Collaboration Talk: The Folk Theories of Nano Research

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ABSTRACT The nano initiative in the US and elsewhere encourages and promotes various forms of multi-stakeholder activities, such as industrial collaborations. Forming part of the discourse of expectations around emerging technologies, collaboration is an important resource holding together different practices of knowledge production. In the conversations between policy and science, collaboration becomes a measurable entity and a measure in itself, figuring in the evaluations of the performance of individual faculty and research centres; however, the policy metaphor of ‘collaboration’ stands for a variety of different forms and shapes of interactions between university and industry. From a discourse analysis perspective, ‘folk theories’ of nano collaboration help to explore the dynamics of the university/industry boundary in the scientific organisational discourse as in a recent series of interactions with scientists, university officials and technology transfer officers in a number of US universities. What does the introduction of the new entity (nano) mean for scientists, and for university practices of technology transfer and commercialisation, in terms of trying to accommodate individual ‘nano’ cases into university regulations and procedures? How are these practices and experiences discussed in terms of collaboration? Assessments of value of collaboration ranged between polarised views, raising questions about occasions, audiences and communities of assessors invoked in the construction of acceptable accounts of nano collaboration. Metaphors and analogies were used to mobilise specific meanings in the discourses of the innovative potential of emerging fields. As such, assessments of the potential of terms pertinent to the emerging discourses, such as collaboration, would be better based on the assumption of shared meanings, not fixed and given, but actively achieved.

KEY WORDS: Nanotechnology, collaboration, industry, policy, discourse analysis, folk theories, specificity

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In that case it was not nano. Well, actually it was (a senior scientist/university administrator, in an interview).

Introduction
In a speech marking the passage of the new millennium at Caltech on 21 January 2000, President Clinton announced that the budget for the next five years would support a new national scientific project, known as the National Nanotechnology Initiative. The NNI was worth $500 million at that time. The ability ‘to manipulate matter at the atomic and molecular level’ was presented as a major advance in contemporary science and technology. A central role was outlined for federal government in achieving the fulfilment of the scientific promise and, as such, to contribute to the economic growth of the United States of America. The early federal support for Internet technologies, which enabled America to take the lead in the ‘Internet industry’, was used as an example to highlight the importance of a timely federal investment for nanotechnologies. In the US and elsewhere, nanotechnology has thus emerged as an important new arena that has found Congressional support.

Collaboration between universities and industries is a prominent part of efforts to fulfil the promise of nano. The language of collaboration is employed in the policy discourses to demonstrate the potential of, and the need for, new scientific fields to be transformed into societally relevant technologies; but how exactly is collaboration between universities and industries imagined as a means of fulfilling the visions that policy makers articulate? Previous literature suggests that local contingencies and negotiations are crucial for establishing and governing collaborative efforts. Some well-documented analyses of emergence and stabilisation of forms of governance of academic–industrial relations in the US emphasise the changing and historically situated nature of university–industry interactions (e.g. Metlay, 2006; Mirowski and Sent, 2008). Other scholars, such as McSherry (2001) and Owen-Smith and Powell (2003), point out the contingencies of processes purported to establish intellectual property rights in university settings. Providing useful insights in the academic governance debate, these works, nevertheless, say little about university–industry collaboration as an element of the everyday discourse and operations of a scientific department. In turn, existing science studies literature on nanotechnologies have paid little attention to industrial aspects of this initiative.

The collaborative thrust in nanotechnology falls within a more general policy discourse of encouraging and creating opportunities for university–industry interactions. In conversations concerning policy, a variety of participants in science, including social scientists, provide responses that utilise the language of collaboration. As with other policy metaphors and reifications (Elzinga, 2004), such as the ‘linear model’ of innovation or ‘translational research’ (Martin et al., 2008), the policy discourse of ‘collaboration’ is generally fairly streamlined with regard to...
the perspectives and outcomes of the collaborative efforts for nano. My contention, however, is that the role of industrial collaborations around nanotechnologies appears more subtle if one begins looking at university–industry interactions as an element of the everyday discourse in scientific organisations, and at the role of industrial collaborations in nano as research practice, as this paper does. Collaboration appears to be a powerful device employed by various agencies to hold together practices of knowledge production, and this paper does not intend to undermine the value of collaborative work. Instead, the critique offered will highlight and examine practices that constitute the value of collaboration in the everyday discourses of science and policy. How are the accounts of collaboration built into scientific practices so as to construct ongoing research as nano collaboration? The world of university–industry collaboration around nano deserves special attention in order to challenge the assumptions about how collaboration works as a discursive theme.

Methodologically, the study can be described as an ethnographic inquiry. Fieldwork was undertaken in November 2007–May 2008. Adopting an ethnomethodology-informed line of analysis (as in e.g. Garfinkel, 1967), the study focused on understanding collaboration as a matter of everyday concern in scientific organisations (research centres, science departments, technology transfer offices, university administration). It is not the objective of the paper to provide a detailed descriptive analysis of ongoing collaborative projects. Instead, I examine how collaboration is sustained as a pursuit to which participants may ascribe both positive and negative value. As my research shows, collaborations are not accessible to researchers and available for description in a straightforward way. Collaboration discourse can be seen as performing multiple constituencies under the auspices of individual agreements that are accomplished by individual faculty members and off campus. A researcher getting access to collaborative work and documents, needs to take into account participants’ practices in dealing with sensitive information (e.g. information non-disclosure). Access requires some understanding of the conventions of becoming a member of a collaboration in the first instance.

To examine if getting access to collaborations was possible, and as the first step to identify appropriate methodologies, I conducted a series of interviews (and also informal conversations) using snowball sampling. The respondents included four university administrators (former scientists themselves); 12 senior scientists (PIs—Principal Investigators—assistant, associate and full professors); and two graduate students, as well as officers from the university technology transfer division. The respondents were asked to reflect upon their personal experiences of doing research with, or reaching out to and managing relations with, industrial collaborators. The paper thus examines how nano collaboration was spoken about in interviews, also paying special attention to the circumstances of the production of narratives about nano collaborations, such as organisational reporting, official presentations, public meetings or governance talk. The conversational materials were analysed from a discourse analysis perspective (e.g. Smith, 1978, 2001; Gilbert...
and Mulkay, 1984; Potter and Wetherall, 1987). This suggests treating collaboration talk as a contingent interactional accomplishment constitutive of the phenomenon under study.

The paper begins by outlining an analytic framework and introducing the notion of ‘folk theories’ of collaboration. The empirical sections that follow focus on the stories that actors tell about university–industry collaborations around nano in the contexts of reporting, making funding decisions and technology transfer. I also examine the discursive means by which the scientific community sustains the university–industry boundary as specific to nano. The paper concludes with a summary of the study and a discussion of its main findings.

Introducing Folk Theories of Nano Collaboration

Participants involved in the interactions I studied articulate what I will generally call accounts (narratives, stories, value judgements) about their collaborative activities for particular practical reasons and under certain circumstances. These may include scientific organisational reporting, official talks, public meetings or interviews, as well as engaging in conversations with peers, university administrators and social science researchers. Rather than adopting a view of collaboration as existing independently from its situated understandings made on the spot, I seek to introduce a sensibility about exactly how collaboration is identified as a topic in situated accounts. The questions about the situated meanings and framings of collaboration acquire special relevance as nanotechnologies become a part of governance talk concerning university–industry relations, such as technology transfer and intellectual property rights. How is collaboration around nano spoken about in the university context? To what extent is collaboration specific to nano, in the sense of holding together various individual and institutional interests, practical orientations and actions devoted to a nano (idea, technology, commercial product)? I will examine the tensions in the interplay between the category ‘collaboration’ and how it works in conjunction with the category of ‘nano’. This kind of analysis aims to understand what it means and what it takes for collaboration as a policy metaphor to serve as an organising rhetoric in the scientific discourses.

Analytically speaking, the (purposeful) activity of introducing entities (‘university’, ‘industry’, ‘nanotechnology’, ‘collaboration’) and relations between them can be theorised through the language of boundaries. The paper will discuss the various ways in which boundaries between such discursive entities as ‘university’ and ‘industry’ are drawn and removed. The reader, however, should not take the opinions analysed in this paper at their face value as definitive representations of organisational affairs: the analysis does not pursue the goal to present facts about nano collaborations. First, like in the second edition of Latour and Woolgar’s Laboratory Life (1979/1986), I put forward (and will illustrate in the paper) an argument against the analyst’s privileged access to the ‘real truth’ about science that
will emerge from close observation of technical (or administrative) practices. Second, the empirical materials underwent considerable reworking as the text of this paper was selectively anonymised. This points at the openness with regard to who takes the burden of attribution of claims (i.e. to identify the authorship of the opinions). The anonymity requirement thus puts the ‘actual’ identity politics in the emerging field in brackets as the paper aims to examine the anonymous participants’ (and the researcher’s) accounts as ‘folk theories’ of university–industry collaboration.

The notion of folk theories in this paper comes from conversational analysis (e.g. Sacks, 1992). Other authors have also offered folk analyses of scientific and technological practices. Rip (2006) examines the nano community discourse in terms of the ‘folk theories of nanotechnologists’. Rip observes that folk theories are ‘a form of expectations’, which become part of a repertoire current in a group or in our culture more generally (Rip, 2006, p. 349). Rip observes that folk theories of technological developments are best seen as vaguely articulated yet plausible narratives about how things go. Similar to this paper’s suggested understanding of ‘collaboration’ as a form of (policy) expectations about the technological development of nano research, Rip analyses the technologists’ construction of the future in terms of ‘roadmaps’ based on assumptions about technologies being accepted ‘anyhow’ if ‘roadblocks’ are overcome. Another type of folk theory that runs through this paper is the comparison of nano with its historical ‘predecessors’ or analogies with other research or industrial programmes, as in the already-mentioned example of comparing nano with the Internet in the early days of the NNI. From this perspective, ‘collaboration’ is one such folk theory that has currency in conversations between science and policy. The proficiency in the language of collaboration, recognition of the appropriate and inappropriate ways of talking collaboration, can be seen as a part of membership in nano. According to Woolgar, the inclusion/exclusion of new entities into the technology organisation (such as the nanotechnology initiative in general, or specific collaborations around nano) is achieved through routinely accomplished discursive acts of maintaining membership in technology: ‘Through language and action, members of social networks routinely remind each other of their membership and of what counts as appropriate behaviour. Folk tales, stories, anecdotes and jokes deploy categories that display the basis for the network membership’ (Woolgar, 1998, p. 446).

For the purposes of this paper, by folk theories I mean narratives that portray certain beliefs, assumptions and anticipations concerning socio-technical orders. These narratives and conversational exchanges distribute agency among entities and propose action to change certain perceived arrangements. Folk theories sometimes portray nano collaborations as subject to contestation at certain moments. To avoid misunderstanding, the term ‘folk theories’ is not used to oppose the accounts to a certain ‘expert’ view of collaboration; rather I seek to highlight how these narratives are a part of the everyday work of participants
who figure out practical steps to initiate, sustain and report collaborative work.
On some occasions, the actors themselves made distinctions between ‘expert’
views and those having currency in a specific scientific community. For instance,
this occurred with invited speakers and during consultations with representatives
of the business community (such as a school of management, or ‘real entrepre-
neurs from Silicon Valley’). These attempts at interaction with established
‘business knowledge’ reflected the assumption that the ‘expert’ knowledge
about collaborative processes may reside somewhere else and can be invited
and transferred to nano. The value of such ‘expert’ knowledge was occasionally
contested. A top scientist observed that invited business scholars never greatly
impressed either the faculty or himself. Might my study, he suggested, yield
observations that could inform his and colleagues’ efforts to build successful
relations with industry? As such, while the notions of substance, relations and
expertise in the emerging fields are open for interpretation, the research inter-
views can be seen as particular occasions for boundary work—to use Gieryn’s
(1998) term—between universities and industries. The boundary is performed
by tales that establish or undermine the credibility of claims about nano
collaboration.

**Question of Specificity**

How did the participants and myself (as analyst) go about establishing the mean-
ings of nano collaboration? As a preliminary remark, the discourse analytical
perspective I adopt suggests that it is not fruitful to rest the analysis of folk the-
ories on the assumption that nano is a fixed and unambiguous category,
especially when it comes to collaboration talk as the main focus of this paper.
A striking element of my conversations with participants was that nano was
characterised not as a ‘uniform’ nor a ‘homogeneous’ category. Although offi-
cial definitions of the nanoscale as ranging “from about 1 nanometer (nm) to
100 nanometers” exist, in the interviews participants preferred to adopt contin-
gent definitions for the purposes at hand. It was noted elsewhere (Woolgar et al.,
2008) that the lack of use of a conventional definition is a feature of the discourse
of another emerging phenomenon related to nano, that of converging technol-
ogies. Being in some cases articulated through a reference to nano, the NBIC
(Nano–Bio–Info–Cognito) convergence discourses exhibit uncertainty about
what counts as substance of convergence, and definitions of convergence are
closely intertwined with membership talk as participants define their expert
status in the field. In the conversations I conducted for this study, the scientists,
administrators and technology transfer officers also did not articulate a shared
definition of nano (except, perhaps, the notion of the ‘nano scale’ as being a
‘small scale’); instead when respondents discussed their own work or specific
attempts at technology transfer, they described examples of nano applications.
Similarly, respondents did not easily identify potentially interested industrial
audiences. The vagueness and uncertainty of both the substance of ‘nano’ and its applications were a matter of practical deliberations. As the first quote—’In that case it was not nano. Well, actually it was’—suggests, the collaboration narratives allowed for a considerable degree of interpretive flexibility with regard to what counted both as nano and as collaborative work. The quote captures a moment of hesitation when a collaborative case would be nominated or dismissed as an example relevant to the interview. In another example a PI mentions:

Just on nanotechnology it is difficult to talk about collaboration with industry.

As the interview continued, the PI detailed the nature of industries, technologies and examples of collaborative projects. We can characterise narratives of this kind in terms of moves between the general and the specific meanings of both ‘nano’ and of ‘collaboration’. These rhetorical moves were routinely made in the discourse I studied. As it went on:

R: Industry is about application, not about uh a tool or technology, okay? So, uh, so most of the ... so, when you say nanotechnology industry, uhm its at a very small sections of companies that providing tools, say that they selling TEM or STEM ...
I: Could you tell me what it is? (a PI).

The question of specificity was not simply a reflection of a greater or lesser amount of detail requested by me or provided in the interviews. Rather, it is an important discursive resource that participants use to make sense of nano collaborations as a governable research practice. It is also a means to articulate their own positions in the discourses of emerging technologies by way of claiming membership in nano. The question of specificity was prompted in the conversations by both the respondents (figuring out if I was interested in nano in particular so they had to narrow down the range of collaborative examples they had in mind) and by myself (clarifying if an account I received/would receive related specifically to nano).

Conversational openings in particular can illuminate the understanding of nano collaboration as situated accomplishment whereby its specific meanings are achieved. The participants were informed about the goals of the interview in an email attempting to frame the interactions. The email, introducing the topic of my research as ‘brokering of university–industry collaborations around nano’ also said that ‘I am interested, in general, in history and your personal experiences of conducting industrial collaboration(s) you’ve been involved in, the structure and dynamics of such collaborations, its goals and its outcomes’. The elaborations of the interview objectives and agreements on the acceptable content of such
accounts were an element of some interview openings, as in the following fragments:

R: I guess I am kinda curious as to what you’re interested in, in terms of collaborations. . . . I have pretty good students and send them for interview in that company which is not really such a technical collaboration in that sense but . . .
I: But it’s a form of collaboration . . .?
R: Yes it’s a form of collaboration (a PI).

R: Are you interested in particular names?
I: In principle, yes, if you can . . . (a PI).

Settling onto some narrative examples happened, in most cases, before I asked if I could switch the recorder on. Ready-made, easy-flowing stories were sometimes recorded, such as some scientists effectively reaching out with their research to the media, or those talking to high-level funding bodies. These narratives were accompanied by scientists drawing my attention to their outreach activities (by showing a popular magazine featuring their invention; mentioning their participation in funding committees); but these easy-flowing accounts were exceptions. Figuring out the appropriate and satisfactory interview content and coming to an agreement on what counts as a collaboration (in general; of interest to myself) was a notable and important feature of the interviews. While, indeed, some cases were nominated by some scientists as collaborative examples per se without hesitation, others were rather hanging on the margins and demanded effort on both sides to find a basis for elaboration upon those tentative examples:

I don’t right now have a project collaborative with a company, but we’re trying to develop something (a PI).

. . . some funding from companies for student development kind of things (a PI).

You know, I am also probably going to do my sabbatical at a company. A sort of a collaboration as well (a PI).

On some occasions a conversation developed after I encouraged a respondent to elaborate on an example after, it seemed, the conversation had exhausted itself. In the fragment below the scientist had mentioned a large collaborative project only in passing, in a remark just before the excerpt quoted here, as just one element of his ‘mixed bag’ of funding, and that suddenly triggered the conversation anew:

R: Yeah. So, that contract, I’m collaborating with BBB and I’m collaborating with LightTech. I forgot about that. How could I forget about that one?
Some interviews began with scientists proposing classifications of collaborative projects. The typologies (like ‘common forms of collaboration’, ‘levels’, ‘phases’) allowed self-corrections and elaboration in the course of the interviews. One scientist (also acting as an administrator) began the interview by offering a description of the ‘most common forms of collaborations’ (rendered initially as interactions between scientific groups):

So the most common form of collaboration I’ve experienced is this: between ... is the one between synthesis groups and characterisation groups

but later, when moving towards industrial examples, suggested that collaborations are not easy to typify:

So one example is ... you know, there is nothing typical (a PI).

In the example below a ‘failed’ attempt to establish a collaborative contact is elaborated as an (example of) ‘phase zero’ collaboration:

R: Yeah, um I’ve written proposals also ... I’ve written proposals for HM and I’ve written proposals with IBC. Neither of them was funded.
I: Hmm.
R: Um but you know ... well actually one of them was partially funded so one of them got a phase zero funding but it got cancelled at the next phase.
I: Right. Phase zero is—
R: It’s easier to prepare ... the first initial of their money phase so that’s ... officially I guess that was a collaboration (a PI).

Another PI explains a ‘phase three’ of his collaborative project as being (merely) ‘a consulting’ (role) as opposed to his earlier offered descriptions of phases one and two involving design and prototype building:

Phase three is really we are, we are very much a consulting role, I mean not even designing, just like they have questions or something, I mean (a PI).

Suddenly, another type of collaboration could be added; or, an example initially thought of as appropriate for the conversation was thrown in doubt. For instance,
asked to give examples of university–industry collaborations, some participants brought into discussion their projects with other (national) labs. Such projects involved monetary exchange, or exchange of expertise and technical resources, which could possibly be interpreted as relevant to the collaboration talk:

I have also collaborated not just with industry but with uh research labs like um the Brooks research lab, I have an ongoing collaboration with them. Um ... I don’t know if that counts in what you’re interested in (a PI).

I: Okay, yeah. Uhm, what was the third example of collaboration you had in mind?
R: Uh third collaboration ... maybe it is not really industry, it is with the national research labs (a PI).

The ‘Organic’ Collaboration?

A diversity of opinions on how collaborations are initiated and sustained could be observed. Some folk theories stressed the importance of the personal ties a scientist carries along with him or her in their career and they can rely on these connections almost instantaneously through a quick phone call. This type of collaboration received a special label—‘organic’ collaborations. This theory portrays a collaborative effort as unproblematic and depending on successfully networked ‘star’ scientists having an extensive set of connections with their former colleagues, graduate students and post-docs. According to a research centre administrator, it was successfully used in reporting on and ‘selling’ the collaborative efforts of the centre to funding bodies. To develop a relationship of this kind, in this view, it was important to organise and attend informal events (dinners, receptions) and sustain conversations about industrial needs and potentially matching research capabilities of a particular lab, group or individual scientist. The ease of accessing and moving freely in the corporate world (organising meetings, getting into corporate premises) was portrayed as one of the keys to success in collaborating. A prominent scientist (who also talked to policy makers) promoted the ‘organic’ approach in the interview, and claimed that, being a former member of a global corporation, he could ‘freely walk in and walk out’. Friendship was also mentioned as a kind of relationship making collaborative work less problematic, especially when it comes down to IP issues.

In other accounts, elaborations on a particular case of initiating a collaboration featured a different form of constructing agency. In these talks the effort to establish collaborations was portrayed as a matter of practical choice. These accounts typically performed the division between ‘university’ and ‘industry’. The reflections on the nature of these two entities (agency, intentions, dynamics, interests) were grounded in the idea of free choice, competition and rational decision making. These accounts also stressed forcefully the idea of collaborative projects
in terms of two independent entities meeting to assess the prospects for a collaborative case. The interviews discussed what sort of efforts lead to such meetings, and the roles of individual scientific or industrial agencies. This type of collaboration talk involved the active work of constructing ‘interests’ and ‘reasonings’ on both sides of the boundary, mentioning intermediaries. In these accounts industry was often referred to as ‘they’. The views were verbalised with regard to the initial efforts scientists made, leading potentially to a successful initiation of collaboration. These ‘pro-active’ accounts emphasise the need for scientists to engage in a search for collaborators who could provide funding for academic research (assuming that industries are not very actively looking for novel or interesting potential applications). The dynamics of such initial engagement are presented in a variety of ways. Two scientists say they are actively searching for industrial contacts:

So uh usually if you do something that is very satisfactory, or very novel, or very useful, then later on you will have to continue money, right? So if you if you, if you don’t look for them, they won’t look for you. Right so (a PI).

I, personally, for my own benefit, I’m banging on the doors (a PI).

Another scientist rejects the idea of the radical pro-active approach. In his opinion, it does not provide credibility for the scientist seeking collaborations. He prefers a more nuanced way of initiating collaborations. His position assumes not only a beneficial role for intermediaries (‘introductions’), but also some milder forms of interaction with industries (‘giving talks’) out of which more interaction can credibly grow:

R: Usually in the cases where you know I’ve gone to initiate it, they don’t take it quite as seriously.
I: Why would that be the case?
R: Probably because they don’t know what you want. They don’t have an idea of who you are to start with. So, they really only want to collaborate with top people in areas and they don’t really want someone coming in forcing themselves and they’ll take it . . . they’ll look at it with sort of a more sceptical eye um if you’re trying to sell them something versus if they’re saying ‘Oh, we know that you do good work. What do you have for us?’ (a PI).

The folk theories of collaboration may portray the process in various ways, undermining each other’s premises and assumptions. Some versions of collaboration tales take on a dominant, stable narrative form. Their official status (such as the ‘organic’ theory) is due perhaps to their aligning well with desirable (policy) visions of how collaborations may work seamlessly; but not everyone
shared such a folk theory, nor was it widely adopted to reflect ‘actual’ experiences of dealing with IP issues that utilised a different, more problem-posing than glossing, language. Even where introduced most forcefully at the beginning of the interviews, classifications of collaborative work fell apart into ‘case-by-case’, ‘project-by-project’ accounts and, as will be discussed in the last section in particular, individual experiences facing general university practices. What seems worth analytic attention is the sense of uncertainty (in the much more contingent ‘non-organic’ collaboration stories) associated with industrial engagement. The fractioned nature of the collaboration talk, the absence of a unified discourse, and the active work of figuring out other possible opinions is also an element of collaboration being a part of university life. ‘What did he or she say?’ was the question I often heard if someone realised that I had spoken to other scientists and the administration. The proposed ‘logics’ of collaborative engagement were not stable discourses and could be questioned, as in a ‘naïve’ graduate student’s question to me following an account of interacting with industrial partners: ‘is this type of relationship typical so far?’.

Stories of the Value of Collaboration: For Whom?

What Counts as Success?

Producing organisational accounts of collaboration is an explicit requirement for some nano research centres, demanded by their funding bodies from the early stages of initial funding proposals. Some administrators of nano centres, however, described industrial collaborations as a resource unaccounted for due to scarcity of information about faculty conducting collaborative projects and about the financial scope of this work. At the same time, some administrators felt that collecting such information in a direct way would attempt an intrusion into the private world of individual faculty members’ research. A need for such accounting (identifying, quantifying, reporting) was recognised by the managers, in particular with regard to reporting to the funding bodies. For instance, annual reports of one such centre to its main funding agency contained consolidated inputs from individual scientists under the ‘Industrial Collaborations’ rubrics, generally providing a name of an individual faculty member and a company(-ies) he or she collaborated with. The amount of detail and practices of displaying collaborative progress for reporting purposes were disputable matters. According to one administrator, no explicit (written) criteria for the centre’s successful collaborative work were knowably stated. Rather, the evaluations of it varied from year to year: on one occasion the centre was praised for its interactions with industries, yet another year a different officer’s feedback stressed the need for not only conducting collaborative projects, but also displaying them. His comment was that the centre was ‘lacking public outreach’ and had to ‘improve’ on this front.

Another administrator admitted that the overall role of industrial collaborations as compared to scientific output was ‘minor’. The centre highlighted its
collaborative projects in reports to the funding agency ‘only very primarily because the agency likes to hear it . . . They just want to know that we are doing something that the industry finds useful’. Mentioning that there were some joint papers, or that there were some students or post-docs who ‘have gone to visit there and spend time there’, as well as visits of some industry representatives to the nano research centre, was an acceptable demonstration that collaboration has taken place. Producing the evidence of building industrial contacts successfully was also a part of the centre’s reporting to the sponsor during formal annual on-site visits to the centre by the funding body representatives. On these occasions, a number of industrial partners were requested to give testimonies (in person, or in a video conference, or on the phone) to the officers inspecting the centre on the day.

Aiming possibly to capture views on collaboration endorsed by funding agencies, I attended a nano forum in Washington, DC gathering PIs and administrators from various nano research centres. The observations from the meeting, enriched with the interview fragments, are illustrative of how boundaries were enacted by the collaboration discourse. In the meeting one could hear a plethora of opinions on the value and dynamics of university–industry collaboration. The topic was officially confined to a panel discussion where one of the leaders of the nano initiative promoted collaboration as an important mechanism for the advancement of nanotechnologies. At the same time, the discussion revolved around proposing and dismissing various models and criteria of collaborative practices, with no consensus achieved: the participants continued to discuss the matter in the meeting corridors after the session.

Indeed, the value of collaboration to scientific work did not only range within the polarised assessment. The university–industry boundary itself was constantly redefined. Some participants (in the meeting organised by a funding agency; in the interviews) claimed that their centres and groups already successfully conducted a number of collaborative projects. The relationship with industries was a part of some of nano research centres’ missions. Representatives of such centres presented a number of success stories, and their views about what makes for successful collaboration. One such story was presented by one of the early participants in nano. It emphasised that the centre saw collaboration as part of its long-range plan and strategic future, and that corporations already participated in the evaluation and planning for the future. The exchange of technical knowledge was built on intellectual property arrangements that satisfied both the university and its industrial partners, while all research, both fundamental and applied, was conducted by faculty but not by industry. Leading industrial names and logos featured plentifully in the presentation which highlighted that these industries were central to maintaining well-funded, thriving research in the centre.

In a round table discussion, however, what counted as success in nano collaborations was not evident. On the one hand, the urge to secure industrial involvement was heard in the context of a discussion to ‘rethink universities’ by means of changing ‘the ivory tower attitude’ and producing research relevant to community.
On the other hand, collaborative efforts were rendered a source of tension, replaying again and again the, perceived as irreconcilable, differences between ‘university’ and ‘business’ thinking. Questions were raised concerning regulation of influence by industrial sponsors, the degree of government involvement in such regulation, and the distribution of both funding and access to scientific results. As such, within the policy setting, the ways of stating the value of collaboration with industries recognised as appropriate, perpetuated the perennial divide between the ‘purist’ folk theory of academic pursuit better sustained on federal grants and the ‘tainted’ industrial money allegedly corrupting scientific output.

*The ‘Academic–Industrial Mix’*

In the interviews, scientists adhered to less rigid assessments. The folk theory that was employed by some respondents to move away from the black-or-white evaluations of the value of collaborations can be heuristically called ‘the academic–industrial mix’. Contrary to the purist view, membership was claimed ‘in both camps’ by some of the participants who said they wore both kinds of shoes in the course of their career. The interviews and observations illustrate how such boundaries are established and removed. Some respondents mentioned that interactions between representatives from those camps makes this ‘a small community’:

... people talk, people meet in conferences and actually this group at IPP knows these RocketCo guys as well as knows these guys. I mean, so we are all a small community, so we know each other. So, like we are doing something else with IPP, but they don’t mind that I keep these industrial partners informed of our progress of the small project going on with another funding agency (a PI).

Within the universities, collaboration was rendered a matter of practical and strategic concern framed in terms of creating and maintaining the ‘industrial–academic mix’. An event on nanotechnology commercialisation brought together representatives of federal funds, smaller funding agencies, nanotechnology entrepreneurs, business angels and venture capitalists, as well as scientists. A panel on university–industry interactions took place where university alumni, now in top positions in both science and corporations, shared their views of university–industry interaction. In the interviews, some scientists acknowledged their constant moving back and forth between the two worlds, still retaining the divide:

So I, I enjoy both, it’s kind of fun to have the freedom of the university where you can pick a path and go down that but it’s also very fun, you kind of get into the game and then you don’t know what the opponent is going to throw at you, and you got all ready for the next problem and it’s
it’s very exciting. So I find I find both very mentally stimulating uh and I get bored with one and I get bored with the other, I personally like the mix (a PI).

Contesting the Value of Collaboration

From the analytic point of view, the value of collaboration appears to reside not in the collaboration per se as an activity to be practically engaged in (or not)—these choices were made routinely, and often in favour of collaborating rather than against. Folk theories of collaboration involved claims to utility. As such, the collaboration acquired positive or negative value in the view of its possible interpretation by various communities/audiences when displayed. For instance, the opinion that collaboration may not be a ‘good thing’ at all stood out and, according to some of the participants, was generally not often heard or immediately attracted supportive voices in public, as in meetings supported by a funding agency: ‘at a conference where everyone feels that they are being looked at by the people who provide the money, no one is going to stand up or, sorry, rarely would anyone stand up and speak the truth’ (a senior administrator). Some scientists, however, were willing to articulate the negative value of collaboration with industries in the interviews.

Against the portrayal of nano as largely an inclusive, collaborative and interdisciplinary scientific practice aligning with the demand by Congress to create jobs through initiating start-up companies, a high-level university scientist/administrator admitted that a ‘better’ way might be to produce students skilled to work in industries rather than pursuing quick-fix start-up solutions. Commenting on the effort of attracting industrial funding to a university, another senior administrator observed that on a larger scale, in their decisions to accept funding from various sources, universities are not only looking for their immediate (or even long-term) benefits, but they perceive themselves as members of a broader academic community and have to mind and negotiate the acceptable standards of academic conduct. In his example, the idea of a consortium with a chemical company attracted university scientists to run multi-million dollar projects, having the potential to bring significant economic benefits and to develop ‘exciting science’; however, a major concern occurred at the point when the consortium proved to be unwilling to negotiate long-term intellectual property outcomes anticipating profit realised from the inventions. After consultations with academic peers, the proposal was finally rejected as a deal that would set ‘a bad precedent’ for at least ‘elite’ universities:

So they were interested in supporting that work but the conditions that they were putting on that support were unacceptable to me, uh my opinion, unacceptable to university practice, I didn’t make, I didn’t make up the rule, I didn’t change the rule to make them happy. . . . I refused and all my other, all the other universities that are the quality of my university have refused also (a university administrator).
Some scientists, even collaborating extensively and getting funding, were doubting the value of disclosing their collaborating with industry in official records of their scientific career tracks; or, at least, such statements would not look good on anyone’s CV as the benefits may be questioned. Two categories emerged in the conversations about the impact of collaborative research on individual career: ‘students’ and ‘senior scientists’ (or rather the informants speaking of themselves). Consider an interview fragment below. An assistant professor stresses quite forcefully the ‘adverse’ impact of the collaborative projects on his own CV, yet considers the benefits of interacting with industries for his students and for his lab overall through getting more and better equipment through financial donations. The distinction between the qualities of scientific output is also made here in anticipation of reactions by academic peers (‘people’) who may dismiss the outcomes of the collaborative work:

I: Does it help you to um sort of have these collaborations on your CV?
R: I don’t know. I don’t know. I mean, I don’t actually put them on my CV.
I: But, ok ...
R: I mean I put the talks on my CV and when I go to give a talk at a company I put that down um (pause) I don’t know. I mean, I think (pause) it depends on who you talk to (pause). I feel ... I think the thing that it helps with is one it gives your students access to you know potentially better equipment, potentially more resources ... two it gives your students access to their jobs potentially which is part of the reason I do it ... and three it enables you to get funding. And frankly I think in our field if you don’t have some industrial collaborations, you’re going to have a real hard time getting funding from any of army offices ... um (pause) I would guess that it probably has very little impact on your CV.
I: Yeah well ...
R: Because you know most people work ... they’re not going to care about ... they’re going to care about um the research you’re doing. They shouldn’t be anyway.
I: Yeah.
R: I mean they may adversely affect your CV, frankly. Right because if you’re doing something that’s too close to industry than people may not read it as research (a PI).

The PI tried to resolve the tension between the need to conduct collaborative projects (for funding) and the need to preserve the boundaries of academic work. Another scientist (also an assistant professor), however, dismissed the assumption of scientific work (and the position in the academic ladder) depending straightforwardly on the ‘purity’ of academic research that has to be reflected in
(the amount of) publications. He stressed that his position was not supported by the merits of his publications but by his ability to handle effectively various kinds of research project:

Uh ... it’s an interesting question ... uh. I am driven by results, I’m not driven by academic review, and in fact if anything that’s a problem with my ... the way I behave, it maybe because of my background, maybe because I did start a company, I’ve seen what happens there and it has affected me, I mean I have people telling me to write journal papers, I don’t write, I’ve never written a journal paper in my life and it is it is kind of funny but uh ya no there are people who tell me oh oh you know you are a professor, you should really make sure your publications are in order and I’m like, no I just want to do good things and get them out there as soon as possible (a PI).

This section has discussed in what sense the statements regarding the value of collaboration (for university, for individual scientific careers) are intertwined with various anticipated evaluations of collaborative activities by communities of assessors (academic peers; other universities). The next section offers an analysis commercialisation of nano as yet another distinct site where folk theories of nano collaborations were articulated.

**Cautionary Tales of Collaboration**

*Nano as a Commercialisable Technology*

Folk theories of university–industry collaboration around nano feature commercialisation prominently across various sites: scientific lab, administrator’s office and technology transfer divisions. Technology transfer can be broadly described as a process of assessing technology value for industries, and of formalising university–industry interactions. What were the folk theories of university–industry collaboration around nanotechnologies in the context of technology transfer?

An interviewee suggested that the popularity of nano was due to ‘an amazing PR job someone did in Washington, DC’. This allegedly allowed the scientific community to aggregate more funding, material resources and federal support under the buzzword. The rise in numbers of disclosed nano inventions accumulating in portfolios of technology transfer officers made nano, if not significant, certainly a notable part of university governance talk. What does the introduction of the new entity mean for university practices of technology transfer and commercialisation in terms of trying to accommodate individual ‘nano’ cases into these practices?

As an instantiation of folk theories making use of metaphors (Rip, 2006), Kearnes et al. (2008) discuss how nano was argued into the policy discourse to
become a legitimate subject for public deliberations due to mobilisation of a credible comparison of nano with genetically modified organisms (GMO). A better understanding of the workings of such comparisons is especially important in view of their possible consequences for the ways in which nano collaborations are made sense of as a governable practice in policy as well as in universities. In my interviews I noted how metaphors and comparisons were brought about to make sense of nano collaborations as amenable to regulation, which I will discuss in this section. The commercialisation discourse featured uncertainty about nominating nano as a successful commercial application. A technology transfer officer found it problematic to identify his colleagues who might have nano cases in their commercialisation portfolios. Nano was better described through an appeal to other disciplinary domains:

As I say, nano is not a very clear uhm uhm ... Emile D, Sam M, and Michel uh T, the three of them mostly cover engineering and physical sciences. And, and even though some of the nanotechnology find applications in bio, but the basis of the technology are more engineering and material science oriented (a technology transfer officer).

Commercialisation talk is another instantiation of achieving specificity in the narratives of nano collaborations. The indeterminacy ran as a feature of the interviews discussing both the ‘newness’ of scientific content of nano inventions, and the nature of concrete industries that nano applications could address (and of the substance of compelling messages to such industries). More agreement could be found regarding the lack of such a thing as a ‘nano industry’ in the strict sense of the word. Claims and assessments of industrial interest were made in interviews, bringing up various more established industrial areas (‘semiconductor industry’):

So, so that is something that uses nanotechnology, but for sure that industry by itself is usually characterised themselves not as nanotechnology industry, they characterise themselves as semiconductor industry, right (a PI).

Some answers framed the potential market for nano in terms of the ‘semiconductor industry’ (estimated by a respondent as a $50–300 billion area depending on the method of counting). This, it seemed to some, would open up teasing opportunities for nano entrepreneurs coming to the market with new technologies. The semiconductor industry was portrayed in some interviews as being driven by what is known as ‘Moore’s law’, depicting the dramatic exponential increase in computing capacities and in the market uptake of these technologies over the past few decades as interconnected. This industrial sector was perceived by these scientists as especially dynamic and demanding an extremely fast applications development rate that universities could not parallel due to their bureaucratic
organisation. The anticipation of a potential commercial success hit its limits, however, when attempts were made to narrow down the ‘market’ to specific industries and commercial propositions. Identifying such industrial interest and matching applications is a special task for technology transfer offices.

Inserting Nano Collaborations into University Regulations

Attempts to achieve and formalise interactions between science and industry involved organising conversations between industries and individual scientists by technology transfer divisions. On the administrative side, this means dealing with particular disputable matters concerning intellectual property rights. For universities, it seems, nano is yet another case around which resources and practices have to be organised, and the respondents’ talk about nano was readily slipping into examples of other emerging technologies (like biomedical technologies) constituting concerns for university administrators.

The main concern is related to the amenability of nano collaborations to fit in with established outward-looking offices within universities, for example ones dealing with industrial and government relations. For practical purposes, senior university administrators I spoke with preferred to think about nanotechnology as a successor to preceding technologies in their attempts at accommodating nano:

So in in general I would characterise you know nanotechnology is uh kind of like its predecessors you know semi-conductor, biotechnology, and then you know before that you have molecular biology (a university administrator).

One concern regarding the introduction of a new technology related to an increasing network of individuals and organisations to be dealt with as an emerging technology becomes accommodated (‘too many lawyers!’). Through proposing various mechanisms, efforts to keep university networks stable were described. There was no observable agreement, however, on what levels of regulation or document language would need to be kept stable to accommodate a new technology.

Some of the (documentary, legal) procedures were rendered (potentially) transferrable to nano from other disciplinary/industrial domains. A senior university administrator mentioned a previous effort by the National Institutes of Health (NIH) to impose the ‘materials transfer agreement’ on pharmaceutical industries, when they were ‘rushing’ into his university campus seeing opportunities for drug trials. As the university engaged more and more university specialists in processing individual ‘nano’ cases, scientists and industries repeatedly found the process to be inefficient. Equally, the practice of devising license agreements for each industrial partner in the case of nanotechnologies appeared to be increasingly messy. Could an NIH template agreement be potentially translated onto nano? However, a technology transfer officer justified the delays with reference to the need to look at every individual case despite available templates for
license agreements. In his view, the way to deal with nanotechnologies was through ensuring transferability of agreements on the level of individual license agreements that kept legal terms (like ‘indemnification’) stable while rendering some other terms (technology, companies and financial interests) open to alteration. A nano research centre made attempts to persuade a large industrial partner to endorse an umbrella agreement under which various collaborations (including but not exclusive to nano) could develop. In other words, the accounts reflected attempts at standardising practices that rendered differentially what holds stable and what becomes subject to modification with regard to an emerging (nano)technology. The ‘acceptable solutions’ to the university governance problems discourse thus performed some kind of ‘ontological gerrymandering’ (Woolgar and Pawluch, 1985) that, on occasions, in a contingent way, made certain phenomena problematic while leaving others unproblematic.

In some interviews with scientists, further comparisons with biomedical cases were cited, and technology transfer divisions in some universities were repeatedly blamed for being ‘slow’ and for imposing unnecessary constraints and non-disclosure in handling nano. The ‘university’ as an entity was rendered in the conversations, in a shifting way, as important/unimportant, efficient/inefficient, powerful/useless as a mechanism for knowledge and technology transfer. Stakes were high, sometimes prompted by expectations of successful industrial applications. One scientist confessed that he preferred to ‘keep out of the way and keep his profile low’ by avoiding the technology transfer office in his interactions with industrial partners thereby never bringing his projects to the intellectual property level. A couple of respondents (with broader experience in the US) admitted that university policies (allowing exclusive licensing in particular) were not as bad as in other places they had attempted entrepreneurial activities. For the majority of others, IP was a major issue.

The Cautionary Tales of Technology Transfer

These sorts of accounts problematising IP can be characterised as cautionary tales whereby technology transfer is presented as a dangerous, or difficult, act. By using these kinds of stories, members of a technology community perform boundaries between themselves and outsiders, in this case technology transfer divisions. The cautionary tales about technology transfer shed more light on the question of the specificity of the (nano) technology content to university–industry collaboration talk. This is where general university rules and routines, and specific, individual cases clash forcefully as the figure of individual scientist-entrepreneur comes to the fore. If, as Myers (1995, p. 97) puts it, ‘the writing and revision of a patent is an attempt to predict and control the future, to stabilize the change’, then trusting one’s aspirations to the technology transfer office can be seen as an exercise of power. Going through university procedures was spoken about sometimes in rather emotive language (‘freaking nightmare’, ‘insanely difficult’,
‘really stressful’). The scientists admitted that they often completed their research contracts (almost) before the actual corporate funding came through. To convey the sense of such stories, one scientist prefaced his account of a failed attempt to file a patent by admitting that he could only talk now about that because he was ‘not mad at them [office of technology transfer] any more as it’s been a year since’.

Individual perceptions of some of the scientists placed the inventor in a competing world where each collaboration (and its outcomes) is determined, to a large extent, by industries assessing the potential of scientific expertise. What becomes subject to practical management in these stories is the ‘emotional attachment’ of individual scientists to their inventions [cf. also Owen-Smith and Powell (2003) for a similar observation]. The management of individual scientists’ involvement in the resolution of IP issues tends, in some portrayals of experiences, to be resolved through the (physical) exclusion of inventors’ voices throughout the IP decision-making process. Some scientists were at ease with the practice, but for many the separation of invention travelling into the industrial sites from the inventor’s self was perceived as violating the relationship between the inventor and the invention based on the emotional attachment. The exclusion of an individual from conversations with industries was a source of discontent that was expressed sometimes with agitation:

I have no right to settle that. So I’m entirely at the mercy of our tech transfer office. I even get, I’m not allowed to deal with it. Even today there are I think the university decide to tighten up the control, I’m not I, I, I not even allowed to sign a NDA myself. . . . It’s just keep my mouth shut. Why does that deal with the university IP, I never understand. . . . So so this has happened, so so I visited SMTechnologies, ok. So every time, my my last SMTechnologies trip right, I have . . . they asked me sign NDA. I say I can’t (laughs) so, so whenever they had discussions I had to get out the door. I mean . . . what kind of thing is that? (a PI).

The ‘individual attachment’ of the inventors found full understanding on the technology transfer side, but administrators acknowledged their decisions were guided by different views of outcomes of disclosing an invention or securing a commercial license. The faculty members were portrayed as driven by ‘unrealistic expectations’ against ‘business interests’ and ‘university mission’:

Faculty members, they . . . I mean people can be very . . . have different opinion. My officers try to do things what we believe is the best business decision and sometimes the inventors are little bit more emotionally involved and I can understand because they spend years but you know and some faculty also have uh unrealistic expectation (a university administrator).
Settling the Disputes

In the situations where conflicts of interests occurred, participants found themselves needing to find acceptable intellectual property solutions (cf. Hilgartner, 2002). University administrators had a ready explanation for the practice of exclusion based on their view of the university purposes they had to accommodate in IP operations. For a chief technology transfer officer, the potential conflict resided in his university’s responsibility to ‘serve the community’, and to ‘advance the mission of the university’, making this effort visible to a wider set of audiences. While some collaborations were admittedly never formalised, the university employed a complex set of procedures that could be mobilised when the collaborative process ‘went wrong’ and seemingly moved out of the hands of individual collaborators. According to a senior administrator, the disputes seldom went so far as to mobilise the most influential decision makers, but the infrastructures were established to provide ‘an avenue for formal adjustment’ if collaboration matters became heated. The mention of the formal advisory structures available ‘out there’ for activation reflects the persisting organisational assumption of possibly contestable moments of technology transfer, which may entail the need to, in participants’ terms, ‘settle the disputes’ by means of mobilising the mechanism. In these cases, lawyers were invited, as well as a number of high-ranked administrators. For the purposes at hand, technology transfer practices could be, and were occasionally, presented for assessment to a network of various groups (board of trustees, technology transfer group), individuals (including the president, vice-provost, vice-provost for research) as well as to the ad hoc created lists of experts and alumni all over the world. So, the importance of a case was increasing equivalent to the network of assessors.

In the context of contested versions of governance whereby emerging technologies try to find a place in the world, where do (re-)solutions reside? As this paper has suggested, ‘university–industry collaboration’ appears to be shorthand for a much more populated world of entities summoned in the accounts of problems and solutions for the organisation. Both the content of emerging (nano) technologies and the regulations they enter, and also create, appear to be controversial and sometimes subject to contestation, occasionally in great need of practical management and resolutions. Most respondents themselves admitted the diversity of opinions on industrial applications of emerging technologies. A senior university administrator offered the following useful starting point in approaching decision making: ‘the nice thing about the university is that you can, at least most of the time, you can have the argument’.

Conclusion: Narrating Nano Collaboration

The paper began by asking broader questions about the role of collaboration as a means to fulfil policy visions with regard to nano sciences and technologies. I
examined the ways in which accounts of collaboration are built into scientific practices so as to construct ongoing research as nano collaborations. I have also looked at how nano collaboration forms an element of governable research in the context of technology transfer. The paper examined a number of occasions where nano collaboration was discussed: in my interviews with scientists, university administrators and technology transfer officers, as well as in events bringing together representatives of science, industry and policy. What can be learned from this study about the role and functions of the metaphor of collaboration in the discourses of nano research?

Exploring the potential of a discourse analysis perspective, I suggested that nano collaboration was best approached in terms of *folk theories* constructing the meanings of nano and of collaboration for organisational or individual purposes, as defined by Rip (2006). If, as Rip suggested, the folk theories of nano research can be understood as a ‘form of expectation’, it appears that attention to these various meanings of collaboration is rather important for our understanding of the production and consumption of expectations in the process of technological change. It can be said that the participants in the National Nanotechnology Initiative ‘routinely and prodigiously produce future-oriented knowledge claims’ (Pollock and Williams, 2010, p. 532) in which strengthening collaboration between universities and industries plays a major role in supporting claims for the achievable industrial potential of nano research. Collaboration forms part of the flows of statements about technologies between organisations and individuals involved in research and commercialisation in the emerging fields. The practitioners, as this paper discussed, employ a variety of folk theories portraying their research as nano collaborations in the context of initiating and maintaining connections with industries, discussing the value of collaboration, and describing processes and experiences of technology transfer. Such folk theories included the official (‘organic’) narrative portraying collaborative connections as seamless and ultimately successful, linking well with the policy expectations. Its opposite narrative presented collaboration through stories about uncertainty, individual struggle and strategising, and included particular types of stories that I defined as cautionary tales. These tales warn the listener against the dangers and risks for a scientist entrepreneur of taking the official route of technology transfer through the dedicated university offices.

Carrying out such analysis, the paper examined the organisational world where the construction of stories about nano collaboration took place. The inquiry attended to contingent discursive spaces where actors explored the possibility of creating narratives about university–industry collaboration as related to nano. The analytic account happened to bring together dispersed opinions and hidden views that may never come together in the life of the organisation. I stressed throughout the importance of taking the ‘nano’ case as a continuous elaboration of boundaries and membership in the technology. This study drew attention to the individual and organisational practices of storytelling as *constitutive* of nano
and of collaborations. In order to collect data about ongoing collaborations, research centres participate in reporting procedures to their funding bodies. As such, collaboration becomes both a measurable entity and a measure in itself, providing for flow of expectations and resources. Collaboration (industrial partnerships) is rendered in such practices as accountable, and calculable. It becomes important for evaluation of the performance of individual faculty and research centres, bearing on the notions of ‘good science’. The ways in which collaboration is articulated have major consequences for policy and economic decision making regarding, for example, infrastructures and buildings.

An important element of my analysis of nano collaborations, however, was the recurring question of specificity, namely how, under what circumstances, scientific work identified as collaborative with industries is told as research in nano. Considering the scope of nano initiatives across nations, as well as fears and aspirations associated with nano, questions about what nano is need to be asked in the first instance from the point of view of the functioning of the term nano in the scientific, industrial and policy discourses. In this paper, I have tried to step aside from the assumption that nano is an easily definable category, but rather I stress the lack of use of conventional definitions of nano and the resolutions of uncertainty associated with the substance of research for governance purposes. Such resolutions were achieved by participants and myself through the contingencies in the conversations that took place; through employing analogies in order to test and mobilise administrative tools; as well as in strategising about the industries that a particular kind of research on the ‘small scale’ may attract. I also asked similar questions about specificity of collaboration, staying alert to the specific meanings and values attached to mobilise particular assessments of innovative potential of emerging fields.

Looking back at the very first quotes that triggered my questions about the accounts of nano collaboration in terms of the moves between the general and the specific, the question of specificity acquires even more importance. Specificity needs to be understood as a practical resource that helps participants to organise their accounts, as the paper has shown. Myself and my participants engaged in interpretation of textual and rhetorical arrangements, such as interviews, non-disclosure agreements, anonymity statements, normative requirements of reporting, and perceived interpretations of the collaboration talk. The locally constructed meanings of these arrangements formed part of appropriate, possible or desirable specificity of accounts of nano collaboration in relation to the audiences for such accounts. The nature of and responses from such audiences were elaborated in, for example, the process of organisational reporting to funding bodies, or the search for socially acceptable ways of stating the value of industrial collaboration, such as in scientists’ CVs, or in public statements. The university decisions with regard to attracting, accepting and managing industrial funding involved making sense of acceptable ways of sharing information about these decisions.
The dynamics of the general and the specific were treated in this paper as part of membership talk and moves between various units in universities. While some accounts collapsed on nano (as in some individual accounts of inventors), others dispersed nano into a broader set of university regulations and a generic collaboration talk making it ‘just another case’ of emerging technologies. At the same time versions of ‘what’s going on’ in these various settings (the lab; the technology transfer office), and hence of the understandings (seen as controversial or not) of both the specific and the generalised accounts of nano, were constantly articulated as the actors tried to come up with substantiating assumptions for their actions. The ‘limitations’ of the worldviews were also a part of exchanging blame and critical remarks, such as in the cautionary tales. The university–industry boundary itself proved to be a discursive resource in the elaboration of the folk theories of collaboration, in strategising about possible ways for interacting through articulating possible antagonisms (in temporalities, expectations, procedures), mutual interests and bounded spaces for interaction.

The policy metaphor of collaboration thus stands for a variety of different forms and shapes of interactions between university and industry. Contrary to the streamlined policy view of collaboration wrapped into the linear economic discourse of innovation, this study has attempted to problematise collaboration by studying it as it functions in the everyday discourse of science and scientific entrepreneurship. Instead of using it as a resource, this study asked: what is collaboration? In what sense can it be seen as a policy metaphor informed by linear assumptions? Are there any alternatives? For this study, it turned out to be much more productive to assume that collaboration is situated, contested and ambiguous. The ambiguity of collaboration provides space for manoeuvre, but equally imposes constraints. It turns out that evaluations of the roles of terms pertinent to the emerging discourses, such as collaboration, would be better based on the assumption of the shared meanings being not fixed and given but actively achieved. By suggesting an understanding of the roles of collaboration in the scientific organisational discourse, I aimed to highlight the need to rethink the dominant assumptions informing current claims in the debate about the emerging fields.

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Accountability’ sub-panel of the European Group for Organisational Studies (EGOS) Colloquium in Amsterdam, the Netherlands, in July 2008, where the first draft of the paper was presented.

Notes

1President Clinton’s Address to Caltech on Science and Technology (2000), The White House Office of the Press Secretary (Los Angeles, California), for Immediate Release, 21 January 2000. Remarks by the President at Science and Technology event, California Institute of Technology, Pasadena, California.

2Such as the ‘hype–disappointment cycle’ adopted in conversations between IT industries, analytical firms and investments as in Rip (2006).

3This definition can be found at the NSF’s National Nanotechnology Initiative website, available at http://www.nano.gov/html/facts/faqs.html (last accessed 17 March 2009).

4In a similar vein, a recent study by Thurs (2007) examines the ways in which nano has proliferated into public discourse as an entity amenable to commercialisation as opposed to being solely a matter of academic pursuit. As such, nano found its place in the stock exchange markets.

5Hilgartner’s (2007) analysis of the use of analogies in the policy effort to promote and institutionalise bioeconomy is illustrative of these processes. See also Wyatt (2004) for an insightful discussion of the roles of metaphors in the public construction of meanings in economics, geophysiology and the Internet.

6Compare Goffman (1961) and Grint and Woolgar (1997) for discussions of the forms of social ordering performed by such accounts.

7Non-disclosure agreement.

8Looking at similar problematics in the area of arms control, Rappert offers an analysis of socio-technical relations which ‘instead of seeking to identify a point of resolution between the two . . . advocates and exemplifies the need to attend to the dilemmas associated with the movement between the general and the specific’ (Rappert, 2007, p. 693).

References


