someone else, it is virtually impossible without taking some kind of 'notes' in this way. If these are done on a flip chart in front of the team the members of the team are themselves enabled to hold on to the different theories of different individuals as they are expressed, which would otherwise be lost in a wide-ranging discussion, to relate the ideas expressed at different times in the discussion and gain immediate 'feedback' which many individuals appear to find rewarding. We have often found that the members of a team express both surprise and pleasure at the way in which so many ideas have been collected over a relatively short period of time about a

situation using 'on-the-spot' cognitive mapping. This method also provides a structure for the meeting as a map becomes a focus for elaboration in particular directions and making explicit the relationships, similarities and differences across perspectives.

Doing 'on-the-spot' coding becomes much easier with practice. However, it will never be as 'tidy' and visually neat as a map which has been carefully drawn with an eye to appearance, spacing and concept clusters. This does not matter when you are representing the views of other people about a situation which is meaningful and important to them; matters of tidiness are pretty unimportant so long as the map is legible. What is important is to get down the ideas and beliefs as they are articulated. There is always an opportunity to 'tidy up' the map and check on understanding later.

Thus, for example, someone might say in answer to the question "Why is it important to you that you work as a team rather than working as individuals?", that "if we worked better as a team we would be ready to share our ideas, and then we would have not only, probably, more ideas but also better ideas". This could be coded as shown in Figure 6.2.

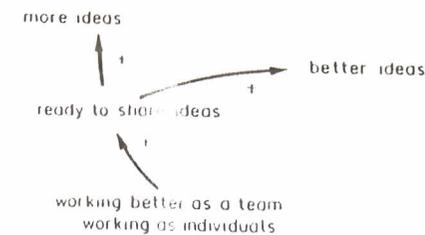


FIG. 6.2.

At this point another member of the team might say: "I am not sure I agree with that. When people share ideas there isn't the same commitment to carry the idea through so really they aren't better ideas, because nothing gets done properly". This could be added as seen in Figure 6.3.

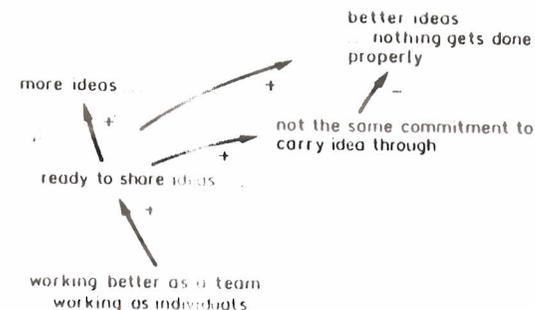


FIG. 6.3.

remains, or by drawing new links between the concepts of different persons.

In earlier chapters we have made the connection between the concepts that we map and the personal construct theories of Kelly. The concepts that people use in thinking about their situations are idiosyncratic, and we have observed that their meaning may be defined in a very individual context, and in relation to a psychological, rather than a logical, opposite. When we aggregate together the concepts of different persons we are choosing not to be governed by this argument, but rather by the opposing argument, which is that there is a degree of commonality between different persons' concepts, and that different persons do mean something of the same thing by similar words. The decision to merge such concepts is made on the basis of their meaning being so similar that there is no significant distortion resulting from merging them and the advantages of so doing in terms of reducing some of the complexity coming from the volume of data, make it worthwhile. Great care, however, is needed on the part of the helper to make sure that the concepts being merged really are seen as similar by his clients. In terms of understanding meaning, the helper is looking not only at the individual bipolar concepts, but also at their context in terms of related ideas. For example, in one case, several members of the editorial team of a magazine told us some of their beliefs about 'regular readers'. When it came to putting together a model for the team we might have merged these into one concept if we had not happened to notice that the context around them suggested that the different team members might have different meanings for the words. In the next team meeting we checked this impression, and found that it was in fact the case; one person meant by 'regular' those readers who bought the magazine every week and had an order for it at a newsagent. Another person meant those who bought it almost every week if there was one left when they remembered, and who probably ended up buying three a month, while another person turned out to mean those who read the magazine at least once a month. These people had been talking about regular readers as if they all meant the same thing for years. It was only the context of their concepts, seen in maps, which finally revealed the misunderstanding.

It is cases such as this that have led us to prefer to do most of our merging in the company of the owners of the concepts concerned. This is not always possible, particularly if there are large numbers of maps that have to be brought together before presenting an aggregated map back to a team. In this case we often make a note to check particular mergers if we do not feel very much confidence in them. Mergers are very often suggested when helpers are listening to a team together, where one member will say something, and another member will say, "Isn't that the same as . . . ?" This may be a helpful merging activity which can enable more of the linkages between different persons' beliefs and concepts to become visible, but the helper should accept the suggestion only with some caution. Most of us, when we are told that we are saying the same as someone else, tend to feel that we were actually trying to say something a

little bit different, and that part of the richness of what we were saying is lost if it is taken to be no more than repetition. It should not be too easily accepted that, because one person says that two concepts can be merged, and the owners of both those concepts agree, that there is no loss of richness involved in the merger. Unless there has been some discussion of beliefs around those concepts, the owners of them may not even know the difference between their positions.

MERGING CHAINS OF CONCEPTS

We often find that a concept seems to connect with several other concepts, and not only the one in connection with which it was first mentioned. As new concepts are added either the helper or members of the team may think of possible connections with other existing concepts on the map, in some cases several other concepts.

This leads the helper to merging chains of concepts. In Figures 6.4 and 6.5 we show two sets of beliefs from two different individuals which could be merged.

The choice of which concept of merged concepts remains within the map is relatively arbitrary or depends upon which the problem-helper believes to capture most. In some cases merging can mean pairing one half of one concept with the other half of the other, as in a couple of cases here. If the problem-helper does not wish to merge in certain cases then concepts that are similar can be placed side by side linked connotatively (see Chapter 4 for the significance of this); or can be merged for the purposes of a chain or beliefs but the 'removed' concept retained by means of a connotative link, as with "no . . . some team spirit" in

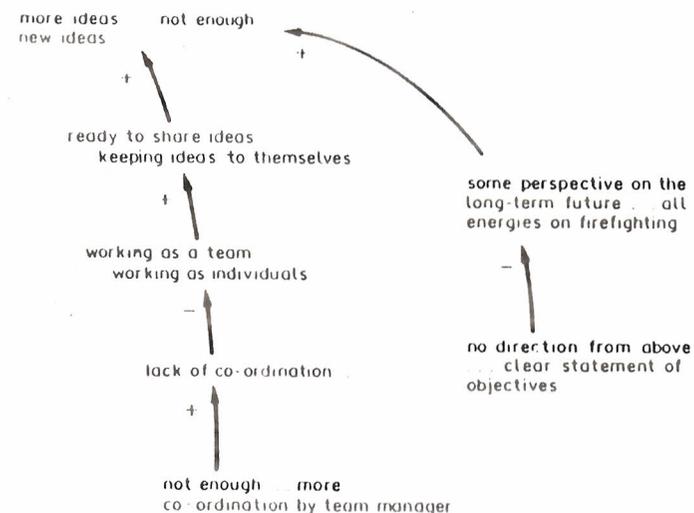


FIG. 6.4.

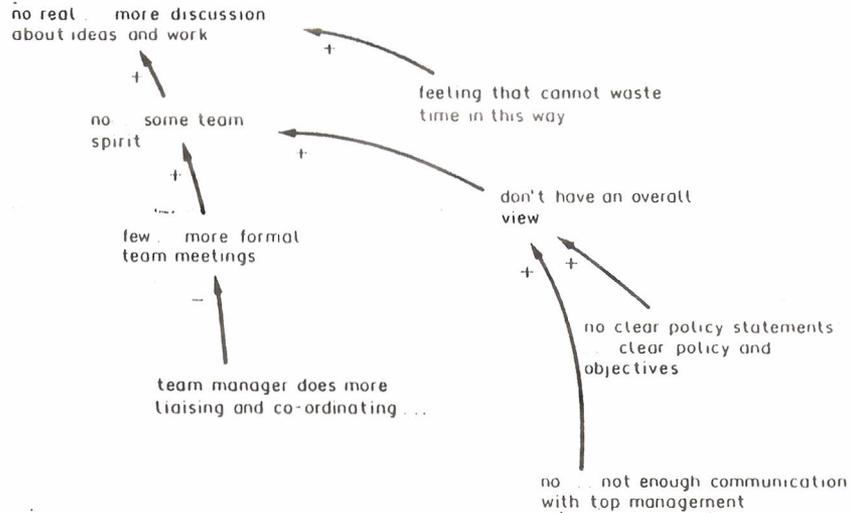


FIG. 6.5.

the Figure 6.6 example. Connotative links can be usefully used in several ways: to indicate a close similarity between concepts which, however, the problem-helper does not wish to merge; suggesting that there may be some relationship between ideas, such as in the constructs about time and energy in the above example; where the problem-helper feels that there is a causal link between theories in two different individual maps but does not feel able to put this in before discussing it with the team.

GROUPING IN TEAMS

We have discussed in Chapter 4 the notion of grouping concepts as a way of sorting them and of enabling people to find their way about them. In the very large maps which tend to result from model building in teams, the significance of grouping becomes even greater. Because of the merging of concepts and the introduction of extra links, the connectivity of concepts tends to be rather high in team maps, and so exploring the concepts connected to only one or two concepts may provide a considerable amount of material for a team.

The helper should analyse the content and structure of individual maps first to decide which clusters of concepts appear to represent different areas of concern, asking "What things does this person appear to be particularly fussed about; what other ideas are connotatively linked to those things or have consequences for them?" Having done this, and seen how areas of concern are related to one another, the helper then compares the individual maps to see if there are mutual areas of concern among the members of the team, even if the content may be

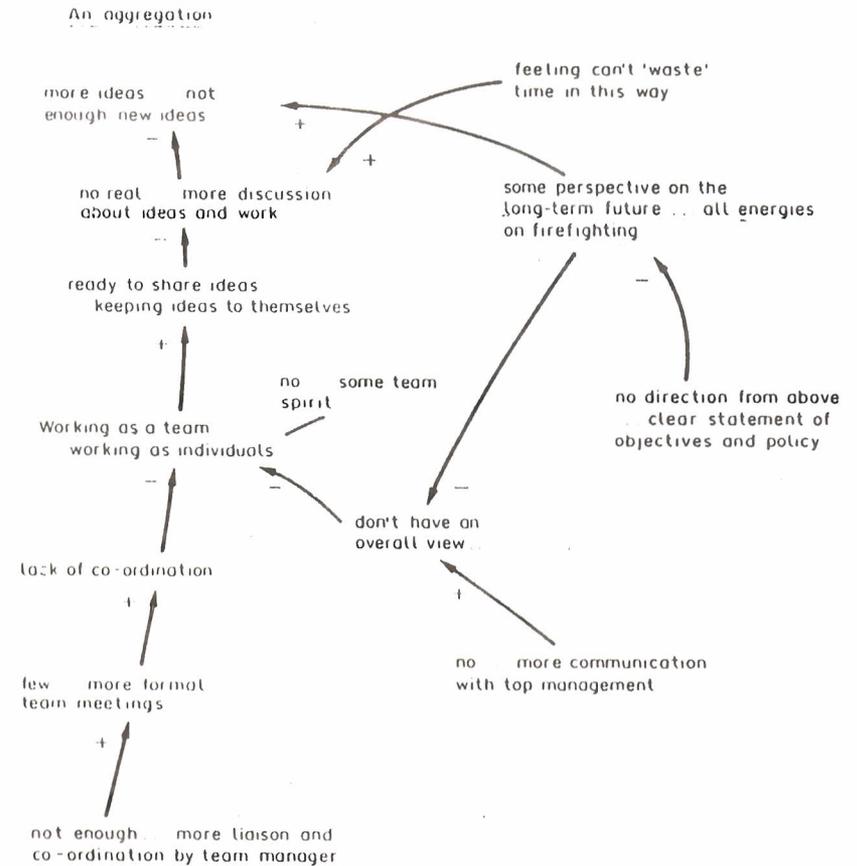


FIG. 6.6.

different, or conflicting, in detail. He can then merge these areas of concern, or 'groups' of concepts. Thus, returning to our example, the helper could group into one merged area of concern all the groups of concepts in the individual maps which had as their key concept something to do with the idea of "working as a team rather than working as individuals".

However, the helper would do well to be very cautious, and if he is not very confident about the similarity of certain groups, he would best leave the merged map having a larger number of groups and then explore similarities and differences further with the team.

As we have discussed in Chapter 2, the individual definition of issues is idiosyncratic, and what one person regards as relevant to an issue another may well not. This can be very illuminating and helpful in team discussion, but it will usually work best if the team members have done their own grouping and made their own judgements as to which of their concepts is relevant to a particular issue.

ANALYSIS, FEEDBACK AND ELABORATION

Because team maps tend to be so much more complicated than individual maps, some of the functions that an analyst can perform upon maps can be even more helpful for teams than for individuals. For example, an analyst might set out to discover feedback loops which arise from the team map, to see if bringing together the thinking of different members of the team suggests any vicious circles which it might be well for the members to be aware of. Similarly, exploring some particular policy, an analyst might do work, possibly using a computer, to trace through paths and consequences of certain policy actions.

Some of the most interesting learning from looking at maps comes from the occasions where there are both positive and negative routes between two concepts. With a large and involved map this may be difficult to spot with the naked eye, certainly in the heat of group discussion, but such links may be discovered by the analyst studying the map, or using computer assistance to help him search for such indicators of likely problems.

When feeding back the merged map the helper will need to give some overview of the model as a whole first of all. Without identifying individuals' ideas, he will explain briefly what seemed to have emerged as areas of concern for the team members, possibly using a 'hierarchy' diagram of the relationship between areas of concern, similar to that shown in Chapter 4. One of these areas will then become the focus for the first more detailed feedback, using the map to show the different theories which have been expressed, some of which may involve conflicts and contradictions, pointing out any feedback loops which may exist, bringing attention to concepts and relationships which seem to be particularly significant in terms of points for action. (Each area of concern can be set out on a separate flip chart sheet for feedback.) Which area the detailed discussion begins with will depend on which the helper sees as most significant, in terms of general concern expressed by members of the team.

The helper will then begin to address some of the beliefs which appear to represent conflicts between members of the team. The map becomes a focus for discussion and negotiation, and the helper will reflect the elaboration and modification that occurs through on-the-spot coding to the existing visual map.

Case Study

Jenny still was not sure exactly how to handle this next stage. It was a tricky one. She did not know whether she had done the right thing in leaving Ian out of it. On the one hand, the games that were bound to go on between the marketing managers, with Justin desperately trying to prove his competence, and between them and Alan would be difficult enough to handle, without Ian's presence complicating matters. She still didn't know what exactly Ian wanted from her involvement other than a change of direction in new product development; she

suspected, however, that he also wanted to get something over on Alan and probably to show his mettle as the new dynamic boss, which was an added unpredictable factor for her to handle in what might already be a high-risk situation. On the other hand if he was presented with a *fait accompli* that he didn't like the consequences could be disastrous. However, it was too late now. She'd have to play the timing of his involvement a little bit by ear, depending on what emerged with the others.

The other question was how to manage the process of a group meeting to bring all the ideas together with the others. If there was one thing that had come out from her discussion with each of the marketing managers, it was that they were all totally wrapped up in their own areas of responsibility. Not that this was either surprising or wrong, but it meant that either they would not be in the least bit interested in those parts of the group meeting that weren't to do with them, or they might become extremely defensive or angry if someone else -- Justin for example -- started making helpful remarks about what they might do with their own products! At the same time there was one significant commonality -- John, Peter and Justin had all talked about the need to keep up with new technology, although exactly what this implied in terms of the kind of technology was as yet unclear. It might be that they all meant the same kind of development, or it might be that their visions were so different that if some kind of joint decision about new-product development was to be made, then they would have to work through together the ramifications of their different ideas. And if they were all convinced that some radical departure was needed, then it would perhaps be easier to move Alan in that direction if they were persuaded by the weight of their joint arguments. She felt that Alan was the sort of person who could be prepared to change his mind if he was presented with what he saw as reasonable arguments. Another alternative might be to get the marketing managers together with Alan on a one-to-one basis. This would at least mean that they were both talking about things that interested them and might reduce some of the more unhelpful dynamics of a group meeting.

She decided that before she made up her mind finally she would go back to John, Peter and Justin, show them their maps both to 'test the water' a bit more and to explore what they meant by new technology. She felt she would have had to do something like that anyway -- even if it involved a fairly quick meeting -- so that they could see what a map looked like and thus have some ideas of what a joint meeting around a qualitative model might mean. When arranging to do this she explained to each of them how she had come by the qualitative model. She reminded them that when talking to her about the figures for the quantitative model they had expressed some ideas that they could not put numbers on but still seemed quite important to thinking about new products, and that it seemed worthwhile modelling these too, but in a qualitative form. Before she did this though, she wanted to check that she had got things right, and to look at one or two things in a bit more detail. She also added that she had cleared this with Ian.

(At least this might dispel ideas that she was wasting their time, and the careful use of a little muscle every now and then was sometimes a good idea.)

None of the meetings turned out to be very long, but they were useful nonetheless. John was still relatively offhand, but he was not antagonistic and seemed quite impressed with the idea of explicitly modelling qualitative beliefs. He did develop some ideas that had not been there before – about the possibility of there being more market synergy between the newer up-market lines and his own. It became clearer that he was not thinking of any drastic change in technology but more of an up-dating on the lines Alan had suggested, to increase their price competitiveness and the addition of their own plastics capability. Justin just continued dishing out his ‘bright young man’ script about the need to sharpen up on their marketing expertise – but what was interesting was that both his and John’s map shared an interest in a greater ‘attack’ on the consumer, rather than on the distributor side of the market. Peter was the surprise. After not having said much in previous discussions he became quite animated and began to elaborate on the need to move into computerized industrial valves. She saw Peter last and by then she had become clearer in her own mind that the best way of proceeding might be to bring John and Justin together with Alan and keep Peter out of it to talk separately to Alan. It would be pretty easy to explain in terms of the distinction between consumer and industrial products, and this arrangement might solve the problem of Ian’s role, and explain his absence from the meeting. If Alan could present something on both aspects of the new-product development programme then Ian could have the opportunity to develop some strategy relating the two, calling in the others with Alan at a later stage.

The meetings had all taken place within a week (the trip to Switzerland had been a short one) so Alan had not been left too long since her last meeting with him, and she had explained to him that she had been using maps to collect some of the qualitative ideas of the others. He had looked a little surprised but hadn’t objected and when she suggested the possibility of two meetings, one with John and Justin and one with Peter, he had merely grinned and said “O.K., why not, it might be very useful”. She had the sneaking suspicion that he was more politically astute than she had first imagined, and had worked out what she was up to. “Why didn’t he mind?”, she wondered.

Justin was predictably delighted at the idea of a meeting where he presumably felt he could start to have some impact on events and get some Brownie points with Ian. Jenny wondered how much Ian had told him of his feelings about Alan on their trip together. She would have to make sure that he did not start trying to trample over Alan – but John and Alan would probably keep him under control. She told him that she would put his map together with the others to produce an aggregated model, and checked with him that “presumably you would prefer me to leave out the personal comments about Ian and Alan”. She didn’t want them in anyway, and he agreed.

John also seemed quite pleased at the idea of a meeting, even with Justin, and Peter was also prepared to go along with the idea. “Yes, it’s probably about time we had a look at where we’re going”, he said. She made a mental note that it was probably that meeting which was going to be the most difficult.

The next stage was to aggregate the maps – Alan’s with Peter’s and Justin’s and Alan’s again with John’s.

To prepare for the feedback with Alan, John and Justin, and Alan and Peter, Jenny used the computer and the COPE software package to help. Although the computer was able to administrate and analyse the data quickly and flexibly it is not essential to the sort of preparation Jenny was undertaking. In general the more individuals’ maps that have to be aggregated the more benefits there are from using COPE. In this case Jenny was aggregating four relatively small models and so COPE was not essential but rather an advantage.

As Jenny was pursuing the project she had been constructing each individual model using the computer. At this stage she had a model for each of Alan, Peter, John and Justin. Her first task was to create a new model with the appropriate models added to one another and similar concepts merged so that the models were interconnected. These are two obvious ways of merging aspects of a model. Firstly, two concepts may have very similar verbal tags, even though they mean different things in the sense of being set within different belief contexts. In this case one of the two concepts is chosen as ‘most complete’ and the other merged into it so that one concept is lost but the relationships are held as context to the remaining concept. Secondly, concepts in one person’s map may clearly relate to those in another person’s map, and so relationships or connotative links can be inserted to show this linking of ideas.

For example, Alan had been discussing “lower selling price” and John “keeping prices down rather than following costs”. It seemed to Jenny that little violence would be done to the sense of what Alan was discussing if Alan’s concept were merged into that of John. (In the computer this is easily done by giving the command ‘m9=16’ which says make the inversion of concept 16, which belongs to Alan, the same as concept 9, which belongs to John; the computer will automatically carry across the relationships belonging to 16 to concept 9.) Similarly Jenny thought there was a link between John’s concept “invest in up-to-date technology rather than keep old inefficient plant” and Alan’s concept “technological innovation rather than stagnation of products”. Jenny linked the two with a +ve signed causal belief link.

A very helpful way of looking for links between maps comes from doing word searches on the list of concepts. Thus, for example, Jenny asked the computer to search for all concepts with the word ‘marketing’ in them. By doing so she was able to spot a potential link between Alan’s comment that “Ian was brought up in marketing” and Justin’s belief in “Ian’s enormously helpful marketing expertise”. She linked Alan’s comment to that of Justin by a causal relationship with positive signification. Jenny also did word searches for ‘sales’,

'Ian', 'image', 'tech', 'advert' and 'merchant'. She spotted several other links by observation, such as the causal link between "Alan needs to know what I need" and "freeze development".

Gradually the aggregated map became a merged map so that the ideas and beliefs of the three persons could be seen and understood in relation to each other. In some circumstances Jenny may have chosen to add her own views of the issue by first constructing her own map (she often uses a dialogue version of COPE to help her express her own views in the form of a cognitive map in the computer). Her ideas then become a basis for introducing an intelligent outsider's view and analysis in a manner that is negotiative, and seen in the context of the views of her client group. In this case she had decided that it was too early in the proceedings to do anything other than try to facilitate negotiation amongst the client participants.

After aggregation and merging she finished up with a model too large to feed back to them in one go. She was also aware that there were several 'problems' within the 'issue' they were addressing. She saw her next job as trying to locate these clusters of ideas and then find a way of feeding them back as groups of ideas which are interconnected. To do this she decided to use a rule of thumb which seems to work well when analysing cognitive maps: she searched for those concepts which were most central because they were the ones with the most explanations, consequences and links with others. Using the computer this is a simple request and the computer presents a list in order of 'centrality'. Using these as 'key' concepts she then let the computer automatically form groups of concepts following the method discussed in Chapter 4.

Looking at the interconnection between these 'areas of concern' produced the first map she intended to feed back (shown as Figure 6.7). We can see

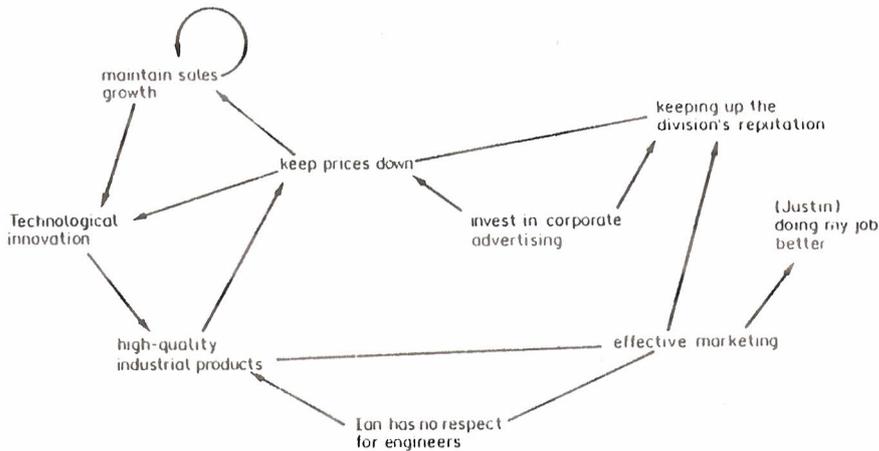


FIG. 6.7. Relationship between areas of concern.

that there are nine clusters each interconnected with others. We may suppose that each cluster is a problem arena which, if tackled on its own, would produce ramifications for other problem arenas. However, Jenny was a little concerned about the existence of two very personal problem areas: "Ian has no respect for engineers" and "Justin doing his job better". She wondered whether it would be helpful to feed back such 'illegitimate' problems. She concluded that it would be wholly unhelpful to ignore the problem about Ian as this was a keystone of the product development issue as seen by Alan; but decided to make 'opaque' the cluster about Justin.

She could now produce maps for each of the clusters (the computer will type the concepts in a sensible layout leaving the analyst to draw the arrows). However, she needed to look at other possible maps that could facilitate debate. She got the computer to locate all those concepts that appeared in several groups; any such concept was potentially important because of its contribution to several different problem areas. "Ian brought up in marketing" was in five of the nine groups, more than any other concept. She also got the computer to search for all feedback loops in the aggregated model; there were four loops, each of them positive (that is potentially vicious circles). Finally, she asked the computer to search for any conflicting paths, that is circumstances where one set of arguments from one concept to another conflict with the outcome of another set of arguments to and from the same concepts. In this aggregated map she discovered one conflicting path from "recession" to "the future of the company".

Jenny now had nine maps of areas of concern, a map showing the inter-relationship of these areas of concern, a map of loops, a map of the conflicting path, and a map showing the concepts immediately surrounding "Ian brought up in marketing". She also produced a list of all concepts and a set of self-adhesive labels, one for each concept, which she could use to quickly make her own maps if necessary. She normally tried to produce an A4 booklet for each participant which would contain the maps she was intending to use during the meeting. She thought the same method was appropriate in this case and so carefully chose which maps to use and deleted those concepts she felt would not help 'public' debate. Figures 6.8, 6.9, and 6.10 are examples of those she intended to use. She completed her preparation by drawing each map on to a flip chart which was to be the centre of attention during the meeting.

She began the meeting with John, Justin and Alan by explaining again how she had attempted to put the ideas together and how they seemed to fall into three different areas. She had already decided that she wanted to look at the feedback loops with them first, and so after her introductory explanation immediately suggested that the loops were interesting. At this point Alan broke in - he pointed delightedly to the cost-pricing issue. "Yes, there we have it", he exclaimed. "We've got to keep up with alloy technology otherwise we'll fall right behind on competitiveness, and once these foreign products get a hold we're sunk." John was looking cautious, and Jenny was just about to ask him

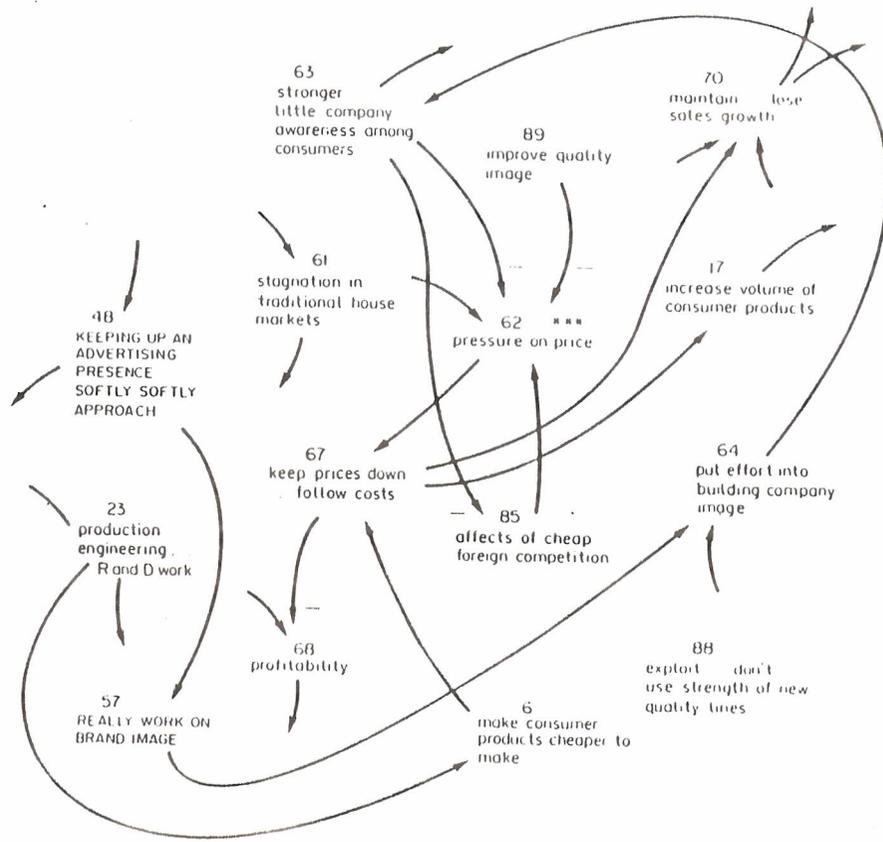


FIG. 6.8. Group 7 "pressure on price".

what he thought when Justin blurted out; "Yes, that's all very well, but look what it says here" (pointing to his own concepts). "What about the question of keeping up our reputation and here - 'just chugging along'. We've got to move with the times, and that means more than just doing the same thing cheaper." Both Alan and John glared at him - they obviously didn't like him very much, and Jenny felt that she might well have to help him out of it - his ideas weren't that bad, he just did not know how to present them. "What do you think?", she asked John, refocusing on the cost question, "There seems to be some contradiction here on whether if you moved into plastics unit costs would be more or less expensive." "I agree that the price of oil is a problem", he said, "and I also agree that we shouldn't abandon our existing foundry skills altogether but I do think that in absolute terms plastic products are cheaper . . . and it's where our future lies. Consumers expect and want plastic products, and they

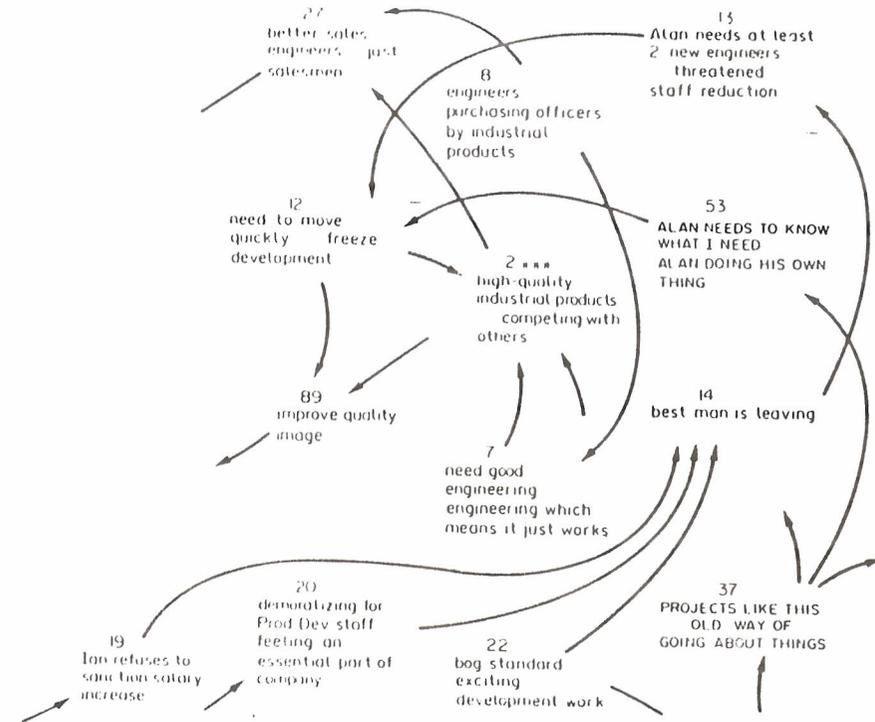


FIG. 6.9. Group 2 "high-quality industrial products".

want absolutely cheaper products, even if a small segment is prepared to pay for the up-market end." "Yes, but while that may be so now", Alan added, "the price of oil is going to continue to soar and this situation is going to stay this way. There are plenty of examples of where products which were once too expensive to contemplate are now feasible because the price of oil has made the alternatives too costly."

In the meantime Jenny was adding these beliefs to the maps. She found that she did not have to do much intervening - the discussion moved quite naturally to the various implications of the different scenarios with both Alan and John debating without apparently needing to ride their own hobby horses. Even Justin settled down and made suggestions that the others listened to. After about an hour and a half, the maps had developed by many more concepts, although there still wasn't much agreement about where to go next. Alan had however begun to think about, and throw out ideas about, a number of possible new-product avenues. His commitment to improving the existing taps was beginning to change. Yet it was also becoming clear to all of them that they were unlikely to get much further without putting some numbers on some of the ideas. As

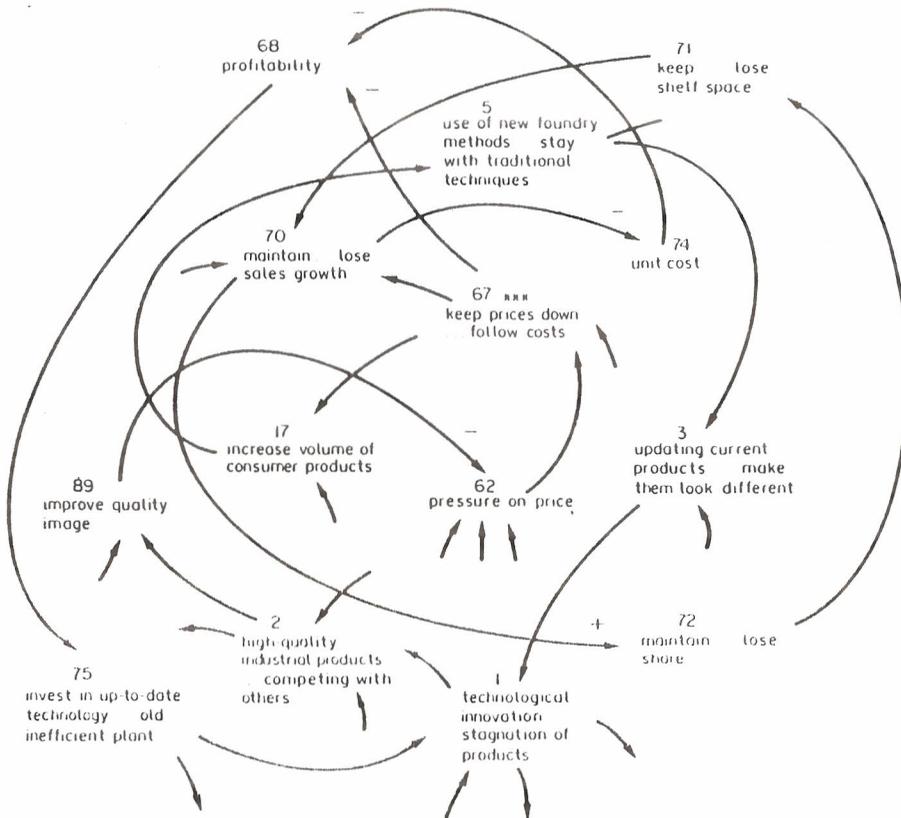


FIG. 6.10. Loops.

Alan said, "We really won't know until we make some estimates of what moving into plastics would mean — not just in terms of product and client costs but also in terms of the new skills we'd have to buy in". It was at this stage that Jenny suggested they stop, and that perhaps that was where they should go next. They all agreed, and it was John who proposed that "I think we should all have a think about the numbers side before we meet again".

The meeting with Peter was considerably less successful. Jenny was surprised. She had expected that Alan and Peter were similar enough, 'down to earth', to get on quite well. She realized afterwards that perhaps she had not paid enough attention to Peter's scathing comments about Alan, although there was probably not much she could have done about their interpersonal dynamics anyway. Peter had started by launching fairly early on in the meeting into a personal attack on Alan. "The trouble with you, Alan, is you can't see what's in front of your own nose. We're living in the world of the micro-chip whether we like it or not, and

if we don't get in on it, we're going to be left completely behind." He got up and walked over to the flip chart on which the model was laid out. He pointed to it — "these things aren't separate — non-aqueous flows are an important market opportunity for us but it's micro-technology that we need to get into". Alan looked stunned and hurt. Jenny decided that she had better give him time to recover and turning to Peter asked "O.K., let's have a look at that. What might happen if we don't move into that area?" Peter exploded again. "It's obvious — we'll just go down the Swanee. I am already getting feedback from our customers that they don't think Leakey is what it used to be." Jenny tried again. "Can you be a bit more precise . . . perhaps give an estimate of what might happen to sales in the next three years?"

She was beginning to feel that perhaps this would not do Alan any harm. Shock treatment might be quite useful so long as Alan's ego was given some resuscitation later.

She let Peter continue, looking at various aspects of moving into micro-technology, and he quietened down particularly when Alan began to ask Peter questions, listening to the answers and not expressing his own evaluations. After an hour Jenny decided to call the meeting to a halt, wondering what on earth to do next. Peter had stopped being acrimonious, Alan hadn't rejected his ideas out of hand, but it had all been a bit too near the knuckle for her liking. She felt she might have damaged her relationship with Alan permanently.

7

Coping with Quantity

Many of the problems belonging to individuals in organizations involve an interest in the numerical implications of particular policies, even if such concerns represent no more (and no less) than legitimating labels for the problems. Costs of production, distribution, promotion and manpower, levels of turnover and profitability are a few obvious examples of factors which an individual in an industrial organization may wish, or be required to take account of. The client may introduce rough and ready numbers from the start. An interest in exploring some of the quantitative implications of the problem may come at a much later stage of exploring and evaluating a qualitative model, or perhaps solely when considering how best to persuade other people to adopt certain recommendations. Whatever their origin, if quantitative elements are seen as important aspects of a problem a helper and client are working on, then it would be as inappropriate to ignore them as we argued it is to ignore non-quantifiable or primarily qualitative aspects.

The following section is for those who are interested in the process by which a cognitive map can be the basis for producing a quantitative model. To do this we shall use a specific example and consider how a cognitive map can be the basis of an influence diagram for a Systems Dynamics model.¹ The use of the word 'process' is deliberate. Our concern is not with the relatively easy technical transformation of an influence diagram to a Systems Dynamics flow diagram and a 'Dynamo' computer model. For this we refer you to the text below.² We wish rather to set quantitative modelling within the approach to problem helping that we have outlined in the rest of this text, and to consider some of what we regard as the most important issues surrounding so doing. It is also important to state that we are not proposing a Systems Dynamics model as the only appropriate form of quantitative model, nor that the discussion here is only relevant to Systems Dynamics models.

We use Systems Dynamics models because they take account of the dynamic consequences of perceived feedback loops which are otherwise quite difficult to handle, and because they are relatively easy to construct using influence diagrams

which are similar in form to cognitive maps. It is important, however, to distinguish between influence diagrams in Systems Dynamics modelling as they are typically used, to model the underlying structure of some 'objective' reality and cognitive maps which are intended to represent, using his own language and theories, the 'problem - reality' defined by the client. A similar point should also be made about the distinction between flow charts or network diagrams, which are intended to model a set of events or processes in a strictly logical, sequential manner, and cognitive maps which may or may not do so, depending on the way in which the client sees his world. The latter distinction does not imply that listening to a client by means of a cognitive map cannot be used to construct at some stage, if required, a flow chart or network diagram; and this activity would almost certainly require some restructuring to satisfy certain logical or computational requirements, as is also usually necessary when moving from a cognitive map to a Systems Dynamics model.

We shall take as an example the situation whereby a consultant has been asked by the advertisement manager and editor of a trade journal to assist them to consider ways of reviving the fortunes of the journal. It has been steadily declining in profitability and circulation for the last few years. The resort to consultancy help has come at the instigation of senior management in the large publishing corporation which owns the journal, and it is clear from the first meeting with the two clients that they believe the journal will be discontinued if they cannot reverse its decline. Thus the problem labelled "need to reverse the decline in circulation and profitability of this journal" is one likely to be characterized by a considerable degree of personal anxiety, and several different meanings to the people involved in terms of the personal implications of failure or success. Qualitative and quantitative aspects are likely to be closely linked.

DECIDING TO QUANTIFY

Let us assume that Figure 7.1 shows part of the map constructed after the first meeting with the team. (It is adapted from a project similar to the one we are describing here.) It shows several feedback loops, truly 'vicious' circles, the content of which would not be unrecognizable in many different product fields, and including the feedback loop relating journal size to circulation which traditionally exists in periodical publishing. It is clear that there are some concepts which are readily quantifiable, such as 'circulation', 'number of editorial pages', 'issue size', 'new sales', and so on. Let us also assume that in the discussion with the team its members have assigned numbers to the concepts about circulation, pages and issue size, with some disagreements about the 'correct' numbers to be given, and to no others. The helper, however, feels that further quantification is likely to be critical to exploring the particular circumstances of this journal and devising satisfactory policies. For example, he wonders what is the relationship between the number of new introductions and the budget for the sales

¹ See the seminal work by Forrester (1961, 1971).

² A useful text on the practical aspects of Systems Dynamics modelling is by Coyle (1977).

would mean we would feel upset less often and be able to concentrate more on our job writing good editorial'. Similarly, although the concept of 'attractiveness to readers' will be needed in the Systems Dynamics model as an intermediary variable within a loop, through which various policy variables 'enter' and affect the dynamics of a loop, it may be extremely difficult for the team members to feel they can give a sensible and meaningful numerical estimate of the relationship between 'editorial quality' and 'attractiveness to readers'. They may, however, feel able to answer the question, "If you were to carry out this policy of aiming at the lower end of the market, with more adventurous editorial, how many readers do you think might not cancel their subscription who otherwise would were the journal left unchanged?" It is then up to the helper to do the necessary computations for the quantitative model.

THE PROCESS OF NEGOTIATION

The helper has to decide when to introduce more strongly and negotiatively his interest in further quantification. He would probably begin to do so at the stage of feeding back the map constructed during the first meeting, having first also converted the map into an influence diagram.³ It is important to do this at this early stage, because it assists the helper to decide what questions he needs to ask the team in order to produce the Systems Dynamics model, although it will undoubtedly be modified as a consequence of discussion.

The influence diagram from Figure 7.1 is shown in Figure 7.2 and it can be seen that the transition is a relatively easy one particularly since many of the concepts in the map are already capable of being expressed numerically.

It is, however, worth noting how some meaning is inevitably lost by the translation to a monotonic concept of the idea that 'an increasing circulation' is attractive to advertisers 'while a declining circulation' is unattractive to them. In the influence diagram the concepts of 'attractiveness to advertisers, distributors', 'commitment of the sales force' and 'readiness of senior management to invest', have been dispensed with altogether. They are important within the overall problem construction and must not be forgotten. They are, however, difficult to quantify and unnecessary arithmetically and so can be ignored within the quantitative model.⁴ Since the potential reader market will not be infinite, relationships between potential reader market and circulation, not explicit in the cognitive map, have also been included.

As he moves from an empathetic to a negotiative stance in feeding back the cognitive map to the team, the helper will probably concentrate upon the nature and significance of its feedback loops. As the discussion progresses and concepts

³ See Coyle, *op. cit.*, chapter 3.

⁴ See Alonzo (1968) for a discussion of the danger inherent in attempts to quantify with numerous variables.

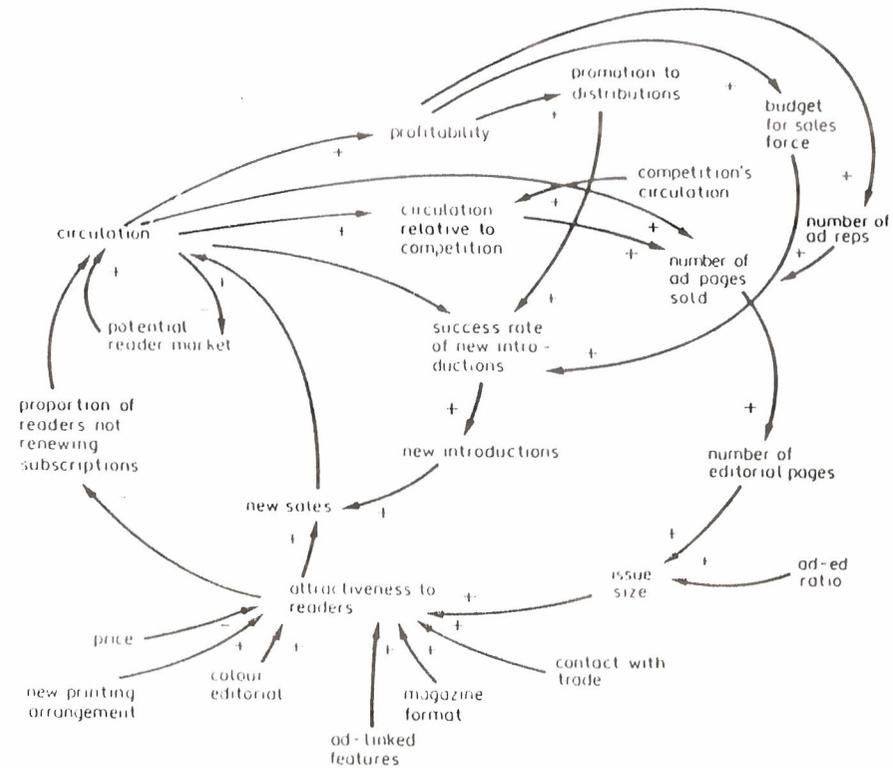


FIG. 7.2.

and relationships common to the cognitive map and influence diagram are discussed, he would begin to encourage the members of the group to make rough estimates of the numbers involved.

Thus, for example, about the relationship between issue size and attractiveness to readers, he could ask something like the following: "Your current average size is x pages. What size would you like to see it? If you managed to have an issue size such as this, what sort of reduction/increase might you get in the number of people not renewing subscriptions/new buyers coming in. . . . What about the next feasible page size above/below this, would this have a greater/lesser effect", and so on. He could then construct a graph of the estimated effects of different issues' sizes upon the sales levels. In undertaking a process such as this we have found it helpful to pay attention to individuality by asking each person to first of all write down his estimates before announcing them, and then, on a 'round-robin' basis, each person to call out his estimate which could be written up on a chart or board. This can then be a basis for discussion and negotiation to arrive at a mutually acceptable estimate. Should there be uncertainty or

reluctance among the members of the team about a single estimate, then another approach is to ask for three assumptions: high, low and expected to work with these.

Throughout this process the helper would pay considerable attention to encouraging the team members to feel that their own and others' subjective estimates, even if very different, were legitimate reflections of each individual's knowledge about his organization and his market, to be worthy of consideration, discussion and negotiation. He would be careful not to force the team members to produce numbers which they were clearly unhappy to produce. Thus a strong resistance by some individuals to giving certain estimates could be handled by not pressing further and suggesting that the individuals concerned think about this particular aspect before the next meeting, if possible researching any data they feel might be relevant within the organization.

ELABORATION AND MODIFICATION

During the discussion, where the qualitative and quantitative aspects must be explored side by side for a full picture, new ideas will undoubtedly emerge which lead to the need for further estimates or modifications to existing estimates. Thus, for example, the helper and team may find that discussion around 'proportion of readers not renewing subscriptions' leads to the conclusion that a certain percentage of readers will always be lost, or that certain time lags are felt to be likely before any change in the journal will significantly affect its sales, or that the market includes a number of loyal readers below which circulation is unlikely to fall.

At the stage when the data requirements for constructing an initial Systems Dynamics model have been met the helper can then feed back the outcomes of some quantitative simulations alongside the qualitative map. To try and reduce the inevitable mystification surrounding the 'magic' numbers coming from the Systems Dynamics model he will need to try and ensure that the team members are aware of the assumptions underlying it and that they come from their own theories about their problem.

The feedback of the quantitative simulations may lead to further 'discoveries'. For example, it may be that the budget requirements for increasing the level of new introductions, according to the current arrangement, seem prohibitively high if any significant change in circulation is to be achieved; or that an increase in issue size above a certain level is punitive in terms of the current printing cost contract; or that the first proposals about changing the journal do not have the required effect on circulation. Certain figures may just seem 'stupid' or 'way out' and it is agreed that something must be wrong with some of the assumptions behind them. Some of these 'discoveries' will lead, for example, to a need to consider the political implications for effecting change in current policies within the organization, or to attend to the strong personal commitments of particular

members of the team to a journal format which allows them to express their own interests but, by their own theories, does not coincide with the interests of potential readers. These are qualitative issues and, throughout, the quantitative and qualitative models will work side by side, as exploring the content and ramifications of one leads to a re-evaluation of the content and ramifications of the other.

The processes described in this chapter would continue until a problem definition has been negotiated which can, it is hoped, lead finally to the evolution of a portfolio of strategies that the journal team can be committed to. The concern is with finding methods of helping the clients reflectively and systematically make explicit, analyse and add to their own theories about their world so that they may devise ways of acting to meet their objectives. Within this context the role of quantitative modelling is no more, and *no less*, than a vehicle for capturing more fully, meaningfully and usefully the client's particular and personal images of his world than can be done by qualitative modelling alone.

Case Study

After the two meetings Jenny felt there were three immediate problems she had to tackle. The meeting with John, Justin and Alan had gone well and they had suggested the need for further work together without any prompting from her. However, this raised once again the question of Ian's involvement. Having started the process of getting the three managers talking to one another and sharing ideas in an apparently amicable and productive manner, Jenny felt reluctant to involve Ian before they had gone a bit further at least. Indeed she felt that if the process with the three of them continued to go well there was no reason why they could not present Ian with a fairly firm set of recommendations which they were all committed to.

However, she felt a need to 'suss out' Ian's attitude to a further continuation of the project beyond the original terms of reference and to his continued, at least for a while anyway, non-involvement. Also, of course, she needed to check this out with her own boss. Thirdly, Jenny felt that she had to do something fairly quickly about the possible disastrous outcomes of the meeting with Peter and Alan. If the two of them did not want to continue to work together, her own position would not be particularly pleasant. She would have failed in the one area in which Ian had hinted he was most interested, new-product development in the industrial products division. And this would obviously affect adversely the likelihood of Ian's agreeing to her continuing with Justin, John and Alan on consumer new-products development. Furthermore, her own boss was hardly likely to be pleased if she soured relationships with an important company division like Leakey.

With these thoughts running round her head and with them a need to go and see Alan and Peter as soon as possible so that she could at least try and redefine

the situation in some more fruitful and promising way for them if necessary, it was only a couple of hours later that she popped her head round Alan's office door. She was particularly interested in Alan's reactions since he had been at the receiving end of Peter's attacks during the meeting. Alan smiled at her. "Well, that certainly gave me something to think about", he said. "Did you find it at all helpful?", asked Jenny, somewhat tentatively.

"Yes I did", replied Alan. "I have known Peter for a long time now, and I had no idea that he felt so strongly about the micro-chip arena. I am still not completely convinced that my own ideas about a better design for non-aqueous flows aren't right. In fact I'm convinced there's a market there but there's no reason in principle why that cannot go alongside a good look at computer-controlled valve systems. The latter is probably a long-term thing anyway, and would also almost certainly require a pretty major investment, not only in terms of plant and manpower — skills, I mean — but also marketing resources. I don't know how Ian would feel about that."

"How do you think he might feel", asked Jenny. "I really don't know", replied Alan. "His background is very much in consumer products. In fact I think it might be quite a good idea to get him involved in talking about it. After all, he is the man who has got to make the final decision about where we go, or certainly get any policy changes approved by the central board."

They talked for a while longer and Jenny left feeling a lot less anxious. She was not absolutely sure whether Alan had just been polite. His suggestion about Ian, for example, may have been a result of not wishing to repeat another acrimonious meeting with herself and Peter, which Ian's presence might avoid. But why not, she thought, and at least he had not suggested discontinuing the discussions. He had also agreed that Jenny could show Ian part of the qualitative model as a way of showing Ian the kind of work they had been doing, so long as it was a part which did not include any personal references to Ian. Now she had to go and find out how Peter felt. Peter was also in and once again the outcome was far better than she had expected. Peter was not as forthcoming as Alan, but Jenny had by now learned enough about Peter's interpersonal style not to be surprised or particularly concerned about this. Indeed he seemed more genuinely keen to continue than Alan had been, probably because he had done most of the talking at the meeting without any strongly negative comeback from Alan. He told her that he had thought the meeting had been worthwhile and added that "Alan was much more receptive than I had expected. Perhaps it's something to do with you being here and that technique you use. It's certainly very good at making you think through your ideas about something. It gives you something concrete to look at and talk to. So many meetings are spent with so much waffle that no one is really sure about what has been going on at the end."

"How would you feel if Ian became involved?", asked Jenny. Peter grimaced slightly. "The trouble is that he really doesn't know anything about the industrial area. I'm not sure that his presence would be at all helpful." He thought for a

moment and then said, "Is that what you're suggesting? Well I suppose it would be one way of making sure that he did get to know more about it. I wonder though whether he will spend some time listening instead of wanting to put his oar in all the time. I suppose it could actually be quite useful if we could find a way of stopping him doing that."

Jenny spent some more time talking to Peter about the idea of Ian becoming involved, working on the idea that one way of getting Ian's support for any new product strategies in the industrial products area might well be getting him involved in their development, rather than offering him a *fait accompli*. Finally he agreed to Ian becoming involved with the proviso that "The three of us make sure that he does listen and doesn't try to run the show". He also agreed to let Jenny show part of his and Alan's cognitive map to Ian. Having got some dates from Peter for another meeting, her next step was to phone her boss, Arthur. She explained that it looked as if the project might be renegotiated for a longer time period and to include more than the original quantitative model, if Ian agreed. Arthur was pleased, and merely asked her to let him know the outcome of a discussion with Ian.

Finally, Jenny arranged to see Ian the next day. When she saw him, she explained to him that there had been a couple of highly productive meetings and that all those involved wanted to continue. At this point she showed him a 'group map' from the Peter-Alan meeting as his first introduction to cognitive mapping. He was not as interested as she had expected. "And how's Alan getting on with it?", he asked. "Is he beginning to think in wider terms?" Jenny replied that Alan had indeed said that he had found the activity useful. She certainly wasn't going to get into a discussion of whether Alan was or was not, or should be manipulated into, moving towards the directions Ian wanted. Ian seemed to realize that her reply had been deliberately evasive and that perhaps it had not been the most tactful question, and did not press further. "Good", he said.

Jenny decided that this was her opportunity to ask Ian if he would like to become involved in the next meeting with Peter and Alan. Ian looked surprised. "Yes, I suppose so", he said. "But I don't want to cramp their style. However, I suppose it would be helpful for me to know about the direction they are going in. What do Alan and Peter think about it?" "It was Alan who suggested it", said Jenny. "Well in that case, fine", replied Ian, adding, "So long as it doesn't take too much time."

Jenny then went on to suggest that it would be helpful if she could spend some more time with him on his own before any meeting, collecting his own ideas and then aggregating them with the existing Peter-Alan model. She felt a need to find out more about Ian's beliefs and interests before a threesome meeting which she would be less able to predict beforehand. He agreed and they then began to talk about the situation on the consumer product front. Here, of course, Jenny had to adopt a different tack and find some reason why Ian shouldn't be involved at this stage. She decided to use the excuse of Justin —

that Justin, as the junior member of the group and his assistant in Ian's previous job, might feel somewhat overwhelmed by Ian's presence and less able to contribute than if he weren't there. Ian accepted this argument and then went on explicitly to agree that Jenny should continue her involvement in Leakey with the new terms of reference.

He did ask, however, when she thought that both teams might have some final recommendations on new product development. He also asked where she was on the quantitative model that she had originally been commissioned to do. To the first question Jenny replied that it would be impossible at this early stage to be precise about the timing of the project, but after two further meetings with each team she would have a better idea. She suggested that this should be the next 'milestone' for reporting back and discussion with Ian, and he agreed to this. On the quantitative model she explained that she had just finished it within the original terms of reference. She would be happy to show it to him but she also felt that while it would undoubtedly provide some important input to the current work, this would probably result in the need to make some modifications to it. He might therefore prefer to wait till these had been done. Ian considered this and then said that he would still like to see it, perhaps at the next meeting they had arranged. Jenny went away well pleased with herself. "It's turning out all right", she grinned to herself.

Having dealt with her various causes of anxiety Jenny was now able to think about the next meeting with John, Justin and Alan. The Peter-Alan-Ian meeting would have to wait until after she had seen Ian on an individual basis anyway. John, Justin and Alan had all at various points in the meeting expressed a need to look at some of the financial implications of their ideas. Certainly Ian would expect any proposals from them to have the relevant numbers. However, the quantitative model she had already done did not incorporate the new ideas, particularly about new products, that had emerged in the last meeting. Nor did it incorporate the feedback loops that had been suggested. She decided that one way of proceeding would be to construct a crude Systems Dynamics model. This would take account of the feedback loops and could be used with the qualitative model for exploring the numerical implications of possible strategy options. Indeed it could be used with the existing quantitative model which would almost certainly provide data for the Systems Dynamics model and be modified as a result of work on the other two models.

Before, however, she converted the relevant parts of the cognitive map to an influence diagram she needed to put the new ideas that had come out of the meeting into the computer, 'regroup' and recheck for loops. Doing this she found that there were a couple of new sub-groups she wanted to establish as a way of structuring and managing the growing complexity of the group 'technological innovation'. This group had in the last meeting more clearly divided into two areas of interest, each of which could be expected to grow in content "updating current products" and "move into new product areas such as plastics".

She was still working on the basis of there being one model covering both the industrial and consumer sections, since the ramifications of developments in both areas on one another would have to be looked at, at some time, by Ian and Alan at least and probably by the five managers together. However, at the moment the two areas were being looked at separately and since she had decided that she might have the computer models available to her clients at some stage, in addition to visual maps, she created two separate models for the two 'teams'.

Jenny looked at the feedback loops again, drawing them out in a visual map. This then became the basis for constructing the initial influence diagram for a Systems Dynamics model (see Figure 7.3). This in turn immediately led her to think about the kinds of questions she would want to explore with the managers at the next meeting, such as:

- the conventional, if nonetheless difficult, price-demand curve;
- the volume-cost relationship;
- the more intangible issues of the effect of varying product qualities on sales and greater concentration on brand or corporate image advertising,

and so on.

In preparing for the meeting Jenny followed a similar procedure to the last time. She produced a folder for each person, with the group titles and their relationships on the first page and then separate maps of the contents of groups

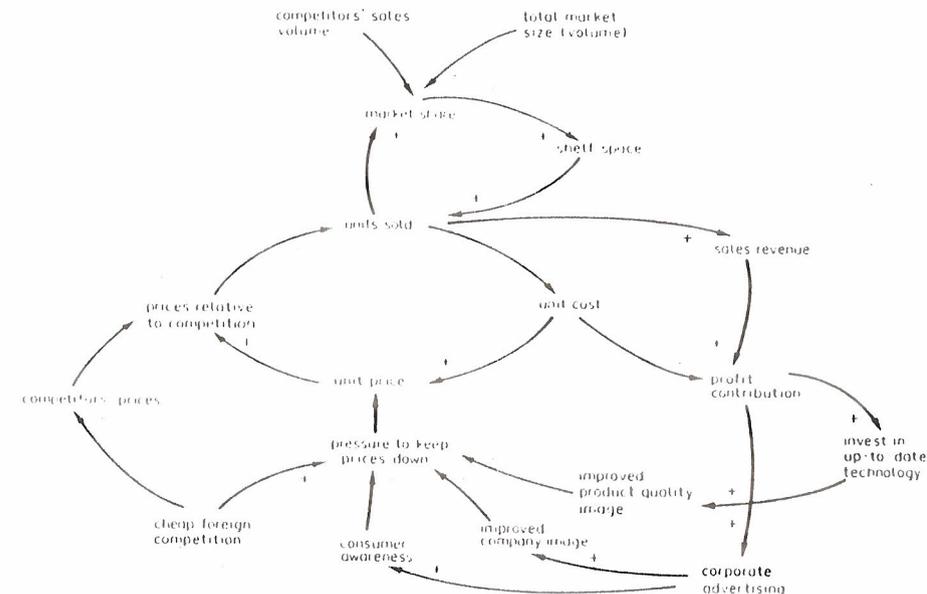


FIG. 7.3. Part of Jenny's first influence diagram.

on each page. The loop diagram also went on a separate page. She then reproduced the maps on larger flipchart sheets using the computer labels to speed up the process. She decided not to reproduce the influence diagram because it did not capture the same complexity of the managers' beliefs as a set of cognitive maps and might therefore be unhelpfully constraining. As the computer model had been previously, she saw the influence diagram primarily as an analyst's tool.

After the initial five-minute warm-up chat Jenny started the meeting by saying "At the last meeting you all suggested we should begin to look at some of the figures involved. Perhaps we could get into those by first having a look particularly at the loops diagram on page 2. Can I first check that it seems to you to accurately reflect what you all said last time?" John was the first one to respond. "Yes, I think it's fair. But it seems to me that it does miss one crucial bit of the price issue. We all know that most customers see some relationship between quality and price. At the moment it looks on the map as if the lower the price, the more we will sell. I don't think that's so. Apart from the obvious limit that cost has on how low you can go on price, I think that it could be positively disadvantageous to go too low, particularly if we think about this other idea down here – the idea of putting some money into improving our brand and company image. There's a limit, I think."

"Yes, I agree", said Justin. "Could you say what those limits are for your existing products?", asked Jenny after she had finished coding John's comments on the flipchart. Thus the discussion moved naturally into the pricing aspect of the model. John and Justin felt that they could categorize the existing products into various groups for the purpose of considering price–demand relationships and Alan agreed with these. Jenny asked each of them to write down separately their estimates of the effects of various price changes, within the range they felt to be acceptable, on volume sale, before putting them all up on the chart for discussion. As John, Justin and Alan talked about acceptable price ranges, the relationship between these and the company image, the likely response of customers to different prices, inevitably they also elaborated considerably their beliefs about the attitudes and preferences of their markets to Leakey products, and Jenny coded these.

They then went on to talk about the volume–cost relationships. At this point they referred to the marketing-plan documents they had all brought with them, and also asked Jenny to look at some of the figures from the quantitative work she had already done. By the end of a three-hour (and, Jenny felt, exhausting) meeting they had developed subjective estimates for all the relationships in and around the loops for existing products, working on indices from 1.0 (representing the current situation) for qualitative variables such as effect of image and quality changes. She had also agreed to do some further analysis of the price–demand curves before the next meeting.

The new-product area remained, however, relatively untouched, although they had made reference to it once or twice when talking about stronger branding

of existing products and the way a move into plastics technology might affect such a process. It was at these points, however, that Alan showed most interest and particularly when the technical difficulties still associated with plastic plumbing ware were mentioned. "Perhaps Alan's interest in design improvement can be satisfied after all by something new", Jenny thought. She also felt that the discussion on new products would need to be more wide-ranging and unstructured initially than would be possible by working within the framework of a systems dynamics influence diagram. She also decided that the next meeting might be a good point at which to introduce her clients to the computer model. It might be interesting and useful for them if she were to input the ideas emerging from the meeting straight into the computer. They would then be able to explore the ramifications of these there and then in a way that would be increasingly difficult, as the model grew in size and complexity, to do quickly and easily through manual and visual manipulations. She also wondered whether if she fed back some simulations of a Systems Dynamics model concentrating on existing products at the beginning of the next meeting, they would become so absorbed in developing more qualitative ideas about existing products that they would not get on to new products that meeting at all.

As the meeting had progressed, she had found it more and more difficult to slow down the discussion by asking for quantity estimates. "Never mind the numbers, let's stay with the ideas", Peter had said after one of her questions about quantifying an estimate about the development of the non-aqueous market. The others seemed to agree, and so Jenny was persuaded that for the thinking they were doing at the present, she should stay with mapping. Problems seemed to be becoming clearer – and in some cases soluble – as they pieced together their ideas. "They may have to put numbers on some of these things later", Jenny had thought, "But at the moment Peter is right. Putting numbers down would just be a way of evading the question." She had made the decision to go on helping them build a joint map in that meeting, and to get round and have a chat individually with as many as possible of them before the next meeting, to discuss how much quantification could usefully be applied – or whether problems were being finished satisfactorily without that.