Method and practice of Interactive Technology Assessment

Learning from a Dutch analytic experiment on sustainable crop protection

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Abstract

In Interactive Technology Assessment (ITA), the TA-analyst functions as a spider in the web of information flows between varieties of actors who share, from widely diverging perspectives, a concern about a particular socio-technological problem. The interactive nature of the inquiry process is an expression of the constructivist methodology underlying the ITA concept. This paper discusses the methodical and practical implications of organising a TA project in line with the methodological principles of constructivist inquiry. It does so by drawing from an analytic project on 'sustainable crop protection' that was set-up in the mid 1990s in the Netherlands, under the authority of the Dutch parliamentary TA organisation Rathenau Institute. The aspirations of the TA-analysts in this case went beyond the constructivist ideal of merely doing justice to the plurality of perspectives that defined the problem issue. They intended the project to result in a fundamental reframing of the crop protection problem and to thus break the impasse of self-containing perceptions and recursive practices that characterised the crop protection policy domain. The experience makes clear that the institutional setting in which a project is organised, the dynamics in its context as well as the particularities of the issue at stake strongly co-determine the chances that a constructivist approach to analysis may be successfully adopted. The paper concludes that implementation of the ITA-concept requires a well-chosen combination of methods and institutional arrangements, and a careful assessment of the conditions under which the project is staged. Lessons are drawn from the crop protection case in regard to the practical staging of an ITA-project.

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1. Introduction

"It is now 2030, and my grandson is taking me for a tour around his farm, which used to be mine, and then on to the supermarket...." Urged to describe the future in the present tense, participants in the analytic project that is central in this paper, the 'Gideon project,' at some point were invited to come up with an imaginary vision about what they thought agricultural practice in the Netherlands would ideally look like within two generations. What possible future of arable farming is conceivable? What kinds of crop protection practices are considered desirable and feasible? This was the type of information that the Gideon project – the name is an acronym in Dutch for Crop Protection Suitable for Sustainable Use and Healthy Economic Development in the Netherlands – set out to collect.

The project, which ran from February 1995 to the summer of 1996, was intended to provide parliament with insight in the possibilities for stimulating crop protection practices that fit the long-term objectives of a sustainable agriculture. Its initiators at the Rathenau Institute, the Dutch TA organisation, hoped to stimulate debate on crop protection that went beyond a mere goal evaluation of the then-current crop protection policy. To that end, it was decided to employ a novel approach to inquiry, called Interactive Technology Assessment (ITA).

The Gideon project proved to be an interesting test-case for this specific form of interactively organised technology assessment. Developed by members of the Public Administration Department at the University of Amsterdam (Grin & Van de Graaf 1996a,b; Grin et al. 1997), the concept builds on the methodological principles of constructivist inquiry and its methodical implications for evaluation as outlined by Guba and Lincoln (1989). The Gideon project sought to apply these methodological ideas in the context of the highly politicised, 'stubborn' policy problem of crop protection, while the outline of constructivist inquiry as provided by Guba and Lincoln is based on experiences with evaluating school curricula.

The discrepancy between the two types of topics and their respective settings raises a number of intricate yet highly interesting questions about the possibilities of organising technology assessment and policy analysis in line with constructivist methodology, specifically when the analysis focuses on issues concerning a sustainable development: How, and on which grounds, are the participants selected in a constructivist inquiry process that focuses on societal problems? What is the role of the analysts in constructivist inquiry on sustainable development issues; how can they maintain a balance between the long-term perspective of the inquiry and the short-term orientation of the input of its participants? To which extend do practical considerations influence methodical decisions, and how

does that affect the project's quality? Under which conditions can a constructivist inquiry induce learning on the part of its participants, and how can these conditions be created in an Interactive Technology Assessment project?

The Gideon project's analysts tackled the methodical questions at the level of practice, in the face of the specific socio-political setting in which the crop protection issue was debated. This paper, which is based on an ex-post evaluation of the project (Loeber 2004), reflects on these efforts by relating the Gideon experience to the methodological premises that underlay the project. In so doing, a light is shed on the practical aspects of staging an ITA-project, and lessons can be drawn regarding the methods and the management of constructivist ('interactive') technology assessment.

2. The practical challenge: breaking the impasse in the crop protection policy field

The agricultural sector represents a strong force in the Dutch economy, and is one of the country's major exporting industries.[1] This is remarkable given the relatively limited amount of arable land available and the rather adverse geo-physiological conditions. The humid and therefore disease-prone soil, together with the health risks of imported plant seed and the health requirements for exporting agricultural produce, have won chemical pest control a central place in Dutch modern agriculture. The Netherlands came to be the world's largest user of pesticides in relation to the amount of farming land available (Bieleman 2000). In that light, it is rather surprising that it took a thirty-odd years after the publication of Rachel Carson's *Silent Spring* – a book that sounded the alarm for the detrimental effects of chemical pest control, arousing an international public response – for the Dutch government to formulate an integral policy on the issue of crop protection.

Pesticides traditionally did not constitute a policy issue in the Netherlands.[2] Until the 1980s, regulations and control measures with regard to crop protection agents focused on public health issues and user safety. Pesticides first entered the political agenda for environmental reasons when in the early 1980s, a deterioration of surface water quality was noticed. Health regulations were gradually modified to include production and application criteria pertaining to the environment. This development was met with considerable protest from the agricultural sector, which in addition to the primary and processing industry also included ancillary industries that supply seeds, inorganic fertilizer, animal feed, technical equipment, and so on. Fertilizers and crop protection agents had come to be looked upon as acquired assets in a highly appreciated mode of production. They were considered indispensable to a thriving agricultural business community and hence to the Dutch economy as such.

The 'Multi-Year Plan on Crop Protection' that the government formulated in 1990 intended to challenge this position of chemical pesticides. The Plan's objectives were to reduce the quantities of pesticides that are being used per acre, to decrease emissions to the environment and to generally diminish the agricultural practice's dependence on chemical pesticides – the addiction metaphor was used intentionally by the Plan's authors.

The culture of 'chemical dependence' was not easily tossed aside. Nor was the practice of high-tech external input agriculture, which had been propagated systematically by a well-developed system of agricultural research, extension and farmers education that was built up in the Netherlands in the post World War II period. The close interplay between governmental agricultural research organisations, the agricultural university, departmental policy makers, (non-)governmental advisory councils and farmer organisations had resulted in extensive know-how on the part of primary producers as well as in apt technological research and development. The network of research institutes, the agricultural business community representative organisations and the Ministry of Agriculture, together with the assembly of Members of parliament that specialized in agricultural policy, in fact was so tightly knit that it was commonly referred to as the 'iron triangle.' The main representative and branch-organisation, the Agricultural Board (*Landbouwschap*), was the Ministry's regular and long-trusted partner in policy making and formed a major power block in the agricultural community. The Ministry accorded the Board great influence on the formation of policy and provided it with strategic information. In exchange, the agricultural organisation offered its co-operation in implementing policy regulations. This neo-corporatist system in agriculture favoured a technocratic approach to policy making that was firmly based on the research data provided by the governmental research institutes on agriculture.

Given this setting, it is not surprising that attempts at bringing about a drastic change in crop protection strategies proved cumbersome. It is difficult to 'rethink' common practice if that is reinforced time and again by the social structures in which it is embedded. The policy makers at the Ministry of Agriculture that were responsible for the Multi-Year Plan on Crop Protection obviously were aware of this mechanism as they chose to draft the policy plan *without* prior consultation with the Agricultural Board and the other usual partners; for sure a breach with standing procedure. It was hoped that the plan might thus escape the fate a previous White Paper on the issue had met, which, in the words of the farmer representative organisation's chairman, had been "effectively neutralized" (personal communication).

This time too, the plan provoked serious criticism from the Agricultural Board, which feared that specific crop protection agents might be banned before reliable alternatives were available. In the ensuing parliamentarian discussion, several members of parliament voiced the concern that resistance from the very parties that were supposed to implement the policy might render the plan's objectives too ambitious. They suggested drafting a covenant between government and the agricultural community so as to ensure a proper implementation; a covenant that preferably built on the Agricultural Board's proposal for implementation that it had submitted days before the parliamentary debate. And so it happened.

With the signing of the Implementation Agreement, the Multi-Year Plan had "lost its edge" in the eyes of those who had championed the Plan's initial idea of transcending the 'economy vs. ecology' dichotomy that dominated the crop protection debate. Although many agreed that established

agricultural practice could no longer be continued, changes in these practices were blocked by existing social structures. It was this impasse of self-containing perceptions and recursive practices that the Gideon project set out to break.

3. The methodological challenge: applying constructivist inquiry principles in TA

The *substantive* challenge was an intricate one. The parliamentarian debate had been clear on that: On the one hand, in the long run (say 2030), the Dutch agricultural sector should offer worthwhile employment opportunities for farmers-as-independent entrepreneurs, on a scale not significantly smaller than anticipated in 1995. On the other hand, the Dutch agriculture in the long run should respect the demands of sustainable development as elaborated in the Dutch Environmental Policy plan of 1989 and its successors.

The *methodological* challenge followed from this set of policy goals. Juxtaposition of the seemingly contradictory ambitions required a different approach to policy analysis than the advocate mode (Jennings 1987, 1993) of generating 'truckloads of data' to support adversarial views, that was so characteristic of the crop protection policy domain. It necessitated the parties involved to take a major leap away from their usual perception of problem definitions, to reach for a fundamental "reframing" (Schön & Rein 1994) of the policy issue.

On the suggestion of several of its Board's members[3], the Rathenau Institute decided to launch a programme on crop protection with such an ambitious perspective. The topic fitted the institute's general objectives of exploring the practical implications of the 'sustainable development' concept. Furthermore, it offered an opportunity to further experiment with novel methods of participatory TA, as it had done in the past.[4] In view of the crop protection project, it contacted a research group at the University of Amsterdam that had elaborated a new approach to TA, Interactive Technology Assessment (ITA) (Grin & Van de Graaf 1996a,b; Grin et al. 1997).

Characteristic of an ITA-project is that the (team of) TA-analyst(s) functions as a spider in the web of information flows between varieties of actors who share, from widely diverging perspectives, a concern about a particular socio-technological problem: the 'owners' of the problem, the parties involved in the development of (technological) solutions and those who are in some way or another (positively or negatively) affected by these (Grin & Hoppe 1995). An ITA seeks to develop problem - solution combinations that are considered both effective and legitimate by all involved. To that end, it systematically puts up for discussion not only possible solution strategies but also the definitions of the problem at issue itself. It does so by employing a constructivist approach to inquiry.

Crucial to the constructivist approach to analysis is that it does not acknowledge the ontology / epistemology separation that characterises the conventional (neo-positivist) inquiry paradigm. It posits that reality – even though it may exist independently of human observers – can only be known through the eye of the beholder. This implies that social inquiry deals with multiple realities that are constructed in context; a view that holds obvious implications for the methodology of research.

According to Guba and Lincoln (1989), in a constructivist inquiry, the question of whose 'construction' of reality counts should be settled in a negotiation process in which all those who have a stake in the issue under scrutiny participate. In practice, this implies that the analyst solicits the "claims, concerns and issues" (1989:40-42) of a discussion partner in an open conversation, thereby consciously trying not to let his or her own preoccupations predetermine the answers. On the basis of the information provided by the interviewee (who provides his or her "emic view"), the analyst reconstructs the way the stakeholder perceives the issue under investigation (which results in the analyst's "etic view"[5]). Thereupon the analyst feeds this reconstruction back to the initial interviewee and subsequently to other discussion partners, a process Guba and Lincoln describe as making "a hermeneutic-dialectic circle." It is *hermeneutic*, according to the authors, "because it is interpretive in character" and *dialectic* because "it represents a comparison and contrast of divergent views with a view to achieving a higher-level synthesis of them all" (1989:149). By submitting the information that is gathered in preceding interviews and group discussions to other participants for comments, new constructions of the various items are made, and missing pieces of information can be identified. Moreover, in this way, Guba and Lincoln posit, there is a constant check on the analyst's interpretation of the issue at stake. It is a practical way of dealing with the inherently political nature of knowledge. According to the authors, the analytic project can be considered successful when all participants (including the analyst) gain insight in the issue under scrutiny (that is, if they become "better informed") and if they acquire a more accurate understanding of the issue, thus becoming "more sophisticated" (1989:67).

The aspirations of the analysts in the Gideon project went beyond the constructivist ideal of merely doing justice to the plurality of perspectives that define a problem area. They intended the project to result in fresh and far-sighted ideas that might help outbrave the present deadlock situation in the crop protection field. This objective of a fundamental reframing of the problem issue added to the methodical challenges involved in applying the constructivist approach to inquiry in a TA project (see box 3.1). These challenges followed from the need to 'scale up,' so to speak, the approach presented by Guba and Lincoln, based as it is on reviewing educational curricula. After all, the two areas of inquiry differed, firstly, with respect to the scope and complexity of the changes discussed and, secondly, with respect to the power dynamics that govern the contexts in which a project is organised. The changes involved in 'sustainable crop protection' not only concern the issue under scrutiny itself (e.g. application of certain agents) but also its wider context (e.g. the development of new chemical pesticides or a reorganisation of the agricultural knowledge extension infrastructure) in which the issue is embedded. Likewise, the changes not only involve the way in which the participants in an analytic project perceive the issue at hand, but also the institutions in which they professionally operate.

Box 3.1 **Applying a constructivist approach to inquiry in TA projects on sustainable development issues: methodical challenges**

The organising principle in the inquiry process

There is a potential tension between the constructivist organisational principle of responsive focusing (taking the participants' claims, concerns and issues as a starting point in organising the analysis) and the requirements of discussing sustainable development issues. The latter may involve fundamental, non-incremental changes compared to the present situation that require a long-term perspective and a focus that transcends the immediately conceivable. While there may be farsighted individuals who take 'the long view'[6] in formulating their claims or concerns, an analysis that is based of responsive focusing may not reach beyond the here and now or the immediate future. Far-sightedness as a sole selection criterion for participation would impinge on the constructivist principle of involving all those who have a stake in the issue. Alternatively, methods and techniques in the analytic project may be used that are designed to lure participants away from the constraints of their every day professional context and inspire them to adopt a long view (see for instance Mambrey *et al.* 1995; Van de Kerkhof et al. 2002). This may, however, complicate the analyst's role. In Guba and Lincoln's portrayal of constructivist analysis, the analyst's contribution to what is being discussed is limited. While s/he brings along personal experience with content matters as well as creativity and intuition in combining the information of others in the process of making a joint construction, the participants direct the analysis in terms of contents. This position of the analysts is not by definition compromised by the use of creativity-enhancing techniques, yet it might be if the results of the analytic project in his or her eyes are not sufficiently visionary.

Combining qualitative and quantitative research

The sustainable development concept pre-eminently gives cause to debates that are traditionally fuelled with findings from empirical-analytic assessments of cause-effect relations. The question is how such analytic results are put up for discussion in the context of a constructivist inquiry. The latter does not preclude the use of quantitative research approaches to elaborate (parts of) the issue at stake, provided that their employment is embedded within an overall research strategy that is rooted in the constructivist paradigm (Guba & Lincoln 1989:42). Still, there is the problem of meaningfully integrating technical and social data (cf. Fischer 1991:122). Furthermore, the challenge is one of generating commitment among participants in a project to put up for discussion what many may consider 'hard facts.' Actors who are trained in professional skills that have their roots in the positivist research paradigm, such as molecular biology or civil engineering, may be hesitant to call into question established facts from their own disciplinary field. Such hesitance may reduce the participants' willingness to accept other perspectives on an issue as equally legitimate.

Inducing learning processes

Constructions of reality that actors hold tend to be self-sustaining and self-renewing and by their very nature are able to 'wall off' contravening evidence (Guba & Lincoln 1989:145, cf. Schön 1983). Yet, conceptualisation of a sustainable development requires a fundamental rethinking of current problem-solution combinations. In an analytic project, hence, the conditions must be created under which the defence mechanisms against unwelcome information (cf. Argyris 1990) may be dismantled and participants are induced to reframe (Schön & Rein 1994) their understanding of the problem. The suggestions in the literature regarding the conditions that render an analytic project conducive to learning and frame reflection (creating mutual trust, a non-threatening atmosphere, see e.g. Argyris & Schön 1996, Forester 1999) may be difficult to realise in the context of highly politicised, stubborn policy problems. Guba and Lincoln mention the "natural setting" as the obvious locus of constructivist inquiry as "[c]ontexts give life to and are given life by the constructions that are held by the people in them" (1989:174-175). This setting, however, may fail to invoke the feelings of useful estrangement in the participants necessary to take a step back from the familiar, in order to reflect on recursive practices and dominant ideas.

Selection of participants and the issue of 'closure'

In constructivist inquiry, all persons or groups that hold a stake in the issue under scrutiny are in principle entitled to participate (Guba & Lincoln 1989:40, 201). The universe of potential stakeholders in regard to sustainable development, however, is indefinite, as a result of which this principle cannot function as a selection criterion. Alternatives must be found, which is complicated because of the intertwining of contents (based on the claims, concerns and issues of the participants) and the power-aspect of in- or exclusion: a specific set of actors may serve to legitimise specific decision-making on issues that, had they been present, other actors may consider unjustified. This problem is mirrored with respect to the issue of 'closure,' that is, the question which topics may be legitimately put up for discussion. In Guba and Lincoln's account of constructivist inquiry, the closure of the analytic process does not seem particularly complex: "[Constructivist inquiry] is focused via the claims, concerns and issues of stakeholders, and there are no holds barred with respect to what claims, concerns, and issues are eligible for inclusion" (1989:200). In projects on sustainable development issues some practical way

of dealing with this two-faced problem must be found in order to keep the analysis focused on the problematic situation that was its *raison d'être* in the first place.

The role of the analyst and commissioning party

In constructivist inquiry, neither the analyst team nor the organisation that commissions the research has "special license, elite status, or superior power, nor is [it] warranted in exerting any special control" (Guba & Lincoln 1989:42, 220-221). Whatever outcome emerges from the participatory process has to be accepted as result. The hermeneutic process thus provides its own quality control: as long as all participants, including the analysts and financers, have an equal say in the deliberations, the outcome may be considered "fair" (that is, genuinely representing the views of its participants) and "confirmable" (implying that the results "are rooted in contexts and persons apart from the evaluator and are not simply figments of the evaluator's imagination") (1989:243). In the case of inquiry projects on issues of sustainable development, involving politically sensitive and technically complex issues, there may be little enthusiasm among parties to cater for a potentially costly (in terms of money, but possibly also reputation) inquiry process on the basis of this condition.

The ITA-method was considered an appropriate approach to deal with the complex institutional setting of the crop protection issue and the widely diverging views of its 'stakeholders.' Moreover, the TA-approach was certainly new. Although some parts of the method had been employed in previous research, the Gideon project was the first occasion on which the ITA-concept was put into practice as such. Thus, the project became a test-case for organising a technology assessment in line with constructivist methodology.

4. The Gideon project on sustainable crop protection

The project began with the formation of a project team. Three senior and four junior researchers joined forces, bringing together methodological and organisational know-how as well as subject matter expertise.[7] A newcomer in the area of agriculture, the Rathenau Institute as well as the project team needed to become familiar with the insight in the technical aspects of crop-protection and in the on-going, intricate process of political wheeling and dealing with respect to the issue. A first round of in-depth interviews served as introduction to the field. The interview training the junior researchers received in advance, as well as the discussions on the methodological presuppositions that underlay the project, were meant to build a team out of the group of individual researchers.

The initial interviewing round, with 27 stakeholders from the agricultural and plant improvement sectors, the pesticide industry, as well as from consumer and environmental organisations, resulted in an inventory of the prevailing problem perceptions. Additional literature and document study were used to process these finding into a listing of some twenty issues that presented both opportunities and barriers for changes in current crop protection practices. Much to the project team's surprise, however, the interviews did not result in an overview of possible short-term and long-term solutions. The interviewees were considerably more successful in outlining the barriers to sustainable crop protection than to formulate suggestions to overcome these. The team members thereupon decided to formulate these themselves on the basis of the accumulated material. The analysts had used an interview technique that was designed to explicate not only problem definitions but also the 'background notions' (overarching theories, values, worldviews) on the basis of which an

interviewee considered something problematic. As a result, they were now able to formulate strategies that together, in specific combinations, entailed a solution to the problems of a number of the parties involved and that at least were not in conflict with the background notions of others.

These solutions were fed back for comments to the project's participants in a second round of interviews, this time by telephone. The interviewees received a description of the 15 solution strategies in advance, with an outline of the problems that each was meant to solve and an indication of the parties that 'owned' the problem. Possible disadvantages and problematic aspects of each solution strategy were also outlined. The participants were asked to react to the strategies that touched directly on their professional practice and were free to comment on the other proposed solutions as well.

A second strategy to support the formulation of a long-term perspective on the problem situation was to redesign a planned plenary session with project participants into a 'future-oriented workshop.' A professional facilitator was hired to help create an analytic space in which creative and innovative visions of a desirable future might emerge. It was on this occasion that the participants were asked to think for 10-15 minutes to come up with a 'dream' about the future formulated in the present tense. The workshop started with a short motivating plenary welcome session, directly followed by three parallel sessions in groups of 8-10 participants chaired by the project team members. The individual visions of the future that were generated were subsequently integrated per sub-group into visions that were shared each by a number of participants in different positions within the agricultural network. In later sessions, the visions were discussed in plenary meetings and then again in subgroups. In that way, the participants and the project team gradually worked towards a limited number of shared images of a desirable and feasible future for arable farming and crop protection. Eventually, three such visions were formulated.

The project team thereupon combined the three visions with the solution strategies that had been formulated on the basis of the interviews, integrating them into consistent development paths. This exercise resulted in three scenarios, each set down in a separate document that comprised a long-term objective and specific steps to be taken on the short and mid-term in order to realise these. The documents furthermore indicated what problems had not yet been solved, what new problems the strategies entailed, and what points had not yet been agreed on. In the documents, these issues were linked to the three future visions in a manner the project team considered consistent and meaningful. A next step was to submit the scenarios for comments to a wide variety of stakeholders. To that end, a month after the future-oriented workshop, another interactive session was organised.

The 'working conference' began with speeches by experts on issues that were considered of relevance for the development of the agricultural sector in the long run, among them the expected developments in the export market and the impact of EU policy on Dutch agriculture. Thereafter, the participants were invited to indicate the degree to which they saw the proposed scenarios as "realistic, desirable and contributing to sustainable crop protection." The objective was to arrive at joint conclusions. A professional process manager who had a demonstrable affection with the agricultural

sector chaired this session. In her introductory remarks, she invited those present to "step in a boat together as we will sail off on wild waters; you do not know these waters yet and we will have to see where we'll end … You will find no trodden paths here today, as it is you who will have to help find the way" (Rathenau Institute 1996b, translation a.l.). On the basis of the ensuing discussions, one of the three future visions was dropped, and the other two were amended.

In the weeks that followed, the project team, in close consultation with the Rathenau Institute's project supervisors and members of the advisory board, integrated the rather inchoate collection of observations, remarks and comments into two scenarios of a sustainable crop protection practice to be implemented by 2030. The 'chemical refinement' scenario involved the development of technical solutions to environmental problems on the basis of state-of-the-art know-how. By contrast, the 'system oriented prevention' scenario involved a genuine break from the chemical control paradigm that characterises current agricultural practices. Together with an analysis based on the preliminary studies of the current situation vis-à-vis crop protection, these were written down in a draft version of the final report. Furthermore, it was decided to study the ideas presented in the system-oriented prevention scenario in more detail by conducting several case studies on the subject.[8]

The draft report was put up for discussion at a public meeting, called an 'open day.' To the meeting, all those who had participated during the previous stages of the Gideon project were invited, as well as other stakeholders who were interested in the subject. In total, 55 people out of the 260 that had been invited attended. The discussion took place in three parallel subgroups on three themes (crop protection policy; environmental objectives; agrarian management). In addition, the draft report was discussed with the advisory board. The various reactions were incorporated in the final version (Groenewegen et al. 1996). On the basis of this document, the Rathenau Institute drew up a report to parliament to inform the debate on the crop protection policy (Sterrenberg & Brandt 1996).

The two scenarios portrayed desirable and potentially feasible futures for Dutch agricultural practice in regard to pest control; the 'building blocks' and the four case studies provided suggestions for concrete steps to be taken. Moreover, the findings were, arguably, legitimate in the sense that they were based on a participatory process of knowledge generation, in which formally each participant had an equal say. In spite of the results' feasibility, desirability and legitimacy (and a thoughtful approach to disseminating of its findings[9]), the results from the Gideon project did not in the least affect the parliamentarian debate that it had intended to inform. Even the fact that the Minister of Agriculture had singled out the Gideon project when presenting the various research reports on crop protection to parliament on the occasion of the mid term evaluation of the Multi-Year Plan on Crop Protection did not influence the tenor of the debate.[10]

5. Leading a horse to water …

Considering the knowledge utilization literature (e.g. Weiss 1980), the modest impact of the Gideon project on the parliamentarian debate is hardly surprising. New information is rarely used

instrumentally, but merely adds to an on-going process of knowledge accumulation which in due time may result in a revision of previously held views. In the case of the Gideon project, the situation was, however, more complicated. The project questioned the very conceptual and institutional framework by which the crop protection issue was usually dealt with. In so doing, the Rathenau Institute almost by definition ruled itself out as a regular discussion partner. Its information on the crop protection issue therefore did not 'add' self-evidently to the existing body of knowledge. Must we then conclude that the entire effort had been of no avail? Many involved in the Gideon project in hindsight tend to draw that conclusion. Members of the project team, the Rathenau Institute's project supervisors, members of the advisory board all express, even though they differ in their assessment of the reasons why, a similar frustration: one can lead a horse to water but one can't make it drink.

A detailed analysis of the crop protection policy in the aftermath of the mid-term evaluation, however, indicates that a more positive conclusion is in place. The Multi-Year Policy Plan's sequel involved a drastic reformulation of the crop protection policy. More in particularly, the proposed changes showed a remarkable resemblance to the findings of the Gideon project. While, obviously, the reframing of the policy issue cannot be attributed to the Gideon project, a relation between the two can be traced empirically (Loeber 2004). Among the developments that influenced the changing views on crop protection policy were processes of learning by individuals who participated in the Gideon project and who were later involved in the drafting of the plan's sequel. Moreover, subtle changes in the balance of power among competing factions in the crop protection area were set in motion by the project, as it provided an institutional basis to insights and ideas that were available already, yet that initially stood little chance of having an impact on the dominant discussion. In that way, the Gideon project had indeed been part and parcel of the innovative, 'sustainable' solution strategies it sought to help design. The employed methodology contributed to this result, as did the practical ploys that the project team came up with to put the methodological principles into practice.

The organising principle in the Gideon project

A crucial element in the ITA-approach is its 'responsive focus': the analysis is organised on the basis of the concerns and issues that its participants put forward. In the Gideon project, the agenda was set on the basis of the information collected in the first round of interviews. The interview the junior team members (four out of the team of seven) received was meant to ensure a 'confirmable' outcome of the interviews. The taught interviewing technique, developed by the UvA faculty members responsible for the ITA-concept (Grin et al. 1997), enabled a reconstruction of an interviewees 'interpretive frame,' that is, the amalgamation of the considerations and assumptions on the basis of which an individual seeks to make sense of a problem situation he encounters, and chooses his line of action.[11] Subsequently, the project team used a coding technique based on the grounded theory approach to data collection (cf. Strauss and Corbin 1990) to organise the findings from the interviews. The feed back solicited in the second round of (telephone) interviews provided a check on the accuracy of the

analysts' interpretation of the findings. Thus, the twenty-some issues that guided the subsequent steps in the inquiry process were explicitly based on the concerns of the project participants and not on the agenda of the Rathenau Institute or the project team.

A consequence of this procedure was that, when the interviewees failed to produce suggestions for (long-term) solutions to the perceived problems, the team of analyst was faced with a serious problem. Obviously, the project team *did* have its own agenda, namely the 'uncovering' of latent solution strategies to break the impasse in the then-current crop protection debate. How was it to pursue its agenda without imposing the analysts' own views on the outcome? The solution strategy it opted for – making use, on the one hand, of the insight gained in the interpretive frames of the interviewees to formulate solution strategies itself, and, on the other hand, to employ creativity-enhancing techniques in the plenary sessions – was an attempt to find a balance between the requirements concerning the contents and the process of constructivist inquiry. The team apparently succeeded in that respect, as the options for change that it formulated 'survived' subsequent rounds of feedback and plenary discussion, and were later integrated in the scenarios that were the project's end results.

Inducing learning processes

The creativity-enhancing methods employed during the two plenary sessions, that were meant to lure the participants away from the here and now, also contributed to the occurrence of learning processes. The chairpersons at the future-oriented workshop took great care to create and maintain a non-offensive, creative atmosphere, in which non-conventional ideas were not rejected but invited and welcomed. A similar approach was adopted by the discussion leader at the working conference. Other practical strategies to stimulate an atmosphere of trust and a willingness among the participants to approach the issue with an open-mind were the choice of location for both plenary sessions (in a remote setting), the duration of the sessions (the workshops lasted an evening and a day each, to help participants distance themselves from the hectic of every-day life[12]) and the short notice on which the participants received the written material to prepare themselves for the sessions. By sending the material only shortly (1-3 days) in advance, the analyst team hoped to keep the participants from discussing the contents at length with their respective organisations. In that way, their input might be free from pre-cooked strategic considerations.

By far the most important feature of the project for the creation of trust was the composition of the participant group. The analysts attempted to create with the Gideon project what they called a new 'analytic space' to discuss the crop protection issue. Their assessment of the deadlock situation in that field was that over the past fifteen years, time and again, the same small number of parties had discussed the situation in a highly polarized setting. As a result, most options for change, in every variation possible, had been by and large outlined and subsequently rejected. In the Gideon project, these parties were now asked to sit on the advisory board. While their involvement was thus ensured,

the project team was able to keep them at bay from the actual analytic process. This was carried out with 'second circle parties': stakeholders who were equally knowledgeable in regard to the issue under scrutiny, yet relatively unfamiliar with the customary political sparring matches on the topic. The project team made an effort to include people involved in the primary production process, that is, people from the 'shop floor' rather than general management or their representatives. In that way, the project team expected a fresh sound to be brought to the debates on the crop protection issue, which might force a breach in the political stalemate situation.

Selection of participants and the issue of closure

The 'universe' of potential participants from which the candidates were selected in the Gideon project was defined in terms of a "substantive closure" (Grin et al. 1997)[13]: The analysts reasoned that if farmers were to change their crop protection strategy, the institutional contexts of agricultural practice (including the knowledge infrastructure, the processing industries, trade organisations, auctioneering organisations and supply industries and so on) would have to undergo change as well. Therefore, persons from the entire agricultural food production and distribution chain were therefore considered potential change agents and were included in the project in addition to farmers. The final selection was made according to the principle of maximum variation, that is, the notion that the group of participants should be composed in such a way that it provides the broadest scope of information possible. The reconstruction of the 'interpretive frames' of the interviewees was useful in this respect: it helped the analysts to assess whether 'new' viewpoints were found which were to be included in the project.

The project team's choice to invite people from the shop floor rather than from management positions was not met with enthusiasm by the advisory board. The board strongly insisted on inviting at least a significant number of representatives of the agricultural and horticultural organisations, to prevent the "danger of the impression that one talks about the agricultural sector without consulting the sector itself" (Rathenau Institute 1996a). Eventually, the disagreement was more or less spontaneously dissolved as the farmers that the project team welcomed to the workshop were mostly recruited from the administrative network of the farmer representing organisation at grass-root level. The effect that this had on the composition of the participant group was reinforced to some extent by processes of self-selection (several approached candidates did not consider themselves sufficiently knowledgeable to participate): eventually some (close) links between individually participating farmers and growers and the formal representative organisations could not entirely be avoided. The extent to which this influenced the contents of the analysis is difficult to establish.

The generally phrased substantive closure was narrowed down to provide a guiding principle for the discussions. Because the analyst team was not supposed to play a leading, decisive role concerning the contents of the analysis, the rules of closure had to "keep the frogs from jumping the barrow" (Grin, personal communication). A well-set closure was considered instrumental in preventing the analysis from drifting away from the topic of sustainable crop protection, while at the

same time allowing the participants sufficient room to bring forward their claims, concerns and issues. Therefore, the criteria by which to decide which topics could legitimately be put up for discussion within the project's confines were discussed extensively between the project team and the Rathenau Institute at the beginning of the project. Thereafter, care was taken to communicate the rules of closure to the prospective participants, first in the letter of invitation, and again at the beginning of the workshops. The rules of closure were based on the aforementioned meta-problem defined by parliament: any topic was considered legitimate as long as it did not rule out the possibility of a viable agricultural sector in the long run, and at the same time complied with the demands of sustainable development as elaborated in the Dutch Environmental Policy plan of 1989 and its successors.

In hindsight, most of participants do not recall any discussion about the 'closure issue' and were not aware of the relevance of such a topic. Yet, it is striking that none had experienced any frustration or concern about whether or not his or her input was taken seriously. Apparently, the aspect of closure was dealt with in an effective way.

Combining qualitative and quantitative research

With their involvement via the advisory board, the role of the experts and opinion leaders who usually dominated the crop protection debate was by no means marginalized. As had been the case with the selection of participants, the board members made a serious effort, time and again, to seriously influence the course of the Gideon project. While the establishment of the advisory board was considered a strategic ploy to sidetrack the crop protection 'big-shots' by some, to others it was a means to provide expert input in the analytic process. The board was considered an "accompanying group" (*begeleidingscommissie*) rather than an advisory board (*klankbordgroep*) by the Rathenau staff that supervised the Gideon project, implying a close involvement in the subject matter (Groenewegen, personal communication). Yet, formally, it was in a position to merely give advice to the Institute and, via its staff, to the project team. As a result, the responsible Institute's staff members functioned both as a buffer and as a linking pin between the two deliberation structures.

Dissension between the project team and the advisory board arose predominantly from a fundamental misunderstanding about the methodological considerations underlying the Gideon project. The regular discussion partners that dominated the expert-laden field were by and large trained and well-seasoned in the neo-positivist paradigm and unfamiliar with a constructivist approach to inquiry, which to them made little sense. The Rathenau Institute time and again had to remind the board of the objectives and intentions of the project, and to explain the project's approach to the advisory board, to little avail. The misunderstanding at the level of methodology in practice translated into an on-going discussion about the choice of methods employed. Even at the very end of the project, the advisory board put a pressure on the Rathenau Institute to switch to adopting a quantitative approach.

By that time, the advisory board's attitude was one of general annoyance with the Gideon project's outcome. Those members who had been sceptical of the project from the very start considered the outcome a conformation of the ("our") analysis on the basis of which the Multi-Year Plan on Crop Protection was drafted. They felt that the project's results were not very innovative and, to the extent that they were, not very feasible. Others who had welcomed the project as an opportunity to re-open the debate on crop protection (that was closed "nail-solid" with the Implementation Agreement), also expressed disappointment. Although they acknowledged the innovative character of the Gideon project and its outcome, they feared that the findings would have no effect on the political debate, for lack of analytical rigour of the underlying research.

Each from its own perspective, the two types of criticism amounted to a call for a rigorous elaboration of the project's findings from a "scientific" (that is, neo-positivist) perspective on research. It was hoped that an empirical-analytic elaboration would add to the finding's convincing power. Therefore, even at its final stage, members urged the Rathenau Institute to abandon the qualitative approach to analysis that was adopted in the project in favour of a more quantitative one.

The four case studies in which the 'system-oriented prevention' scenario was elaborated were conducted to meet the criticism of the advisory board. The cases served to illustrate the practical implications of the somewhat abstract results of the Gideon project and provided the requested quantitative backing to the project's findings. Since this kind of empirical detail about the consequences of a non-chemical control approach to crop protection on farm level had not been readily available until then, the case studies came to be looked at, according to some informants to this evaluation of the Gideon case, as the project's a main result. The case studies did not only provide information that was "relevant and really new", according to a discussion partner, but also spoke a familiar language in the eyes of many.

The sheer discrepancy between the usual way of discussing the crop protection issue (with "truck loads of empirical data", according to a participant) and the approach adopted in the Gideon project (with the interactive sessions that another participant typified as "those bear-garden gatherings") contributed to the tepid reception the project and its outcome received. Possibly, the employment of empirical-analytic research methods (for instance, by conducting the case studies earlier in the project) within the overall hermeneutic-dialect approach might have helped bridge the gap between the methodology adopted in the project and the neo-positivist paradigm that dominated the crop protection field.

The role of the analyst and the commissioning party

Because of the fundamental differences in their outlook on methodology, the advisory board, the project team and the commissioning Rathenau Institute were caught in an awkward *ménage-à-trois* for the duration of the project. This affected the project's process and contents in various ways.

The first exchange of information between the project team and the advisory board, that many in retrospect call "unfortunate," set the tone in the further communication process between the two. The project's initial findings (from the preliminary research activities, including the interview rounds) did not meet with the advisory board's approval. Not familiar with the methodological considerations concerning a responsive focus and a grounded theory approach, the board members were annoyed by the quality of the texts, which they considered "bristling with factual mistakes." To pacify the board, the Rathenau Institute urged the project team to revise the texts. It was then decided to publish them in the shape of five separate reports. The choice to go public with the initial findings, in turn, had a far-reaching impact on the analytic process. The writing of the documents became a goal in itself rather than a means by which to organise the analytic process, which put heavy demands on the time and energy of the project team. More importantly, the wish to reach a wider audience implied that the contents of the documents had to be convincing and "correct." While the Rathenau Institute had a reputation to conduct trustworthy and solid research in various fields, the crop protection area was not among these. The reports, hence, inevitably came to function as a means to establish the Rathenau Institute's credibility as a sparring partner in the crop protection debate. This objective did not tally with the methodological considerations on the basis of which the material was collected. However, information on the methodological approach adopted in the Gideon project in the documents was limited to a remark in the foreword of each of the booklets that "the contents of [the] working documents provided the starting point for a discussion with and among participants to the Gideon-project" (see for instance Schreurs & Grin 1996).

The decision to seek credibility as a discussion partner on substantial grounds, rather than by emphasising the project's contribution to the on-going debate on methodological grounds, affected the analytic process in more than one way. The critical reception of the results from the first analytic activities for some of the (junior) members of the project team was discouraging. The methodological premises on which basis the Gideon project was set up were tried even more, when for personal reasons, two junior members left the team. With their departure, a part of the expertise and sensitivity for the issue at stake that was built up in the preparation phase was lost. Unintentionally, with the publication of the preliminary results, moreover, the Gideon project found itself in the middle of the crop protection's political hornet's nest.

The communication problems between the project team and the advisory board stemmed not only from a basic lack of understanding about the project's methodological rationale, but also from the implications the methodological premises had for the possibility to exercise control over the analytic process. As the Institute's project leader explained in retrospect, "[t]he thing is, with an interactive process, you don't get a grip on what's going on. Most specifically, you cannot predict the outcome. That was the hardest for the advisory board to put up with. The board was anxious to co-determine the outcome of the process and did not seem to understand that that desire is at odds with the intentions of an ITA process" (Sterrenberg, personal communication).

The Institute itself too was rather apprehensive about the method employed. The ITA approach had initially seemed to suit the project's purpose and the Institute's agenda well. In practice, it took quite some getting used to: "at first, I was not fully aware myself of the consequences [regarding the extent to which one can control the process]. It was a conscious yet difficult choice. After all, as a Rathenau Institute, one seeks to posit one's own view, especially in the direction of parliament. As the process was unrolling, one could see that one is not going to get there. There was a certain tension between what we eventually meant to get out of the analysis, and the inquiry process itself" (idem).

This tension came to the fore most explicitly at the final stage, when the board was closely involved in wrapping up the findings of the inquiry process. The participants in the inquiry process as well as some of the project team members call the influence of the advisory board on the contents of the project's outcome and final results considerable. As one of them observed: "The people who were at the table [at the future-oriented workshop and the working conference, respectively] were a little surprised to find that certain elements had gone missing in the final results" (Groenewegen, personal communication). Interestingly, with the exception of the project team members, neither the interviewed participants to the interactive sessions nor other informants (members of the advisory board) considered this lack of "fairness" and "confirmability" a serious flaw. To most of the participants, attending the sessions itself was a worthwhile cause.

6. Inferences and lessons

Several inferences may be drawn from the Gideon case material regarding the application of constructivist inquiry principles to the practice of interactively organised technology assessment. First of all, it is obvious that the institutional setting in which a project is staged, as well as the particularities of the issue on which it focuses, largely co-determine the way in which the premises of constructivist inquiry can be put into practice. Furthermore, it is clear that a sophisticated methodological underpinning of an interactively organised technology assessment is no guarantee that in practice its intentions may be fulfilled.

These observations underscore the relevance of ensuring, by way of starting conditions, that all responsible parties have a shared understanding about the (im)possibilities of the employing a constructivist methodology in relation to the project's objectives, project management and impression management. These observations add to the general assertion (Grin et al. 1997:21) that in the case of generating knowledge on ill-structured policy problems, an interactive approach to TA is called for. The findings from the Gideon case suggest that in addition to an assessment of the type of problem at hand, also an assessment of the problem's context and the issue's content is called for:

> Before initiating an ITA, it is sensible to conduct a preliminary study, not only to investigate the problems at stake and the different ways in which these are being defined by relevant actors. The study should also provide a clear view on:

- The particularities of the issue's institutional embedding: Which is the knowledge arena in which the issue is being discussed (what is considered 'relevant knowledge'; under which conditions is a truth claim considered 'legitimate') and the TA is meant to sort some effect? What kind of product (type of knowledge; 'design' of a project's results) in principle may fall in fertile ground in this arena?
- The particularities of the network in which the issue is a topic for discussion: What could be a motive for relevant parties to engage in an ITA? Is there some internal commitment among relevant parties to actually partake? Under which conditions may parties (whose partaking is considered relevant from the TA initiators point of view) who do not (yet) consider themselves as 'problem owner' be motivated to participate?
- The particularities of the issue at stake: Is there a technological artefact that may serve as focal point or boundary object? At which stage of its developmental life cycle is the central technological artefact? May a discussion of its characteristics or design serve as an organisational principle for structuring the discussion and learning process?

A preliminary study may provide the basis for assessing the potential pitfalls and intricacies of applying a constructivist approach to inquiry in TA projects in advance. In that way, the analysts may outline a strategy to deal with these, thus avoiding the need to rely on *ad hoc* decisions in the face of unexpected difficulties. Judging from the Gideon project:

> Before the actual start of an ITA-project, it is advisable a) to ensure that the members of the analyst team all are equally familiar with the quintessence of the constructivist methodology that is adopted in the TA project (if not, some training and discussion sessions should precede the actual analytic activities); and b) to ensure that (some of) the team's members are sufficiently familiar with the issue under scrutiny. In order to present a credible discussion partner to the discussants in the TA project, it is imperative that knowledgeable team members are involved and play a visible role in the project.

The experience with the Gideon project shows that the advantages of being an outsider to the knowledge arena that a project means to 'break in' to (in order to shed a 'fresh light' on some issue without having one's own institutional position influencing the project's power balance) are counterweighted by the disadvantages of lacking sufficient credibility to be taken seriously as a discussion partner.

Even if such preparatory requirements are met, methodological problems cannot be ruled out. In the case of the Gideon project, each of the three players involved in its organisation – the team of analysts, the commissioning institute and the advisory board – initially seemed confident that the ITA approach suited their purposes. The implications of the adopted methodology (notably the limited possibility of managing the course of events), which was seemingly clear to all involved at the outset of the project, only came to full light once the project was on its way. The parties involved came to realise that in spite of a seeming agreement on the methods and direction of the project, the differences in intentions put a strain on the project's course. In practice, in the course of events, there was a constant trade-off between methodical considerations and strategic considerations, which led to a weakening of the project's potential to realise its objective:

> Preceding the TA project, it is advisable to make sure that the commissioning party is familiar with the methodological principles of the approach that is being adopted in the project and that it at ease with the managerial and organisational implications of that approach. In case the adopted approach is at odds with the strategic intentions that underlie the commissioning party's choice to set up a TA project in the first place, the method's consequences have to be discussed thoroughly before the actual analytic endeavour commences. In case no clear commitment can be gained, the project should be called off.

On the basis of the Gideon case, hence, the idea of "initiating a contract with the client or sponsor commissioning" to ensure proper implementation of a constructivist inquiry (Guba & Lincoln 1989) arguably requires further specification. As the Gideon experience shows, a paper construct is not enough. The commitment required is not intended to defend the project against ill-will (that is, against the intentional violation of a project's methodological principles) but rather against unfavourable consequences that follow from unforeseen misunderstandings between the commissioning party and the project team. This may suggest that it is wise to put the issue on the agenda for discussion during a project's preparatory stage.

Upon ensuring proper starting conditions, the ITA's analytic design requires a constant monitoring in the light of contextual developments in the course of the project. As concerns its methodical elaboration, the Gideon experience shows that:

> A responsive focus (taking the "claims, concerns and issues" of participants as the starting point for focussing the analytic endeavour) does not preclude the possibility to address problem situations from a long term and/or a global perspective. Creativity enhancing techniques can provide a useful contribution to the inquiry process without compromising its integrity and 'fairness" as long as its findings are put up for discussion in the deliberative process along with any other input.

The Gideon project provides evidence that a responsive focus indeed may hamper the inclusion of radical, long-term changes and non-incremental solution strategies. The use of specific discussion techniques appeared a practical solution, as well as the careful creation of an atmosphere trust:

> In order to enable participants to formulate genuinly 'new' problem - solution combinations, an ITA analyst's first and main concern is with creating the conditions under which learning may occur. The TA project is a site for discursive (re)construction of meaning rather than for extending the usual politics of interest into the realm of knowledge production. Learning is likely to occur when the project enables a wide variety of participants who hold different views on the subject under investigation to exchange information on the problem issue, in a way that involves the explication of their tacit assumptions and worldview that underlie their issue-related utterances. The analyst team should play an active role in ensuring that the participants feel sufficiently at ease with one another to let go of defensive routines and to take seriously into consideration unwelcome or counterintuitive information.

The Gideon case also provides material to draw lessons concerning the institutional arrangements in which an ITA project is to take place. The case material makes clear that the institutional conditions under which a TA project is initiated and staged are of equal relevance for its success as the methodological considerations and strategic focus that underlie the project's methodical choices:

> In order to enable a project to result in ideas that entail a genuine break-away from the trodden ('unsustainable') paths, it has not only to be designed according to the methodological principles of constructivist inquiry, it should also be allowed to be implemented along these lines. This implies that the project is not controlled by its financiers and/or initiators on the basis of pre-set goals, but rather that it is given sufficient leeway to take shape as an 'emergent design': previous developments and findings in the project determine the focus and shape of the next 'move' in the inquiry process.

This also impacts the way the achievements of the analyst team are to be assessed:

> The analysts that design and implement an ITA cannot be hold accountable to the achievement of objectives concerning a project's contents that are formulated at the project's outset. Assessment criteria rather should be process-related (is the process' continuation ensured; does it comply with the conditions for constructivist inquiry?) and should be product-related only in an 'ex post' evaluation (are we happy with the results; is there now a better quality of information exchange; are the involved actors more sophisticated; are we better equipped to deal with the issue at stake and/or with unforeseen side-effects?).

Of a more fundamental nature even are the implications for the institutional arrangement as such:

> Cultivation of a TA's potential clash with its institutional context is a must: issues that require a genuinely 'novel' way of structuring problem - solution combinations will benefit from non-conformity. This has to be acknowledged and accounted for in the project's institutional embedding. Furthermore, the analyst team must make sure that along the way, (implicit) attempts by actors from within the project's context to 'pull back' the project into accepted ways of operation can be repulsed.

It is clear that the participation of stakeholders in the TA project investigated here was not intended as a contribution to furthering the democratic ideal per se. The decision to include various perspectives in the analytic effort was meant to ensure the development of a sound notion of 'what to do next' regarding the issue under scrutiny. In other words, participation served the goal of improving the quality of political judgement on crop protection. Furthermore, it was considered a strategic move in order to ensure that the outcome of the analysis was acted upon.

The case material also illustrates that this latter, strategic goal of an ITA project may not be easy to achieve. To the extent to which a project succeeds in achieving non-conformity with 'traditional' existing ideas and institutions, it runs the risk of clashing with the embedded practices it wishes to change. As the Gideon experience shows, even if the initiator is an independent organisation, which is enthusiastic about methodological innovation, it is hard to deal with the consequences of giving up control over content and to defend the approach in view of criticism that is inspired by conformity to existing practices and accepted ideas.

The methodological choices and the strategic aspects of operating in a power-laden context apparently can, in other words, be uncomfortably at odds with one another. However, if the starting conditions outlined here are met, and the analysts are ready to stand the heat, it may be expected that an ITA project is able to withstand the pressure from internal and contextual dynamics that the tension between method and strategy brings along. In that case, an ITA is in principle a very suitable forum to inform political judgment on non-incremental societal change (cf. Loeber 2004, forthcoming).

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[1] With 25% of the overall exports of goods and 15% of the imports, the agricultural sector makes an important contribution to the balance of payments in the Netherlands. After the US and France, the Netherlands is the third largest exporting country of agricultural and food products in the world (Ministry of Agriculture 1995).

[2] In his treatise on pesticide use in the United States, Perkins (1982) convincingly argues that crop protection practice traditionally did not incite governmental action because of dominant liberal notions (each individual would handle his own insect problem). The development of chemical insecticides suited the political philosophy, as they enabled anyone with a pest problem to solve it in a way suited to their own specific circumstances (1982:271). His observations arguably hold true for the Dutch situation as well.

[3] Among them one who, affiliated with the Ministry of Agriculture, had been involved in the drafting of the Multi-Year Plan on Crop Protection.

[4] The Rathenau Institute (then called NOTA) in the 1980s, for instance, had pioneered in elaborating the concept of Constructive Technology Assessment (Daey Ouwens et al. 1987).

[5] The phrases "emic" and "etic" were first coined by the linguist Pike in 1954 (cf. Pike 1967) to express the distinction between a speech act as analysed in the speaker's own internal cultural logic (the emic interpretation; a word derived from the Greek phonemic), and the description or explanation of that speech act in the light of the outsider analyst's logic, that is, the etic interpretation (based on the Greek phonetic). In the 1960s, the emic/etic concept was introduced to the field of social anthropology by the cultural materialist Marvin Harris, and thereupon became applied in various scientific disciplines in widely divergent meanings. In spite of an extensive and authoritative debate on the concept between Pike and Harris, who each hold diametrically opposed views on its conceptualisation (cf. Headland et al. 1990), it is most commonly used, often without reference to its spiritual fathers, to indicate the distinction between an "insider" versus an "outsider" view, as is the case with Guba and Lincoln's use of the concepts.

[6] The phrase 'the long now' is borrowed from The Long Now Foundation that seeks to foster creativity with regard to environmental responsibility in the long run. To that end, it has, among other things, initiated the construction of a 10,000 Year Clock (a 1999 prototype of which has been on public display at the Science Museum in London, England). The clock (which "ticks once a year, bongs once a century, and [of which] the cuckoo comes out every millennium" according to co-founder D. Hillis) is intended to "encourage the long view" and reframe the time-horizon in thought on technology, politics and business: "Ideally, it would do for thinking about time what the photographs of Earth from space have done for thinking about the environment" (http://www.longnow.org/about/about.htm; cf. Brand 2000).

[7] The project's implementers were the Research Centre for the Philosophy, History and Social Aspects of Science of the Free University in Amsterdam (main contractor), the Department of Public Administration at the University of Amsterdam, and the Centre for Agriculture and Environment in Utrecht (sub-contractors).

[8] In total, the Centre for Agriculture and Environment carried out four cases studies, regarding the prevention of diseases, plagues and weeds in arable farming, in vegetable cultivation under glass, in the apple- and pear cultivation and in flower bulb production.

[9] In addition to the Report to Parliament, the findings from the Gideon project were disseminated via a special Newsletter and a press communiqué, and were presented to members of parliament by the Rathenau Institute's project supervisor at a public hearing on request of the Standing Committee on Agriculture.

[10] For a detailed analysis of the debate, see Loeber 2004.

[11] Grin and Van de Graaf (1996b) distinguish between four categories of considerations, on the basis of their epistemological status. Two categories concern the arguments that an actor applies to assess a specific situation, and two categories consist of more generic notions. The latter include value systems and "overarching theories" (1996b:77) and pertain to an actor's professional perspective and outlook on life. These form the normative and empirical background models against which an actor views a situation that he considers problematic, and formulates a definition of that problem and assesses the cause-effect relations that he considers of relevance for understanding the problem.

[12] Indeed, one of the participants remarked in retrospect, "the most endearing ideas were formulated over breakfast, so to speak" (personal communication).

[13] Problem definition on the one hand, and the selection of participants on the other, are closely interwoven aspects of a constructivist inquiry. The question is which comes first, the selection of the topics on which the project will focus, which determines the universe of potential participants, or the selection of stakeholders that are to participate and that themselves set the project's agenda? Grin *et al.* (1997) suggest a pragmatic solution for obviating the chicken-and-egg problem of problem structuring and participant selection. In principle, the authors argue, two paths can be followed: one that begins with a participative *(sic)* closure, and one that begins with a substantive closure (1997:39). In the first case, the TA analyst intends to involve specific actors at any price, in the latter case, the main concern of the TA is determinant for the number and type of actors to be included, restricting participation to a certain extent. The authors add that an interdependence between the selection of actors and of issues also can be observed in spite of active interference by the TA-analyst: "[a] commonly occurring mechanism that easily leads to implicit modification of the [substantive] closure has to do with the availability of the people who want to participate" (1997:39).