Chapter 6

The influence of the initial phases on programme dynamics

Arie Rip

In the schematics of rational policy-making, a priority is set and articulated by policy actors, whereas implementation and execution are the responsibility of agencies and researchers. In the real world, there is no such neat separation: researchers and agencies lobby at a very early stage to get their interests represented, and policy actors depend on them for information, to supply interesting projects and for legitimization (Mayntz & Scharpf, 1990; Rip, 1990a).

For evaluation, the salient question is how to obtain a realistic view of the goals, or better, the charter, of an R&D programme (Rip, 1990b). The notion of 'charter' is important. It emphasizes that one should not simply take over the goals listed in some document, even if it represents the official establishment of the programme. The charter of an R&D programme can be seen as containing, as a first approximation, the **rationale** of the overall enterprise, the **objectives** (specified in the programme document, otherwise to be reconstructed) and the **political compromises** that have been built into the programme set-up. Although a charter is identified as present at some point in time, it should not be taken as static. It is advisable to reconstruct the **dynamics** of the process of building up the charter and the vicissitudes of implementation, in addition to the rationale, objectives and political compromises. This is particularly important given the widespread occurrence of goal shifts, and the consequent problems in evaluation. Is a shift in goals during the course of the programme to be taken as giving in to circumstances and biases, and so a failure? Or does it show the programme's capacity to adapt, and thus count as an indication of success?

The object of this chapter is to take stock of these processes of articulation and transformation of priorities through the multiplicity of 'micro-' and 'meso'-decisions taken by programme directors. To do this we will draw on a series of case studies that analyses in detail several priority programmes in The Netherlands (Rip & al., 1986; Rip & Hagendijk, 1988). Transformations can be seen to occur in the scientific and policy issues to be treated in the programme, and in the way in which the interests of different parties are taken into account; these transformations can be understood as solutions to a problem of aggregation and disaggregation of interests, so as to create a programme that is a 'going concern'. Such a reconstruction has a double aim: to increase the understanding of the dynamics of priority programmes with all actors and to support the evaluator in reaching realistic conclusions.

1. ANTICIPATION STRATEGIES

In the life of a programme it is often possible to identify a phase during which articulation of a priority is an important, and sometimes the main, concern. In this phase, the cognitive as well as the institutional stages for later implementation are set. The main dynamics derive from the strategic behaviour of the different actors. It is in their interest to have the priority formulated in a certain way. As has been documented before (e.g. for cancer research by Hohlfeld, 1979, and for environmental research in West Germany by Küppers & al., 1978), articulation of priorities, whether by working parties in the policy sphere, by committees, study groups of scientists or by other advisory bodies, also implies the introduction of filters that selectively transform the original problem definition into one that accommodates existing cognitive and institutional patterns.

This is very clear in the case of environmental research: in almost all countries the problem is quickly broken up into questions belonging to different environmental compartments (water, air, soil), which are (or were) the domain of different government agencies. Even for specific problems, as in the case of acid rain research, compartmentalization occurred very quickly, and in relation to the interests of governmental and quasi-governmental actors. Table 1 presents a reconstruction of the filterings and transformations (Schulte, 1986).

Table 1.
Successive elaborations of the research problem in acidification

Report , elements of research	Emission	Route	Damage to	Preventive measures
Inventory (Jan 1984)	SO_2 NO_x	AIR WATER SOIL	Aquatic and terrestrial flora and fauna; groundwater; ecosystems and food chains	
Assessment of inventory (Jan 1984)	SO_2 NO_x NH_3	AIR SOIL	Terrestrial floral and fauna	
Additional research programme (Jan 1985)	NH_3 SO_2 NO_x	O_3 SOIL	Trees, crops Health	NH_3 control techniques, Effectiveness of control techniques
Specification into research projects (Oct. 1985)	NH_3 SO_2	O_3 SOIL	Douglas fir	NH_3 emissions Effectiveness of control techniques

Source : adapted from Rip & Hagendijk, 1988.

Table 1 resembles the scheme of Van den Daele & al. (1979) in the sense that it shows a transformation of an original policy problem into an eventual research programme, in what looks at first sight like top-down articulation. Let us consider the dynamics in somewhat more detail. In most cases, in The Netherlands as well as in other countries, when a priority is first put on the agenda it is of a very global nature ('Shouldn't we do something with biotechnology?'), and its articulation is delegated to representatives of relevant bodies (government agencies, research institutes, scientific disciplines) in order to obtain a realistic specification, as well as to create some commitment to the priority. This implies that such a programme committee (or a similar body) faces the task of structuring the problem in such a way that it relates to the global priority, but also to its own perspectives and interests. That is, articulation of a priority requires aggregation of interests.

Policy-makers, for their part, indirectly anticipate possibilities and problems of implementation by being careful when drawing up and selecting members of the body to which articulation is delegated. Other interested actors try to influence the process of articulation by presenting their views openly or through channels. Thus, during the articulation of the Dutch programme of acidification research, the environmental department of Shell Nederland Company took an initiative in organizing a meeting of the directors of relevant research institutes to discuss the nature of the problem and the priorities for research. The results of the discussions reached the policy-makers through more or less informal routes, and can be clearly recognized, it is said, in the make-up of the research programme finally proposed. The articulation of a priority may also be the arena in which a battle is fought over who should be allowed to take the initiative, or have the major responsibility. Will acidification be defined as an environmental problem or as a problem for forest and range management, with a corresponding shift in departmental responsibility? The moves in this battle can be traced as far as the choice of research management body and the compromise solutions reached there.

In the case of biotechnology, the generally recognized global nature of the priority made it possible for a variety of actors to involve themselves. In The Netherlands the four most relevant government departments each started its own articulation of the overall priority. The establishment of a single programme committee put a stop to these efforts – but the struggle for influence returned during implementation when governmental bodies and research organizations were reluctant to collaborate with the programme committee unless their particular perspective was taken into account.

Even before articulation starts, actors may move to take up a strategic position. This is especially apparent when scientists anticipate global priorities. In coal research, for example, it was clear in the mid-1970s that coal would become important in the energy situation, and also that scientific and technological expertise on coal had almost disappeared. In The Netherlands, a number of scientists from universities came together to set up a research programme, before official steps had been taken to set up a national research programme on coal. The university 'combine' was able to have its projects and priorities included in the programme. Subsequently, some of its members were able to capitalize on this and grow, whereas others switched to other goals (e.g. when they expected a shift in priorities due to the changing energy situation after 1980).

These cases show that articulation of a priority and its implementation cannot be separated: they are components of one dynamic. This perspective implies that the authoritative selection of the priority and its formal statement in a programme document, although an interesting process in its own right, is often just a momentary freezing of the dynamic, which reasserts itself when implementation is started in earnest. This part of our analysis is particularly applicable in multiactor situations with some distinction between policy actors (e.g. government departments) and other actors. In other cases, e.g. when priorities are generated within the research council system, the actors are less heterogeneous, and there are often accepted procedures to be followed, e.g. invitation of proposals and selection through peer review. An example is the plant ecology priority in the Dutch Research Council: acceptance of the priority programme was delayed until the 'right' combination of actors and topics had emerged (Hagendijk & Alkema, 1986). Some manoeuvring can also be shown in the case of molecular biology, which was not handled by the more or less accepted research council procedures (Kwa, 1986).

2. GOAL SHIFTS

Authorization of the programme and its objectives may occur at a time when implementation has already started. In The Netherlands – as in other countries – it has become accepted practice in national research programmes and in innovation-oriented programmes that a programme committee disburses funds as soon as it starts its articulation task. In the case of biotechnology in The Netherlands, the committee was installed in May 1981 and submitted its programme in April 1982, which was accorded in May 1983 – but projects had already been funded in October 1981. In fact, the government bodies supporting the programme had already made commitments before the committee was installed (Rip, 1986). This reminds us that government agencies have on-going concerns and interests. The generation, articulation and selection of a priority then becomes an instrument in this larger game. The implication is that the task of a programme committee is not just to work on the priority, but also to take the diverse interests into account and assemble them into a working whole. The implementation game has not only to be 'fixed' (Bardach, 1977), it has to be kept linked to its environment as well.

The processes of articulation and strategic anticipation introduce shifts with respect to initial goals of the **programme actors**. This is the outcome, not always intended, of adaptations to overcome expected or experienced implementation problems and/or to accommodate the interests of relevant actors. In a number of cases, the original structuring of the problem or the programme is changed. In the programme for coal research, the committee used a matrix: the coal 'business column' (from mining to end use and emissions) was crossed with the stages in the innovation trajectory (from fundamental to applied research and development). When it turned out that industrial participation could only be 'bought' by funding demonstration and pilot projects as well, this element was added to the scheme to provide a pigeon-hole. Similarly, the 'innovation trajectory' has guided the programme committee for biotechnology in defining categories of fundable projects (basic research combining biological and technological research; application-oriented basic research, applied research) and in devising (sometimes innovative) schemes for such research. But when participation of biologists had to be 'bought', more fundamental research, also without a technological component, was allowed. In addition, the programme committee changed its perspective on biotechnology (from a European definition emphasizing integration with process technology to a more American definition in which molecular biology features heavily; Rip & Nederhof, 1986).

Goal shifts must be reconstructed by the evaluator. The next, and even more difficult, issue is whether to evaluate them positively or negatively: adaptation of a priority will make it a more realistic (or feasible or promising) one; alternatively, obstructions from the field (or coalitions between actors) have undermined the achievement of legitimate policy goals. Note that goal shifts can also be introduced by policy actors or those responsible for the execution of the programme: the Alvey directorate stated after some time that the really interesting goal was to create a collaborative culture among industrial and academic participants (Rip, 1990b).

This observation leads to a methodological problem in evaluation studies: in terms of which goal should implementation and output be assessed? Traditionally, evaluation studies have tried to solve the problem by keeping to the (original) goal of the policy-maker, even if it sometimes turns out to be difficult to identify that goal. But when goals are global, and further articulation is necessary, as is nearly always the case with science policy priorities, it becomes impossible to speak of an 'original' goal.

Taking the official formulation of the priority after articulation is not a solution: we saw how the authorization of a programme may appear some time (two years in the case of biotechnology in The Netherlands) after the authoritative selection of the priority. And such an assessment criterion might be counterproductive, because it would evaluate negatively all changes made during implementation, including those that are applauded by all actors as sensible ones. Still, one has to stop somewhere: otherwise one could define as goals those that reflect the eventual outcome, and implementation would become successful by definition.

One way out of the dilemma is to check what kind of **implementation strategy** has been followed. We have distinguished two main types (between the extremes of 'dirigisme' and 'laisser-faire'): an **accommodation strategy**, in which adaptation to preferences of actors is important to gain their commitment (hopefully) and create a general capability in the programme area; and an **orchestration strategy**, whereby the implementors diagnose the situation and its dynamics, and orchestrate their measures, activities, public relations and interOaction with actors so that their original goals will be achieved, possibly through detours and with the help of strategic action (Rip, 1990b).

With an orchestration strategy, one should take (reconstructed) original goals and use these as the yardstick to evaluate effects achieved. With an accommodation strategy, however, the modification of goals and emergence of new goals is to be seen as the desired outcome of a learning process, and thus an effect by itself.

3. COMMITMENT OF RESEARCHERS AND RELABELLING

Micro-decisions also occur at the level of researchers who decide to invest time and other resources in a new R&D programme. For the policy-makers, the commitment of researchers to the programme goals is important, and they want evaluators to check the extent of such commitments (Rip & Nederhof, 1986; Nederhof, 1990). For our present discussion, the promises made by researchers[1], the relabelling of on-going research that may go with it, and the mutual positioning occurring in such cases is of interest, because this is what shapes the programme in its early stages.

In many cases, there will be a small core of researchers already active in the programme areas, who will also often be active in persuading policy-makers and funding agencies to take this up as a priority.

There will then be a periphery of researchers and institutes that are in principle relevant to the potential priority, but, for one reason or another, not primarily oriented towards it and, finally, a much larger domain of researchers, institutes and also customers of research who might, in time, shift their activities to the new area.

In the case of biotechnology, for example, in The Netherlands as well as elsewhere, the core consisted of a number of technologists who had been promoting biotechnology as early as the 1970s, supported by a few applied microbiologists, and toward the end of the decade a few molecular biologists interested in the application of the new genetic techniques. According to the data in Rip & Nederhof (1986), this core grew only slowly during the 1980s, even after the implementation of the programme for biotechnology, the major

1. More particularly, spokesmen for the new and promising areas such as biotechnology, new materials, micro-electronics.

changes being the result the mobilization of biologists towards technological issues and application, many of them in disciplines or institutions where such work was not common. When biotechnology-relevant researchers were asked about the change in the extent of the biotechnological component in their work, the striking result was that the largest change (in terms of number of researchers concerned) was the change from little or no biotechnological component to 'appreciable' (i.e. 20-60% of the research effort).

There are good reasons for interpreting such changes as a bandwagon effect. Researchers have some cognitive mobility, and they can shift their research to new themes. High-temperature superconductivity research is a well-documented case of such shifts (see, for example, Hazen, 1988). How stable are such shifts? Is biotechnology the new fashion, bringing glamour and funds to those who take part in it, and are researchers relabelling on-going research in order to share in the windfall? Relabelling is a continuing concern for science policy-makers and programme implementors, who are afraid that their attempts are being undermined by such strategic behaviour of scientists[2].

In the survey of biotechnologists in The Netherlands, Nederhof and I attempted to gauge the extent of the phenomenon of relabelling by asking respondents if they thought that relabelling was widespread. The results were clear: relabelling was thought to be widespread, and the involvement in relabelling, interestingly enough, depended on how essential the biotechnological component was to the respondent's situation. If essential (i.e. biology component above 60%), little relabelling was reported. At lower levels of involvement, two groups emerged: one that exaggerated and the other that was hesitant to attach the label 'biotechnology' to its work.

Although policy actors are justifiably concerned about the occurrence of relabelling, it should not be overestimated. Screening of project proposals by knowledgeable reviewers certainly helps. Some of the interviewees held that, after a first wave of relabelling, the screening of proposals, and especially the **prospect** of knowledgeable screening, had been sufficient to limit relabelling to relatively innocent up-labelling of claims. In fact, policy actors should perhaps be more concerned about researchers **not** recognizing the relevance of their work to the priorities or not wanting to label it so. Unnecessary down-labelling can reduce the effectiveness of implementation and is harder to spot and counteract than up-labelling. A second point to be made is that scientific research can actually be relevant to a number of goals at the same time. Producing different labels for one's research for different audiences is part of a risk-spreading strategy. In The Netherlands, we encountered a case where a project had been part of an

2. Not only researchers behave in this way, policy actors allow themselves similar strategic action, for example when the Dutch biotechnology committee funded 'pure' biological research, in order to get biologists into their sphere of influence, and later reduced the amount of funding for this category. In France the practice of relabelling has been named neatly 'habillo-technologie'.

earlier (and partly concurrent) national programme to stimulate coal research, and was then submitted to, and accepted by, the biotechnology programme.

One can go a step further and show that labels attached to research for opportunistic reasons will still have effects. Some effort is made to retain credibility, and resources mobilized under the new label will orient research in the desired direction (this is seen easily for instrumentation, but holds more generally). But it takes a number of years before such effects become irreversible [3]. The policy implication is that policy actors should not, after weeding out the worst cases, try to improve the efficacy of the screening ever further, but instead take the researchers up on their own labels, for instance by requiring accountability, and over a sufficiently long period of time.

For biotechnology, with its general atmosphere of new opportunities, six years of sustained incentives appeared to be enough to achieve irreversibility. In other cases, where the situation of the disciplines is more resistant and there is less general support for the priority, longer periods are necessary: longer, in fact, than most R&D policy programmes run. It may then be fruitless to take commitment to the priority as an important objective, and the policy actor should focus on immediate outputs (and on other kinds of second-order effects, for example a collaborative culture).

In this analysis of micro-decisions of researchers and policy actors, their mutual strategizing has been emphasized, and this elaboration of principal-agent theory (see Mayntz & Scharpf, 1990) seems to us generally applicable to an understanding of the dynamics of building up R&D programmes and setting their implementation in motion. It is also necessary, however, to look at other contexts in which the actors move, even if in practice an evaluator cannot expand his or her analysis very far. One example will suffice to make the point. Scientists will identify with one or a few disciplines, and their research decisions are influenced by their relation to these fields. In the sociology of science, studies of risk strategies in going with or against prevailing paradigms have shown that young scientists (with nothing to lose) and well-established scientists (with enough reputational capital) are more willing to take risks than the middle category (Mulkay, 1972; Lemaine, 1980). For shifts to programme goals, similar analyses can be made. For example, when biologists could move to laboratory work instead of field studies (an important choice in the 1950s and 1960s), their choice was partly determined by the number of biologists having made this move already: at a particular moment it would become too risky to remain in the 'old' orientation, even if one was not interested in laboratory work at all. A similar process may be going on in the shift of biologists to technology

3. They may also depend on the situation in the discipline, see Dits, 1988, on the variety of cases in coal research in The Netherlands and Zeldenrust, 1989, on the dynamics of such research trajectories in general.

and application: when the bandwagon is attracting enough attention, one has to jump on it, whether one believes in it or not.

If policy actors thus cannot by themselves 'force' a scientific field to change its direction, they should always take the expectations of the scientists into account. When they feel that overall changes are necessary, they should choose suitable paths to build up expectations and so initiate a bandwagon effect. Interestingly, such expectations of scientists are partly derived from their assessment of what the impact of the programme on the field could be. So in lucky cases programme intentions become self-fulfilling prophecies! Particularly if participation in a programme brings scientific reputation (as is the case, for example, with some projects in the ESPRIT programme; Rip, 1990c), such a dynamic will play a role. To offset this optimism, note that in other cases, of course, scientists just exploit the new funding opportunities and run off with the money to the next programme.

4. METHODOLOGICAL POINTS AND RECOMMENDATIONS

This chapter has focused on the micro-decisions of policy actors, intermediate actors, such as programme committees and other implementors, and scientists and other actors who are, as it were, at the other end of the policy spectrum. In doing so, the importance of reconstructing the **charter of the programme**, and the dynamics of its evolution, was emphasized. In actual evaluation studies, such reconstructions are not always visible. Professional evaluators regularly carry out a little bit of charter reconstruction when they submit a proposal for an evaluation study, and have to base themselves on limited documents, while knowing that there are conflicts of interest and difficulties of problem definition going on.

In the present chapter, a number of methods of reconstructing a charter and tracing dynamics have been touched upon, ranging from contemporary history through interviews with informants, to social science methods and theories. Well-placed actors often have a good idea of what happened, know about the infighting and positioning, about the coincidences and incidents. They can be used as informants, but will always project their own story. Analysts must therefore work as much as possible with documents and archival materials, and start interviewing only when they have formed a preliminary picture, from which critical questions and cross-checks can be derived.

There is the practical problem that not all data is documented or, if documented, accessible. There is also the important problem that overall patterns may not be visible to informants, nor may they be detected by the analyst just by reading and interpreting documents. If at all possible, statistical and social science methods should be introduced to find patterns at more aggregate levels. For the generation and articulation of a priority, there are few such opportunities: one looks at emergent phenomena, and often unique events. In the case of implementation, there are more possibilities. One example is the analysis of committee meetings and of project databases, as was done for the Non-Nuclear Energy Programme of the European Communities (see Chapter 7). The survey of biotechnologists in The Netherlands used above is another example. Both for implementation and for generation and articulation of priorities, interviews will often be conducted, and these can be more productive if structured with the help of relevant insights and theories of science dynamics and science policy dynamics.

4.1. Problems of acceptance

The eventual 'story' of an R&D programme, as told by the analyst, can be reasonably robust. However, it can be contested by actors, and their power may compensate for their lack of argument. In our own studies, we occasionally encountered resistance, and even determined criticism, of our reconstructions, and a satisfactory resolution was not always possible. Particularly when the reconstructions are carried out while the programme is still in progress, or its continuation is still debated, the interest of different actors in specific reconstructions are obvious, and can be recognized in their reactions.

For example, when the Alvey evaluators tried to show that the original promises were unrealistic, the Alvey directorate was very unhappy as this might undercut their political support. Then, they argued that the Alvey programme was the first of its kind and should be treated kindly. The evaluators could not push their point of view, and the directorate was, in fact, making a legitimate claim.

In general, the addressee of the evaluation is in a position of power, while criticism of the analyst's story by others will have less impact. Things will be different in situations with multiple addressees; it will be interesting to trace the fate of the evaluation studies on the German microsystem technology programme co-ordinated by the VDI/VDE Institute in Berlin, because these studies are explicitly geared to a variety of audiences.

4.2. Learning effects

When the analyst's reconstructions are accepted, they will produce learning effects with the various actors: when one recognizes what has happened, ongoing strategies may be modified, and new programmes may be set up in different ways. So there may well be long-term changes induced by the commissioning of evaluations and the uptake of their results. One example is that the experience of diffuse, sometimes conflicting and often shifting goals has led policy actors to require clear objectives at the beginning of the programme. In the UK the Department of Trade and Industry's ROAME rule is a case in point (see Chapter 3), and many guidelines for evaluation emphasize this anyway as a matter of principle (Krull & al., 1990).

The problems occurring during interest aggregation and transformations of priorities that we discussed above are not just a matter of lack of experience, however. Interest dynamics cannot be reduced just by learning how they occurred. There is an irreducibly political and strategic aspect to the generation and articulation of priorities and programmes. This can be contained when one organization forms the context of the programme and its implementation, for example the British Department of Trade and Industry, which has built up its own style of programming and evaluation. In multiactor situations, which will continue to be important, diffuseness and the micro-politics of R&D policy-making and implementation will remain. Reconstruction of the charter of R&D programmes will, however, introduce an element of reflection, and thus an opportunity for rationalization of activities. Not in the schematic, top-down utopian rationalism dreamt of by policy-makers, but in terms of opportunities for communication, accountability and interactive efficacy in general.

REFFERENCES

— ARNOLD (E.) & GUY (K.), « Parallel Convergence », Frances Pinter, London, 1986.

— BARDACH (E.), « The Implementation Game: What Happens After a Bill Becomes a Law », MIT Press, Cambridge, 1977.

— BOBE (B.) & VIALA (H.), « Une Décennie d'Évaluation des Programmes de R&D à la CCE », EUR 13097, 1990.

— CALLON (M.), LAREDO (Ph.) & al., « Évaluation des Programmes Publics de Recherche. Le Cas du Programme Communautaire Énergie Non Nucléaire », Presses Universitaires de Namur, Namur, 1989.

— COZZENS (S.), HEALEY (P.), RIP (A.) & ZIMAN (J.) (eds), « The Research System in Transition », Kluwer Academic, Dordrecht, 1990, NATO ASI Series D, Vol. 57.

— DITS (H.), « Turn to Coal. Mission Orientation of Academic Research », PhD Thesis, University of Amsterdam, 1988.

— FUJIMURA (J.), « The Molecular Biological Bandwagon in Cancer Research: Where Social Worlds Meet », Social Problems 35, 1988, p. 261-283.

— HAGENDIJK (R.) & ALKEMA (E.), « Het BION-Zwaartepunt Plantecologie als Voorbeeld van Wetenschapsbeleidimplementatie », in RIP (A.), HAGENDIJK (R.) & DITS (H.), (eds) 1986, p. 175-180.

— HAZEN (R.), « The Breakthrough - The Race for the Superconductor », Summit Books, New York, 1988.

— HOHLFELD (R.), « Strategien gegen den Krebs: die Planung der Krebsforschung », in VAN DEN DAELE (W.) & al., 1979, p. 101-238.

— KRULL (W.), SENSI (D.), & SOTIRIOU (D.), « Evaluation of R&D: Current Practice and Guidelines », Report to the European Commission, EUR 13336, 1991.

— KRUPP (H.) (eds), « Technikpolitik Angesichts der Umweltkatastrophe », Physica-Verlag, Heidelberg, 1990.

— KÜPPERS (G.), LUNDGREEN (P.) & WEINGART (P.), « Umweltforschung, die Gesteuerte Wissenschaft », Suhrkamp, Francfurt a/Main, 1978.

— KWA (C.), « Het Onderzoeksbeleid Rond Moleculaire Biologie », in RIP (A.), HAGENDIJK (R.) & DITS (H.) (eds), 1986, p. 163-173.

— LEMAINE (G.), « Science Normale et Science Hypernormale: les Stratégies de Différentiation et les Stratégies Conservatrices dans les Sciences », Revue Française de Sociologie n° 21, 1980, p. 499-527.

— MAYNTZ (R.) & SCHARPF (F.W.), « Chances and Problems in the Political Guidance of Research Systems », in KRUPP (H.), (ed.) 1990, p. 61-83.

— MULKAY (M.J.), « The Social Process of Innovation. A Study in the Sociology of Innovation », Macmillan, London, 1972.

— NEDERHOF (A.J.), « Between Acommodation and Orchestration: the Implementation of the Science Policy for Biotechnology in the Netherlands », Research Policy 19, 1990, p. 379-386.

— PRINS (A.), « De Implementatie van Het Aandachtsgebied Gerontologisch Onderzoek », in RIP (A.), HAGENDIJK (R.) & DITS (H.), (eds) 1986, p. 63-73.

— RIP (A.), « De stimulering van de Biotechnologie in Nederland », in RIP (A.), HAGENDIJK (R.) & DITS (H.), (eds) 1986, p. 99-118.

— RIP (A.), « Societal Construction of Research and Technology », in KRUPP (H.), (eds) 1990a, p. 84-94.

— RIP (A.), « Implementation and Evaluation of Science & Technology Priorities and Programs », in COZZENS (S.) & al. (eds), 1990b, p. 263-280.

— RIP (A.), « An Exercise in Foresight: The Research System in Transition, to What? », in COZZENS (S.) & al. (eds), 1990c, p. 387-401.

— RIP (A.) & HAGENDIJK (R.), « Implementation of Science Policy Priorities ». Analysis Based on a Series of Dutch Case Studies and on the Contributions from Participants at an International Workshop Held in Amsterdam, 31 January-1 February 1987, Science Policy Support Group, London, 1988.

— RIP (A.), HAGENDIJK (R.) & DITS (H.) (eds), « Implementatie Van Prioriteiten in het Wetenschappelijk onderzoek. Bestudeerd aan de Hand van Enkele Case Studies », Raad van Advies vor het Wetenschapsbeleid, Den Haag, 1986.

— RIP (A.) & NEDERHOF (A.J.), « Between Dirigism and Laissez-Faire: Effects of Implementing the Science Policy Priority for Biotechnology in the Netherlands », Research Policy 15, 1986, p. 253-268.

— SCHULTE (F.), « Het Additioneel Programma Verzuringsonderzoek », in RIP (A.), HAGENDIJK (R.) & DITS (H.) (eds), 1986, p. 119-133.

— VAN DEN DAELE (W.), KROHN (W.) & WEINGART (P.) (eds), « Geplante Forschung. Vergleichende Studien über den Einfluss politischer Programme auf die Wissenschaftsentwicklung », Suhrkamp, Francfurt a/Main, 1979.

— ZELDENRUST (S.), « Ambiguity, Choice and Control in Research », Phd Thesis, University of Amsterdam, 1989.