Practices for reflexive design: lessons from a Dutch programme on sustainable agriculture

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Abstract: Not coincidentally, deliberative policy analysis has been practiced often in cases that in a very essential sense involve value dissent and major uncertainties: cases of what Beck, Giddens and others have designated 'reflexive modernisation'. Deliberation, under such circumstances, is to support a synthesising kind of judgment across existing differentiations and distinctions, that is a process of judgement in which assumptions, knowledge claims, distinctions, roles and identities, normally taken for granted, must be critically scrutinised. Thus, existing institutions tend to provide inadequate guidance for such 'reflexive design'. In this paper, we shed some light on this challenge by telling and reviewing the story of Programme 348: 'Future Livestock Production Systems' for the reflexive modernisation of Dutch agriculture, following major crises in the country's husbandry sector. Although an institutional arrangement had been created that was rather favourable to reflexive design, the programme encountered significant difficulties, which we argue are rooted in the institutions that have emerged throughout agricultural modernisation over the past century. We then use Wenger's insights on 'communities of practice', as a framework to both understand how established institutions could manifest themselves in P348's reflexive arrangement, and how these difficulties have been dealt with in more or less successful ways. With the insights thus gained, we wish to contribute to the still underdeveloped literature on reflexive design in the trail of recent work by Forester and Fischer.

Keywords: agriculture (agrofood); communities of practice; learning; reflexive modernisation; sustainable development; system innovation.

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1   Introduction

Over the last decade, there has been considerable attention to deliberative (or 'interpretive'; cf. Durning, 1993; Hoppe and Grin, 2000) policy analysis. Deliberative policy analysis (of which we consider deliberative technology assessment as a specific case) is most needed in situations characterised by both factual uncertainty and normative dissent (Gutmann & Thompson, 1996; Hisschemöller and Hoppe, 1996). The idea of deliberative policy analysis is to define both a problem and a solution in a

process of reciprocal, argumentative exchange between the actors involved in the problematic: those who have a stake in it (the stakeholders: those who are co-owners of the problem; and those affected by potential solutions) and those who may be needed for implementing the solution (the co-producers of the solution). It has both a democratic, participatory and a pragmatic, efficacy rationale: it is to support policies that are designed to – legitimately and effectively – resolve the problems experienced by societal actors.

As we have argued elsewhere (Grin and van de Graaf, 1996), the intended outcome should be understood neither as value consensus (which is only rarely possible, and not needed for joint action) nor as a mere 'tit-for-tat' compromise (which is often not sufficient for prolonged joint action). Rather, the outcome of a deliberative policy analysis should be congruency: a course of action that makes sense for each of the actors involved. This should be distinguished from consensus: the idea of congruency is that each actor considers the outcome sensible in terms of his or her own interpretive frame, shaped in the type of professional or social practice(s) the actor is normally engaged in. Stakeholders consider it an 'unproblematic' solution to 'their' problem, while co-producers are motivated for performing their envisaged part in realising the solution. This also involves a crucial element of creativity: a confrontation between stakeholders and co-producers, between knowledge workers and social actors, is used to 'make possible', through innovative strategies, what hitherto had not been conceived as feasible; and to make a technically good idea into a 'socially robust' (Gibbons et al., 1994) one by redesigning it, turning side effects into design criteria.

Not coincidentally, deliberative policy analysis has been practiced often in cases that in a very essential sense involve value dissent and major uncertainties: cases of 'reflexive modernisation' (Beck, 1997; Beck et al., 1997). Such issues concern dealing with the risks that have come with 'simple modernisation'.[1] At least as much as these risks by themselves, a crucial characteristic of risk society is the inability of existing institutions (that have developed through and tend to privilege simple modernisation processes) to deal with them. These authors therefore argue for a 'reflexive modernisation', implying a need to redefine existing functional differentiations between politics, the market and society, as well as within these subsystems. This may include different modes of knowledge production, a redefinition of fundamental societal distinctions such as femininity–masculinity or nature–technology and 'rule altering politics'.

Deliberation (the 'round table model', Beck, 1997) for such *reflexive design* (i.e. the design of strategies for reflexive modernisation) is to support a synthesising kind of judgment *across existing differentiations and distinctions*. Thus, it requires more than the usual involvement of stakeholders and co-producers in design: additionally, such 'discursive will formation [in recursive systems]' (Fox & Miller, 1996, p.91) requires that institutionally embedded assumptions, knowledge claims, distinctions, roles and identities which are normally taken for granted, must now be critically scrutinised. Given that specific institutional arrangements are needed for reflexive design so as to mitigate the problem of 'institutional void' (Hajer, 2003) and considering that such arrangements tend to be influenced by their wider institutional environment (Hoppe & Grin, 2000), reflexive design presents institutional and methodical challenges that deserve much more attention than they have hitherto

gained: apart from some important exceptions – such as Forester's enlightening reflection on practical experiences (Forester, 1999), and Fischer's recent insightful theoretical explorations (Fischer, 2003a,b) – there is little policy analytical literature on the issue.

It is our objective to contribute to further understanding, reflecting on a typical case of reflexive design: a Dutch programme aiming to define new, sustainable livestock systems. In Sections 3 and 4, we will discuss this programme, specifically the degree to which stakeholders and co-producers have been involved and the way in which they have been involved, and the degree to which it entailed transdisciplinary design. Subsequently, we reflect on these experiences, drawing some positive lessons and, especially, considering some of the more important difficulties encountered as rooted in the reflexive nature of the project and indicating how one might do better. We will start, however, with a brief section on the 'simple' modernisation of Dutch agriculture as it has occurred over the past century, and the institutions that have been produced by and given direction to these modernisation processes.

2   The modernisation of Dutch agriculture: orientations and institutions

Modernisation of Dutch agriculture started during the late 19th century's agricultural crisis, when the urgently felt need to improve the country's competitiveness in the primary sector made the sector – hitherto left to the free forces of the market – into an object of governmental policy making. A crucial part of policy making concerned the establishment of a knowledge infrastructure: higher and lower forms of education, as well as a variety of research and development institutes. In the first decades, the efforts undertaken in this fresh knowledge infrastructure focused on enhancing competitiveness through product improvements and land saving.

After World War II, which ended with a traumatic 'Hunger Winter', this knowledge infrastructure – then part of the ministry of agriculture, and covering all levels of agricultural education, extension services, research institutes and experimenting stations – was rapidly extended, eventually comprising some 7000 academic professionals. The pace of modernisation further increased; its objective shifted to ensuring domestic food production for affordable prices (eventually without the product subsidies introduced early after the War) and freeing the labour force for industry. This led to a very rapid pace of rationalisation (Bieleman, 2000). The primary sector's share in the labour force decreased from 19% in 1947 to 5% in 1990, while the amount of capital goods (machines, cattle, buildings) increased by 80%. The high quality of Dutch food specialties on the one hand, and the competitive prices of intensively produced bulk goods on the other hand, have significantly improved the sector's economic potential.

A crucial feature of the knowledge infrastructure that has significantly contributed to the rapid and successful modernisation of Dutch agriculture was the so-called 'OVO (a Dutch acronym for research, information and education)-triad', which generated knowledge and technology through innovative agricultural research and disseminated it to agricultural practice through education at

agricultural schools as well as through information services to farmers. The dominant, mutually recognised, task division of farmers and researchers remained one in which researchers generated knowledge and technology which farmers were supposed to apply. By basing their work on experience with farming (many agricultural researchers come from farmer's families), as well as imposing an understanding of farming as a knowledge-intensive, rationalised enterprise, utilisation of knowledge and technology, guided by the activities of the OVO-triad, occurred relatively smoothly.

Modernisation of Dutch agriculture also led to profound institutional changes in the market. A main focus was on exporting animal produce. Eventually a self sufficiency of 250–300% was reached in meat, eggs and dairy sectors. While the number of animals kept and their individual productivity increased over time, the number of farms dramatically decreased (Bieleman, 2000, p.21). This was accompanied by far going specialisation. Within decades, virtually no 'mixed farms', with both animal and crop production, were left; even stronger, a further specialisation occurred towards farms that only bred or fattened pigs, or kept cows or chickens – the latter two even split into meat production on the one hand and dairy products on the other. In addition, food chains became longer and more complex. Farms increasingly focused on the function of actual animal holding or crop cultivation, other tasks becoming the domain of other players, specialised in (knowledge intensive, advanced) activities feeding into the farm or processing and distributing its products (Bieleman, 2000; Priester, 2000).

Governance was mainly concerned with ensuring a viable primary sector, through stimulating further knowledge and technology development, financial measures, land redistribution to enable concentration and specialisation, improvements in water management to increase the carrying capacity required by increasing cattle density and the use of machinery. Institutionally, policy making was in the hands of an 'iron triangle' of the agricultural ministry, agricultural branch organisations and agricultural specialists in parliament (Bekke & de Vries, 1994; Wisserhof, 2000).

This tightly woven system was, for a long time, widely appreciated for its many successes. Social support started to diminish in the late 1970s, however, when concerns were raised on overproduction, animal welfare and environmental emissions, especially from manure. As Wisserhof (2000) has pointed out, during the 1980s the classical institutional arrangements (the OVO triad and the Iron triangle) were opened up under the pressure of outside actors (non-governmental actors, citizens; their echoes in parliament) and successful attempts by the Ministry of Spatial Planning, Housing and the Environment to achieve a place at the table of agricultural decision making. A decade later, new institutional arrangements started to actually arise, stimulated by these earlier developments as well as by a general tendency towards 'retreat of government'. One of these arrangements was Programme 348, '*Future Livestock Production Systems*', which we will now discuss in more detail.

3   Early proceedings of Programme 348: 'Future Livestock Production Systems'

Programme 348 was launched as one of the policy responses to the classical swine fever (CSF) epidemic that swept the country between February and September 1997. While the manure problem and animal welfare concerns (e.g. chicken housing) had already attained themselves a firm place on the public and political agendas, the CSF crisis made the Ministry of Agriculture, Nature Management and Fisheries conclude[2] that existing modes of animal keeping were no longer satisfactory given their consequences on animal welfare, the emissions and the resources which were needed. This gave rise to a combination of 'cold', regulatory policies, aiming at reducing pig farming; generating market-conform policies, so as to make the sector solve its own problems; and future-oriented programmes like P348, which started in 1998. Over its lifetime, subsequent crises have occurred: the BSE outbreak (peaking in the Netherlands in 2000, following a peak in 1996 in the UK); foot and mouth disease (2001); and the MPA affair touching the pig and calf sectors in 2002. These further fuelled the idea that fundamental change was necessary. Thus P348 soon got to be considered – both by its leadership and by the 'steering group' formed by government – as a programme for system innovation, i.e. as a programme for reflexive modernisation.

The programme was commissioned by the Ministry to DLO, a consortium of agricultural research institutes. DLO originally was the acronym of Direction of Agricultural Research (later Service for Agricultural Research), reflecting its nature as a governmental branch. Privatisation of DLO during the late 1990s[3] (Van Dorst et al., 1999) had required a switch from lump-sum funding to a more demand and market oriented, programme-based research strategy. In important respects, the organisation was still in the process of making that transition when P348 took off.

While the Ministry granted P348 to DLO, it was made very clear that it was intended to be *an intensive, trans-disciplinary cooperation* between the several DLO institutes and several other institutes, representing different animal sciences disciplines as well as, for example, agro-economics. In the context of profound institutional transformation and associate competitiveness, this was obviously a complex challenge. At the same time and dialectically, the programme was seen as a spearhead in this process of institutional transition.

In addition, there was the substantive requirement to design 'something completely different', with a knowledge intensive character, meeting changing societal demands and appropriate for agricultural practice. In order to reach more focus, the intended programme leader, a senior researcher from ID-DLO (now part of Animal Sciences Group of Wageningen UR), experienced in management and innovative projects, together with two representatives of two other DLO institutes (this later grew into the so-called Core Programme Team), on the basis of informal talks with the Ministry and others, drafted a programme proposal. They argued that so many interests were at stake that it was crucial to have a range of stakeholders (like animal rights organisations and environmental groups as well as co-producers (meat processors, cattle feeding producers, retailers, etc.) actively involved in the programme as co-designers of future livestock systems. Thus, the choice was made for *a deliberative method.* It is important to note here that, not unjustifiably, farmers were considered not only as co-producers but also as stakeholders: originally mainly

'causers' of the problem, they were rapidly becoming potential victims, facing vigorous policy and societal demands and simultaneously having little individual leverage vis-à-vis other, more powerful elements of the economic chain.

Recognising that such radically innovative, deliberative and transdisciplinary research was not standard routine within the DLO organisation, several non-standard rules were laid down in the programme proposal. The institutional arrangement thus created included (Spoelstra, 2003; Van der Peet, 2002):

- the choice to identify and integrate views from consumers, citizens, and social organisations, on such issues as food security, animal welfare, and environmental aspects, with each other as well as with views of farmers and market parties concerning economical aspects

- a commitment to the composition of interdisciplinary project teams

- a commitment of the programme to system innovation

- a commitment to the principle that 'programme interest would be considered above institutes' interests'

- a choice for the Sustainable Technology Development method (STD, cf. Weaver et al., 2000; Green & Vergragt, 2001; Partidario, 2002) – central to that method was the collective, deliberative development and realisation of future visions to guide 'processes of technological, cultural and structural change'

- a division of the budget between ongoing projects within the institutes and overarching projects; the idea to develop visions during the first two years and to later elaborate them into specific projects.

A steering committee, composed by the Ministry, reviewed this proposal. Interestingly, it more or less corrected for the earlier emphasis on technical knowledge and produced proposals to involve a wider set of institutes, which were subsequently invited.

Following these decisions, it became clear both how unusual this approach was for the programme team, and how strong the latter's commitment was. After a period in which the Core Programme Team made the turn from just 'getting together and talking' to mutually learning: the entire P348 team was trained to use the STD method, further elaborated with the method of interactive technology assessment (Grin & van de Graaf, 1996; Grin et al., 1997; cf. Grin, 2000) for its use on visions, as in the STD method). The methodical course, focusing on such things as the distinction between stakeholders and co-producers and interview techniques for reconstructing their interpretive frames, helped to create a basis for two major results: a so-called stakeholder database with some 400 entries, providing data on stakeholder views and contexts; and a well illustrated report (Ketelaar-de Lauwere, 2000) with several broad visions for future livestock systems in the Netherlands.

Reception of the report appeared to be mixed. Policy makers, people experienced in STD projects and strategically inclined stakeholders praised the report for its innovativeness and the degree to which it had been written in close cooperation with stakeholders. The use of graphical material contributed to understanding by a broad

range of actors, and stimulated active participation, commitment and enthusiasm both during production of the report and afterwards. Within the DLO organisation, on the other hand, it was less appreciated, since it was not recognised as a 'scientific' report (Spoelstra, 2003). This lack of appreciation of some of their peers and the relation between this product and formal productivity requirements within DLO has undoubtedly put additional pressure on some programme team members.

The Core Programme Team then realised that it was urgently necessary to translate the very broad visions of stage 1 into much more specific visions for specific contexts and, subsequently, in projects. Another unusual rule was formulated: the requirement to formulate project proposals together with stakeholders, one of which ('the leading stakeholder') was even supposed to be the prime applicant. Also, the methodical course was continued, now emphasising themes like methods to deliberatively elaborate visions; the deliberative design of strategies to implement them; and the implications of reflexivity.

In spite of these efforts, relatively traditional proposals were formulated initially, focusing on *disciplinary analysis* or *incremental improvement* of isolated *elements* of livestock systems rather than on *trans-disciplinary, reflexive system design*. According to the programme leader, this can largely be attributed to the difficulties which farmers, societal organisations and researchers appeared to have in understanding and fulfilling their new roles (Spoelstra, 2003). On instigation of the steering committee, and through some quickly organised course sessions, several bunches of projects were integrated into more encompassing projects for system innovation. Most of these got approval from the steering committee, and of these, nearly all can indeed justifiably be identified as projects aiming at reflexive design of new livestock systems.

4 Final stage of the programme: reflexive design in progress

As of January 2001, these projects actually got started. The focus of activities shifted to the project level and the role of the Core Programme Team became much more indirect. In order to still ensure that programme objectives (work on system innovation, deliberatively and trans-disciplinarily) would be achieved, several rules were agreed upon and imposed on the project teams, including:

- a project team consists of at least a leading stakeholder, a DLO-project leader and a process adviser

- implementation is to be done by teams that involve and transcend several institutes

- budget is allocated for periods of six months, on the basis of a list of agreed objectives and activities

- projects are to demonstrably contribute to the overall programme

- project teams provide information for maintaining the website, thus also facilitating project monitoring and mutual exchange.

In joint programme sessions, difficulties and ways to deal with them were exchanged between members of the various project teams; and some of the meetings were set up as course sessions. Advice was provided from the start onwards by a process adviser experienced in group dynamics. Also, from early 2002 onwards, project advisers with a methodical background were involved. In the following, we will briefly describe how these projects proceeded, to what degree they succeeded and what difficulties they encountered, in spite of all provisions taken.

Of the eight projects included in P348 we will discuss four, which together account for the most interesting lessons. Our discussion of the first three projects (reported more extensively in Felix et al., 2003) is based on triangulation between data from various sources: documents produced in the course of the projects; written ex-post reviews by project leaders; ex-post reviews by the programme leader and the secretary of the steering group (Spoelstra, 2003) and observations by the process advisers (Bos and Felix; as well as Bob ten Hoope, who was interviewed). Project leaders were given the opportunity to comment upon preliminary versions. A similar procedure was followed concerning the fourth project, *Hercules*, which was co-funded since 1999 from P348, but had started in 1998 as part of another policy programme ('EconomyEcologyTechnology', EET), from outside the agricultural realm. This evaluation was reported internally (Bos, 2003) and analysed at more length in Bos & Grin (2003). The objectives of these projects have been listed in Table 1; Table 2 summarises the parties involved in these projects: stakeholders, project leaders and knowledge workers.

Table 1   Objective of the projects

Project	*Objective*
Zoö-centric design	Design of a production system that departs from animal welfare aspects, and to test and adapt the design from the perspective of other criteria.
Sustainable poultry meat production	Design of a long-term vision for integrating traditional and biological chains, as well as specific projects to work toward that vision.
Family housing in an organic pig raising	Design of a biological animal housing facilities and a biological chain for pig keeping.
Hercules: innovative stable concepts	Develop and test a new concept for pig housing and the production of organic fertilisers.

Table 2 Main contributing organisations with their role in the project

Project	(Leading) stakeholder(s)	Project leader	Project adviser	Main knowledge workers
Zoö-centric design	Animal Protection Association (Dierenbescherming)	Animal Sciences Group Lelystad	Wageningen University	Institute of Agricultural and Environmental Engineering (IMAG) ASG Lelystad
Sustainable poultry meat production	None	ASG Lelystad	Wageningen University (until 1/2/2002) University of Amsterdam (1/2/2002–1/3/2003)	IMAG ASG Lelystad Agricultural Economics Research Institute (LEI)
Family housing in an organic pig raising	Nutreco (only from January 2001 until April 2002)	IMAG	Wageningen University	IMAG ASG Lelystad LEI Agrotechnological Research Institute (ATO)
Hercules: innovative stable concepts	DSM Nuon Hendrik UTD Fancom Janssen-Kessel Farmtec	IMAG	None	IMAG Wageningen University Applied Research Division of the Animal Sciences Group

4.1   Project 1: 'Zoö-centric design'

The objective of this project was to design a production system that – contrary to normal practice – departs from a sincere consideration of animal welfare aspects; and to subsequently test and adapt the design from the perspective of other criteria, including ecological concerns, economics and food safety. The leading stakeholder was the largest national animal protection association (*Dierenbescherming*), who indeed engaged enthusiastically and very actively in the project. Other stakeholders were much less active. The very active role of the *Dierenbescherming* was one reason. Another was a certain discomfort with the unusual role they were supposed to play. As the project leader recalls:

> "During a workshop, the chairman and the project team strongly emphasised that stakeholders would be 'at the wheel'. This was not well received. During bilateral feedback later on, precisely this appeared to be an 'irritation factor'. People simply did not believe it; and those who did believed it would not work: 'researchers are not like that'."

A third factor was that some of the visions discussed had an alienating effect. In the words of the project facilitator:

> "It was just too far from participants' life. Twenty years ahead is beyond what they can conceive of."

Much attention was paid to specific arrangements to stimulate trans-disciplinary cooperation: interactions were planned on all levels (individual, projects, groups), it was agreed that research work would be interdisciplinary in nature and it was symbolically decided not to make *a priori* budget divisions. Yet, reality appeared harder than anticipated. It was difficult to get sufficient interested knowledge workers from the institutes; those that were allocated to the project were not used to cooperating with colleagues from other disciplines and stakeholders. The latter problem was, moreover, reinforced by culture differences between institutes, especially between an agro-economical institute and the two animal science institutes, but also between the latter.

While these difficulties were handled adequately by a the process adviser experienced in group dynamics, transaction costs – that of course were only a derivative of the deeper causes mentioned – were eventually considered to be so high that the project leadership decided upon outsourcing. Thus much of the work got done 'back-office', and thus the research work became strongly separated along traditional disciplinary divisions. Finally, knowledge workers appeared to be inclined to analytical work rather than design. According to the programme leader, they had 'invested much time in interdisciplinary work; they had not succeeded because the population of researchers was too uniform'.

All these factors together led to a shift of emphasis from integral, reflexive design to analysis of separate aspects that corresponded with traditional disciplines. More precisely, particularly due to the difference in involvement between *Dierenbescherming* and other stakeholders, much of the work focused on animal welfare. On this issue much new and authoritative knowledge has been generated, and *Dierenbescherming* felt content with its thus increased ability to have a more solid input in policy debates in this knowledge-intensive sector to which it traditionally did not belong. In addition, it has been found that there is a serious lack of scientific knowledge on the health consequences of natural behaviour.

Furthermore, the relations between animal welfare aspects and other criteria have been analysed and described. Finally, a conceptual model has been developed so as to guide breeding towards animal welfare, and it has been indicated what knowledge would be needed to operationalise that model. The latter especially was interesting, since it became clear that these knowledge needs could not be fulfilled on the basis of the knowledge stock that had been developed as part of the intensive agriculture regime. Thus, an element of reflexive knowledge generation resulted, driven by the reflexive problem definition taken in the project (departing from

animal welfare), and fed by the strong involvement of the *Dierenbescherming* and by knowledge workers' inclination to analytical tasks.

In sum, results were diverse. In terms of deliberation, it must be noted that there was little balance between the various interests due to the strong involvement of one stakeholder, which both created a strong drive towards that stakeholders' favourite aspect and had a negative impact on the engagement of other stakeholders. In terms of reflexivity, a fully-fledged reflexive design did not result, as a consequence of the ways in which the just mentioned role of the leading stakeholder and the difficulties encountered in trans-disciplinary cooperation reinforced each other into a movement to a more mono-disciplinary, analytical undertaking. On the other hand, a sincere basis for reflexive design was laid through the elaboration of knowledge needs for tuning breeding to animal welfare and the exploration of the relations between animal welfare aspects and other design criteria.

4.2 Project 2: sustainable poultry meat productions

The Sustainable Poultry Meat Production Project started late 2000 and was intended to help resolve a variety of problems that had been facing the sector for some time: animal welfare concerns, the sector's problematic image amongst consumers, food safety in relation with bacterial contaminations (Salmonella and Campylobacter), emissions (especially through manure), as well as dissatisfaction with the meat structure and taste of intensively produced poultry. The idea was to resolve the problems through designing a long-term vision for integrating traditional and biological chains, as well as specific projects to work toward that vision[4] (Oude Elferink and van der Hulst-van Arkel, 2001).

The project started with interviews with stakeholders and, especially, co-producers, so as to make an inventory of their visions and their ideas on how to realise them. Of some 35 invited stakeholders, nearly half showed up at a workshop in May, 2001. They expressed interest for continued involvement; and indeed most of them continued to play a role. The problematic side of the coin was that, while a significant number of farmers was involved, banks, retailers and – especially – societal organisations appeared underrepresented (Van der Klis et al., 2003).

A second, and tougher, obstacle for truly reflexive design was implied by the initial lack of enthusiasm amongst participants in drafting long term visions. A first reason was the relatively small sense of urgency for long term, systemic change amongst farmers and other inside players. Second, due to the under-representation of problem-owning stakeholders, this was hardly counterbalanced by other participants. Third, many primary producers were rather convinced that existing power relations hardly enabled them freedom of choice. They were concerned that even considering, for instance, a particular number of animals per square meter; as one of them noted: 'If you would set some target for 2040, then government will prescribe it for 2020!'

Also, they knew that they were largely dependent on earlier links in the economic chain (50% of the costs concerning feeding) as well as on later links, to whom they had very tight contractual obligations. In the words of another poultry farmer: "We must get a fairer prize! We are rather creative, and therefore we are still surviving ... We have no say whatsoever. Labour and risks are for us, but we have no say over the prize."

These power factors affected their contribution in several, mutually reinforcing ways: it made them focus on short-term problems rather than long-term visions; awareness of their limitations made them less creative; and it made them raise difficulties against any long-term solution, rather than the other way around. Consequent difficulties in designing long-term visions were reinforced by hesitations on the side of knowledge workers. Many of them felt insecure in such 'vague' exercises in which they could hardly rely on existing knowledge and design routines; also, they feared lack of appreciation from superiors and other peers. The process facilitator recalls that "they even feared to lose his credibility within 'the sector'."

In spite of these initial difficulties, the project team – urged by the steering committee, which had rejected intermediate plans as insufficiently visionary – eventually managed to produce long-term visions (Van der Klis et al., 2003) by taking a variety of measures. While the process adviser managed to reduce difficulties in trans-disciplinary cooperation through advice on the interpersonal level, a more important reassurance came later, when some innovative farmers, with a clear stake in far going innovation, got involved. Thus, although the two large sub-projects undertaken in the final year of the project were relatively mono-disciplinary and analytically oriented (an ecological analysis by an animal science group; and a market-economic analysis by the economic institute), discussing (intermediate) results between colleagues led to mutual learning and understanding, and even to some trans-disciplinary synthesis. In addition, the project team yielded farmers and other co-producers ample opportunities for discussing short-term difficulties and their roots in existing relations (repeatedly resisting pressure from the ministerial steering committee. Second, taking these concerns into account, the knowledge workers drafted visions which they felt held the promise of overcoming the problems implied by existing relations. The main limitation was that, after all discussions on short-term problems, time did not permit to test extensively to what extent the vision made sense in the eyes of stakeholders of different backgrounds.

4.3   Project 3: family housing in a organic pig raising

In order to deal with animal welfare and health concerns, to fit farms better into the landscape and to reduce emissions due to manure and transportation, this project aimed to design biological animal housing facilities and a so-called 'short' chain (many functions on-farm) for biological pig keeping. Other objectives were to collect, develop and integrate knowledge, and to bring about interactions between a variety of stakeholders (Donkers, 2001). The project team comprised several co-producers, including Nutreco, who initially was the leading stakeholder.

The project started with a workshop where farmers, knowledge workers and Nutreco constructively discussed opportunities for the project to contribute to a sustainable pig farming chain. Much less attention was devoted to short-term problems than in the poultry project, the main exception being a discussion – induced by the project team rather than participating stakeholders – on dealing with prize competition. After this first workshop, Nutreco stopped being the *primus inter pares* among the involved actors, since others appeared less interested in answering the specific research question Nutreco had been interested in experimental data rather than desk studies (Aarnink, 2001). Subsequently, the project focused on the design of

long term visions. Several workshops and creativity sessions were held, and in addition farmers were consulted during visits at their homes on the ideas drafted by the knowledge workers. The project team succeeded in creating significant commitment amongst farmers for actively contributing to that effort, and these farmers appeared to have clear ideas on the long term. 'Pig farmers from [the provinces of] Limburg and Overijssel showed strikingly many parallels. They have then taken leadership in the project'.

Behind both the relative neglect of short term problems and the interest in long-term visions was the *a priori* interest these stakeholders appeared to have in long-term change. Undoubtedly, this was due to the pressure that had 'plagued' the sector since the 1980s (manure), and which had been boosted by the 1997 CSF epidemic. Also, commitment to visions was promoted by the fact that the designs were tailor-made for the specific regions of participating stakeholders.

Trans-disciplinary cooperation was significantly promoted by the so-called innovative design method, chosen and consistently applied by the project team. This method combines methodical design with initiating system innovation through identifying needs, drafting a programme of requirements and, finally, formulating scenarios (Donkers, 2001). It enabled the team to identify and deal with new knowledge needs, on new ways of measuring emissions and on new markets, as well as the need to develop paradigmatically new knowledge on animal health. In both respects, it is fair to say that the project contributed to reflexive design. However, scientific interest among participants of the project and division of the project in two separated parts (pigs housing systems and pig chains) limited the degree to which an actual design resulted.

4.4 Project 4: Hercules: innovative pig housing concepts

The Hercules project was intended to develop and test a new concept for pig housing and the production of organic fertilisers (Ogink et al., 2001). The project aspired to solve a range of problems with pig farming, by seeking a narrow integration of functions within the housing system. These problems included energy use, emissions of ammonia and odorous gases to the environment, the costs of getting rid of the manure, and animal welfare concerns (climate, grated floors, lack of straw etc.).

The idea was that urine and faeces, unlike the case in traditional sewerage systems, would be processed separately so as to yield high quality, specific fertilisers. This was to be achieved through convex-shaped manure belts, running under the grated part of the floor. Subsequently, drying the urine by using the warmth produced by the pigs, and composting the manure would result in two attractive organic fertiliser products for agriculture. Additionally, and also unlike traditional sewerage systems, the manure belts could transport the manure out of the pig house, even when it contained lots of straw. Straw is – at least by the general public – seen as a positive contribution to animal welfare.

From its start in 1998 as part of the EET programme, the project was a combined effort of six firms, ranging from manufacturers of pig-house components to a chemical multinational, and three different agricultural research institutes, oriented to both fundamental (IMAG and Wageningen University) and applied research (PV Lelystad and Praktijkcentrum Sterksel), with knowledge workers from various

disciplines. Two years later (in 2000), the project acquired additional funding from P348, which introduced the requirement to involve farmers and adopt a deliberative method.

The project has been successful in creating commitment from the participating co-producers, especially since market introduction was strongly emphasised during its final stages. Yet, the degree of reflexivity was severely reduced by the decision to drop the manure belts and, related to this, the extensive use of straw. A variety of reasons played a role here (Bos and Grin, 2003). Firstly, such an integral system was alien to the market: farmers were used to constructing pig houses on a component-by-component basis, obtaining components from specialised firms only providing that particular component. Secondly, the belts appeared a major cost-driver, partly because the cost-effectiveness of both the components of the system and its products were not considered integrally, while it was its integral character which made up for Hercules' attractiveness, socially and financially. The added cost increase of €0.05 per kilogram of produced meat was considered prohibitively high, especially since, thirdly, it appeared hard to sell lucratively the envisaged fertiliser specialities, which were new and demanded some changes in crop breeding practices – this difficulty discovered too late wage attempts to actively create market opportunities. Fourthly there were doubts concerning the scientific evidence on straw's benefits for animal welfare, combined with concerns on its implications for labour conditions. Finally, several smaller problems arose, including concerns about pathogen transport by the belts and supply problems. Therefore, the belts were dropped eventually. What remained was a highly innovative project, perfectly fitting in EET objectives, but much less reflexive than it had been conceived originally.

5   Lessons on reflexive design

Maybe the single most important message from our case study is that creating an appropriate institutional arrangement is a necessary but *not* sufficient condition for reflexive design; and that in reflexive design, the art of dealing with those circumstances that cannot be adequately pre-empted by such rules is crucial. As discussed in Section 3, rules had been defined early in the programme so as to promote stakeholder involvement, trans-disciplinary/trans-institute cooperation and reflexivity. By and large, these rules have also been enforced, when necessary, during the programme; and awareness of their rationale as well understanding how to deal with them were promoted, among other things through the methodical course and the process guidance offered.

This has led to important achievements. For instance, both in the zoö-centric design and the family housing projects, the awareness that trans-disciplinary cooperation was quintessential to success was recognised, and a lot of effort was invested in promoting and facilitating it, and in dealing with the difficulties encountered. In these projects, researchers also deliberately sought knowledge of different types, realising that current knowledge stocks had co-evolved with existing practices of intensive husbandry. Furthermore, a large number of farmers and social organisations has been interviewed during the initial stages of the programme. Also, although the representation of the various stakeholders and co-producers may have

been imbalanced in some respects, especially in the zoö-centric design, the poultry and family housing project – and, in its later stages, the Hercules project – made serious efforts to involve stakeholders and to actively use their insights and desires in the design process. These efforts have positively affected the proceedings and the outcomes of the programme as a reflexive design effort. Yet, stakeholder involvement, trans-disciplinarity and reflexivity have been continuously challenged, with mixed impacts on the proceedings and results of the programme. In the remainder of this section we will categorise these difficulties and provide a deeper understanding; so as to eventually be able to provide some suggestions on how they might be dealt with better.

5.1 'Challenging factors' and their institutional roots

The difficulties encountered can be categorised as a variety of, often mutually reinforcing, factors. First, as we have seen both during the initial stage of P348 and in the projects on zoö-centric design and poultry chains, among both stakeholders and researchers there was discomfort with the roles they were supposed to play. The rules set reflected the realisation that it would be crucial that farmers would act and be accepted as co-producers of knowledge and technology, both to benefit from their creativity and inventiveness and to base research and development on a renewed understanding of agricultural practice. Yet, the associated new roles were at odds with the identities these actors had assumed throughout the era of agricultural modernisation. While innovations from farmers have sometimes played a significant role, especially in the last 25 years, this found its institutional recognition only in niches of the system (Bieleman, 2000; Priester, 2000). The OVO triad metaphorically emphasised and reified the other model: researchers providing new knowledge and technologies, and agricultural practitioners adopting them. This could be a relatively successful innovation strategy due to a cultural homogeneity; for instance, researchers typically came from rural areas, if not farming families, a background which helped them – mostly in a rather implicit way – to tune their work to the realities of agricultural practice.

Secondly, and closely related, in all projects many knowledge workers, rather than the trans-disciplinary, design-oriented attitude necessary for reflexive design, exhibited a strong inclination towards their home disciplines. They anticipated that they would be assessed – in a situation of resource competition and organisational shrinking – in terms of articles published in professional journals and contribution to the budget of the home group. Journals – especially the more prestigious ones – tend to be strongly disciplinarily oriented; and from them, the ones that had become most favoured in the DLO organisation were rather analytically oriented. The fact that the products of the initial stage of P348 met such an unfavourable balance between criticism and appreciation within the DLO organisation was typical; it both fed these anticipations in later stages and indicates that their fear that they might be punished rather than rewarded for their innovative efforts is not entirely implausible. This cultural characteristic of the DLO organisation, combined with the fact that research and development had, until recently, been shaped by a myth of an ongoing modernisation process, is shared by knowledge workers, policy makers and primary producers alike (Van der Ploeg, 1999, Chapter 6). Given that disciplines and

subdisciplines had shaped themselves around that myth, design issues more or less took the form of disciplinary analysis – until this myth was to be replaced by a development towards sustainable development.

Thirdly, the disciplinary differentiations between institutes, in spite of the rules set in P348, still played a role in the projects. In the zoö-centric design project, the eventual decision to reduce transaction costs through back-office work reintroduced these differentiations; in the end in the poultry-project individual sub-projects were defined along disciplinary lines.

Fourthly, we have seen how stakeholders and co-producers anticipated constraints they would face whenever the project outcome would 'land' in the real world, shaped by the existing regime of modernised agriculture. In the poultry project, farmers felt limited by EC legislation, tailored to intensive rather than sustainable production; and by their dependence on market parties in the highly specialised, differentiated chain that had emerged throughout post-war modernisation. The latter also played a crucial role in the Hercules project, where a €0.05 increase in the costs per kilogram of meat was considered virtually prohibitive. It is important to note here this does *not* reflect a 'hard' law of economics: many consumers now – other than in the years following World War II – appear prepared to pay for specialties, prepared meals and products for 'new' food habits (Van Otterloo, 2000). Rather, the problem with the modest cost increase must be attributed to the increased dependency of farmers on especially downstream players in the chain: the 'logic' of the market – often reified in, for instance, contract relations between primary producers and later players – that cost increases of primary products are treated in a multiplicative way rather than additively.

Also, more subtly, as we have argued more extensively elsewhere (Bos and Grin, 2003) the Hercules project was bothered with anticipations of the responses of the outside world. For instance, the problems surrounding market introduction of the manure specialities produced were partly attributable to the functional differentiations between animal and plant production – both in the market and the knowledge infrastructure – which had emerged throughout post-war modernisation.

Fifthly, we have seen several instances of how the still controversial nature of the issue area interfered with P348s proceedings. In the poultry project, farmers feared that any preparedness on their side for a design that would be more far going than existing policies might lead to stricter policy norms. Similarly, the emphasis of the *Dierenbescherming* in the zoö-centric design project, on providing a scientific basis for animal welfare aspects of animal keeping, can partly be explained because of that organisation's keen interest in using science to 'authoritatively' underpin its position in societal and political debates on the issue. A final example is the researcher in the poultry project who feared to loose his credibility within 'the sector' through engaging in the design of a sustainable system – notably not in his role as provider of sound knowledge, but as a 'reflexive designer'.

5.2   *The challenge of reflexive design: recognising and managing different modes of belonging*

While the latter factor may be seen as largely a matter of political opportunity, the first four 'challenging factors' have deeper roots. They are typical expressions of the

existing regime, which privileges existing practices. One might say that Hajer's (2003) metaphor of institutional void is, under the circumstances, even too optimistic. While visions may be seen as a means to provide orientation to collective actions which cannot be guided by existing institutions – Dierkes et al. (1996) designate visions as the 'functional equivalent' of institutions under such circumstances – we have seen that the very construction of such visions in the well-designed institutional arrangement was not embedded in an institutional *void*, but, worse than that, was hampered by its embedment in the institutions that form the current regime.

It is easy to recognise here the sort of mechanisms Frank Fischer (2003b) has recently asked attention about. Drawing on postmodern writers like Foucault (1984) and Bourdieu (1997), who have written about the 'spaces' (institutional arrangements) for practices in which identities, social relations and rules are being contested and transformed, argues that "traces of previous interactions are so much ingrained [in such spaces] [that] no newly created space can be entirely cleared of those assumptions and meanings. Nor can spaces be emptied from expectations and experiences, or traces of social relations in other spaces." This leads Fischer both to proposing more research on the question how such spaces are 'occupied, negotiated, subverted or mediated' in processes of 'intersubjective dynamics'; and to asking what may help, meanwhile, to deal better with these dynamics through adequate facilitation of reflexive projects. We believe that the preceding analysis contributes some insights to the former; and that we may add some insights to Fischer's on the latter, not only in the form of some lessons from P348 on facilitation, but also concerning *the conditions under which* such facilitation may have some success.

Etienne Wenger's (1998) work appears to offer a fruitful perspective for the latter. He discusses learning as a process of transforming meanings and identities in 'communities of practice', and conceptualises learning as anchored in different 'modes of belonging'. First, *engagement* in a 'community of practice' offers opportunities for negotiation of meaning and the design and implementation of strategies. Engagement is necessarily bounded in time and space. These boundaries may be overcome through a second mode of belonging, *imagination*, the transcendence of time and space through creating new images of the world and ourselves. It is a way to recast the present. Finally, *alignment* is the bridging of time and space through connecting engagement in a community of practice to enterprises elsewhere. Alignment may be helpful because it brings a particular engagement in line with the practices it seeks to influence. Learning occurs especially where there are tensions between different modes of belonging.

More precisely, in Wenger's account, engagement in the community of practice provides the appropriate context for action, which remains close to standard routines. Learning largely results from the tension between the limits of that context on the one hand, and the transcendental opportunities implied by imagination and alignment on the other: wisdom results from the periphery of communities of practice. In P348, however, the engagement in which project teams are supposed to be engaged in are non-standard, even reflexive, in nature. Thus, while the institutional arrangement created for the project may favour such reflexivity, the practices they seek to align with, as well as the actors engaged in the project, may tend to rely more on existing practices and thus challenge reflexivity. Let us now see

how facilitation in these projects did and did not manage to deal with these difficulties, and what conditions for success were at work.

In the *zoö-centric design* project the impact of traditional disciplinary, analytic inclinations could be mitigated because of significant stakeholder involvement and a very strong awareness of the need to overcome, through adequate process management, structurally and culturally embedded disciplinary boundaries. Even after the project turned to more emphasis on back-office work, sufficient trans-border exchange was organised sufficiently well to yield a reasonably reflexive outcome. Thus, the project suggests that a combination of method and determined process management can help to overcome these difficulties. The fact that, however, the project yielded analysis rather than design, can be attributed to the modernist inclination of knowledge workers to analytical work, together with the equally modernist inclination of the leading stakeholder to increase the legitimacy of its position by obtaining authoritative knowledge. Both inclinations have been at least reinforced through anticipatory alignment with cultural and structural features in knowledge infrastructure and the governance system, respectively.

The *poultry project* is an example where imagination contributed to reflexive design. Given the limited sense of urgency in the sector, conditions were less favourable to imagination. Yet, in the course of the project, project leadership managed to have visions constructed through skilfully relating farmers' own short-term concerns to structural features of the existing regime. Imagination beyond existing practices was promoted through alignment with innovation-oriented farmers later in the project, stimulating identity transformation among researchers driven by loyalty to primary producers. Also crucial was the insight gained in the relation between the reflexive project and existing institutions: on that basis, project leaders could help participants to "organise their struggles, helping them to understand the situation and develop alternative strategies" (Fischer, 2003b, p.25). In other words, this entails casting policy analysis 'in the framework of a larger social critique, an epistemological step that links it to critical theory and an 'emancipatory interest'' (Fischer, 2003a, p.215). The ways in which project leadership managed to achieve this in these projects reminds us of Forester's (1999) discussion of his cases in terms of Hoch's notion of politically informed pragmatism: opportunities for deliberation are to be created and expanded through a dual view (understand both substance and relations between actors) combined with an active and deliberate use of interdependencies between actors so as to 'sell' the dual view to them.

The *family housing* project showed a significant degree of imagination: it produced visions well beyond the existing regime. Such imagination could not have occurred without the future oriented inclination of participants, fuelled by the earlier CSF crisis – factors that could do their work because project leadership, like that of the poultry project, carefully exploited these feelings as well as incorporated other interests of the participants in their visions. In addition, like in the zoö-centric design project, consistent use of an adequate method (the 'innovative design' method) played a significant role so as to mitigate alignment with disciplinary boundaries through frequent, iteratively organised, interaction between various disciplinary representatives, often 'pulled' by the wish to satisfy stakeholder needs. This was reinforced by a strong awareness of the need to transform identities, similar to what we have seen in the zoö-centric design project. Together these factors contributed to

the fact that long-term visions and regional projects were defined. Yet, here too (anticipatory) alignment of knowledge workers and farmers with disciplinary boundaries and task specialisation in the market, respectively, presented difficulties.

Concerning the latter, the *Hercules* project was most interesting as it very explicitly proposed a design beyond such boundaries. In the early stages of the Hercules project, imagination played a major role: the intellectually fascinating and professionally challenging nature of the idea helped to successfully mobilise pre-existing identities to its – reflexive – advantage, alignment with established practices turned the table in later stages. Unfortunately, in the later stages, precisely these features appeared to demand too much detachment from existing practices in primary animal and crop production, housing construction, and knowledge generation appeared to present insurmountable problems: alignment with these practices, expressing itself both as the difficulty to recognise and deal with some implementation problems and as anticipations of others.

In conclusion, we have seen that engagement in reflexive design was served well by the institutional arrangement created around P348 and also, under certain circumstances, promoted by methods that stressed trans-disciplinary cooperation as well as imagination through the construction of visions. It was also hampered by the fact that knowledge workers, as well as other participants, brought in established identities and tended to align with existing practices. We have seen how anticipation by knowledge workers of negative responses by 'significant others' provides a case in point. Such alignment, as we have seen, could be accommodated through appropriate methods; it could, however, not be pre-empted, especially because it was brought in by participants who know the real world all too well. Similarly, alignment through anticipations of power relations (the poultry project) and institutional differentiations (Hercules) is hard to pre-empt. Imagination may help to make these issues discursive; but the degree of success seems to be co-determined by the degree to which this vision can be constructively related to the problems of the real world (cp. poultry *vs.* Hercules), which participants know the project – and they themselves – will eventually have to face.

6   Concluding reflections

This contribution was undertaken so as to obtain more empirical insight into reflexive design and its challenges. We have concluded that, even though the institutional arrangement created in P348 was relatively well designed for reflexivity, the effort of reflexive design was significantly hampered by the ways in which established institutions managed to enter the project. Both the ways in which this occurred and the – more or less successful – ways in which these influences were dealt with have been clarified from the perspective of Wenger's framework.

The latter analysis implied that while we believe that our analysis has yielded important lessons for 'facilitating' reflexive design, it has also suggested that its success may critically depend on a favourable environment, i.e. an environment which exhibits responsiveness to problems that result from existing practices, and/or offers sufficient and adequate alternative practices to align with. For instance, *market parties* do well to use their entrepreneurship to extend the notion of 'corporate social

responsibility' well beyond adaptations of individual behaviour, towards realising new market constellations and 'economic laws'. *Knowledge institutes* in which the programme took place may consider creating different standards of accomplishment alongside, or instead of, the current ones which are tailored to disciplinary, analytic work; or to create alternative career paths. Also, it may feed the knowledge needs of reflexive design projects back into fundamental research, thus not only improving the knowledge base, but also creating new opportunities for alignment with significant others. *Government* could, much better than it usually does, combine determination to promote reflexive change with responsiveness to legitimate concerns about existing power relations and other institutionally embedded difficulties that it may help to resolve. Also, it could strategically connect practices for reflexive design with each other as well as with structural trends that may contribute to it.

To be sure, turning these apparently simple recommendations into practical viable guidelines implies a programme which uses the sort of empirical insight presented here and builds on, but also needs to go beyond, several existing bodies of literature. While we can hardly begin to outline such a programme here, let us finish our discussion by indicating some directions for further study.

Concerning governance institutions, March and Olsen's (1995, pp.49–90, 183–240) discussions of the development of political identities and of political adaptiveness needs to be elaborated beyond a theory of the political–administrative system and its relation with citizens and civil society, into a theory that also includes 'sub-politics' and its institutions (Beck, 1997). An elaboration of Smits and Kuhlmann's (2002) notion of system instruments from an explicitly transformative viewpoint may offer interesting points of departure.

Similarly, there are more narratives to be reconstructed (Rhodes, 1997, p.192*ff*) than those of political–administrative institutions. Concerning organisational learning, while Wenger is probably amongst those authors who come closest to adequately theorising reflexive design, we have already seen that this is a different type of engagement than that assumed by Wenger. The implications for 'learning architectures' and associate 'organisational design' (Wenger, 1998, pp.230–262) needs further elaboration, as does the relation between learning processes and the embedment of learning in a wide environment (Lam, 2001).

We believe this is a programme that eventually needs be translated in guidelines for what essentially may be called the *art* of facilitation – the capacity to adequately deal with the environment in reflexive design. Such a facilitator should have the skills to help participants in reflexively understanding and dealing with their context (Fischer, 2003a,b; Grin, 2004). Further developing that art is quintessential for our society's capacity to actually undertake reflexive modernisation.

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Notes

1. Simple modernisation is driven by scientific and technological progress, which are supposed to yield social progress. Reflexive modernisation is driven by the desire to use scientific knowledge and rational understanding so as to adequately deal with the side effects created by such modernisation processes.

2. Ministry of Agriculture, Nature Management and Fisheries, *Kracht en kwailiteit* (policy memorandum).

3. Yet, the Ministry still is its most important client, funding about 70% of the research portfolio (Van Dorst et al., 1999).

4. See Oude Elferink and van der Hulst-van Arkel, 2001. A second objective was elaborating and implementing a short-term concept for short chains (reducing transportation of young chickens). This was done in a separate project, which we will not discuss here.