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Critical Accountability: Dilemmas for Interventionist Studies of e-Science

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E-science initiatives are technology-enabled interventions in current research practices. These interventions are justified by the hope that e-science infrastructures and tools will foster new venues for researchers and scholars. This triggers a complex interaction between hope, hype, and accountability. In this article, we discuss a new initiative at the Royal Netherlands Academy of Arts and Sciences (KNAW)—the Virtual Knowledge Studio for the Humanities and Social Sciences (VKS)—in which we are directly involved. The VKS combines the goals of reflexive analysis with design of scholarly practices in a variety of fields. The article discusses this nexus and the tensions involved, as exemplary of the types of challenges that researchers will experience in e-social science as it develops.

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Introduction

The building of new research tools, digital libraries, and digital work environments for research is generally seen as unambiguously supporting the further development of the process of knowledge creation. This also holds for the relatively recent investment in cyberinfrastructures for research in the United States and the e-science program in the United Kingdom (Atkins, Droegemeier, Feldman, Garcia-Molina, Klein, & Messerschmidt, 2003; Berman, Fox, & Hey, 2003; Hey & Trefethen, 2002). The hope is that it will be possible to create powerful "Virtual Research Environments," consisting of "a set of sophisticated tools and technologies that will ease the extraction of information from data, and of knowledge from information" (Hey, 2006, p. vii). By working in these new information environments, researchers should become more productive and better able to cope with interdisciplinary problems. Physics, astronomy, and the life sciences have been at the forefront of e-science, a discipline increasingly seen by certain actors as relevant to the social sciences and humanities as well. The series of conferences on e-social science that started in 2005 in Manchester, within the framework of the U.K. e-science program, is an interesting example of this development (http://www.ncess.ac.uk/events/conference/).

In this article, we focus on this new development by discussing an initiative to analyze and support e-research in the humanities and social sciences in the Netherlands started on January 1, 2006: the Virtual Knowledge Studio for the Humanities and Social Sciences (http://www.virtualknowledgestudio.nl/en/), funded by the Royal Netherlands Academy of Arts and Sciences (http://www.knaw.nl). As we ourselves are involved in this project, our discussion can be read as an exercise in prospective reflexivity: an attempt to analyze the tensions we expect to experience in the next few years.

We start this discussion by making a distinction between e-science and e-research. Terminology is not innocent and the dominant use of the term e-science in discussions of new information infrastructures for the humanities and social sciences carries with it an emphasis on data-oriented computational or quantitative analysis (Wouters & Beaulieu, 2006). We propose to use the term e-research instead, which may include all available research modes, and thereby acknowledges disciplinary differences in the integration of cyberinfrastructures and tools in scholarly practices (Fry, 2006; Kling & McKim, 2000). We propose, moreover, to understand the development of e-research in the humanities and social sciences as *an intervention in the practice of knowledge creation*. The drive to create new ways of knowledge generation that is dependent on, and mediated by, high-performance computing networks has usually not been the result of the autonomous development of the field in question. For example, cell biologists did not accidentally hit upon the idea of simulating a living cell in a three-dimensional graphical immersive environment. Rather, this resulted from interaction with computer scientists involved in the creation of virtual reality environments initially funded by DARPA (Sutherland, 1968), eventually leading to projects such as the Virtual Cell (http://www.nrcam.uchc.edu/login/login.html).

The creation of these types of coalitions around advanced research instrumentation, and the related funding schemes, constitute complex forms of interaction between different scientific and scholarly communities, funding programs and agencies, and technology developers and experts. Presently, we are witnessing the emergence of this type of interaction in the social sciences and humanities. In this stage, the result of these interactions can perhaps best be characterized as *a parade of prototypes* developed within the framework of a particular project but aimed at broader area of scholarly communities. For example, papers presented at the First International Conference of e-Social Science in 2005 in Manchester showed ways to put social science applications on the Grid (Crouchley, van Ark, Pritchard, Kewley, Allan, Haynes, & Morris, 2005), a spatial decision support system (Birkin & McFarland, 2005), tools for distributed data analysis (Fraser & Biegel, 2005), modeling and simulation environments (Birkin, et al., 2005) and a prototype for networking social science resources on the Web (Schumann, Meier, Heise, & Schmiede, 2005). It is not yet clear to what extent these prototypes will survive their initial period of funding and contribute substantively to social science research.

The success of these projects will depend on the fit between "the problem" (as conceptualized by the social scientist) and "the solution" (as provided by the prototype designer). This fit is the result of a complex process of interaction between the social, political, economic, technological and epistemic dimensions of the research process. These dimensions have been the object of study of the field of science and technology studies (STS) during the last 40 years (Jasanoff, 1995; Hackett, Amsterdamska, Lynch, & Wajcman, 2007). The expertise in this field is therefore pertinent to understand the dynamics of e-science (Hine, 2006b). For example, the creation and development of collaboratories has been studied by Olson and colleagues (Olson, Finholt, & Teasley, 2000) who have drawn as one of their key conclusions that most collaboratories die after the prototype stage due to lack of users (http://www.scienceofcollaboratories.org/). This has also been a key problem for data archives in the social sciences and humanities (Boonstra, Breure, & Doorn, 2004). In other words, the problem of non-users of promising technologies (Wyatt, Thomas, & Terranova, 2002) is a key issue that has to be examined (not simply "solved") if we wish to better understand the development of e-research.

Non-use is an exceedingly interesting phenomenon that may in some cases be the materialization of resistance to an intervention from outside the relevant scholarly community. In other cases, it may simply result from the fact that the e-research initiative is simply irrelevant to the field, or even invisible to the core group of experts within it. In all these cases, it may be fruitful to conceptualize e-research as an intervention in current practices, potentially upsetting these practices and disrupting the existing fabric of social relationships that carry the process of knowledge creation.

Intervention as Social Problem

STS has a strong tradition rooted in discussing the implications of its research practice as an intervention in the practices of the actors it studies (Ashmore, 1989; Bijker, Hughes, & Pinch, 1989; Blume, 1974; Collins, 1985; Hine, 2000; Knorr-Cetina, 1983; Latour, 1990; Latour & Woolgar, 1986; Pels, 2003; Woolgar, 2002; Woolgar & Ashmore, 1988). However, both its political ramifications and its methodological consequences have been explored with the emphasis squarely on the implications for STS as a field and a practice (whether the fact that they were involved in an STS study has had consequences for the actors studied, but what these consequences were has not received nearly as much attention). For example, the extent to which STS researchers should take sides in the controversies they study has been dicussed (Blume & Catshoek, 2001; Martin, 1988). In the late 1980s, the debate on reflexivity in STS was partly a debate about the consequence of the fact that every study is inevitably also an intervention (Ashmore, 1989; Woolgar, 1988). Still, this longstanding scholarly tradition has not solved the problem, and there are good reasons to keep querying the issue. Perhaps, this is in some ways due to the inherent insolvability of the issue: New empirical cases will always entail new dynamics

between STS researcher and the "case actors," which generate reformulations of the problem of doing STS as an intervention (Coopmans, Neyland, Simakova, & Woolgar, 2005).

The tradition has rather resulted in a pool of standardized answers as a resource, out of which which three types seem to predominate: the "we are only doing academic research" answer; the "we explicitly wish to give voice to the underdog" answer; and the "STS should be useful" answer. The first answer effectively mobilizes the model of uncontaminated basic research, which is driven by curiosity or by theoretical concerns. It abstains from any attempt to change the social world it studies (and further posits that there is such a position from which one can make these decisions). The second answer mobilizes the model of action research, often combined with "standpoint epistemology"—although of course standpoint epistemology has other political interventions in its bosom. The third answer builds upon the model of application-oriented research, and stresses the social impact of STS knowledge. Examples of the latter are constructive technology assessment (see for a recent example http://www.nanoandsociety.com/projects/nanoned.htm), computer-supported collaborative work (Grudin, 1994), and the use of ethnography in technology design (Suchman, 1987, 2000). The first answer tries to minimize or ignore the intervention effects of doing STS, the second celebrates its political dimension, whereas the third emphasizes its instrumental dimension.

We would like to raise the issue of intervention by discussing it specifically in relation to its normative dimensions—intervention implies an interaction in order to make a difference, to change the way things are. In a context where, arguably, the promise of science and technology is increasingly important, we want to question the way hope, promises and goals for the future are articulated in the sciences and in STS, and to examine especially carefully the dynamics by which the hopes of a science or technology are coordinated and distinguished from those of STS research. In this paper, we will therefore not deal with unintended consequences of doing research. Instead, we will discuss research in so far as it explicitly *aims* to intervene, in particular where this intervention is performed by invitation. For example, STS researchers are increasingly called upon to work in the context of application-oriented programs and projects, for example in programs on the social implications of new technologies. While we have termed such developments "elsification" of STS elsewhere (Beaulieu, 2005), we wish to pursue here a more detailed examination of the various rapprochements and distinctions possible, and pursue this observation in a reflexive mode.

While we mainly deal with our own setting in the later part of this article, we do note numerous examples of intervention-oriented projects. This raises the question of the perspectives for STS in these programs. In order to reflect on these issues, we draw on the body of work on intervention is STS and on the STS scholarship on the "dynamics of expectations" (Brown, 2003; Brown & Michael, 2003). We are especially interested in the question whether it is possible to provide a different "solution" to the tensions generated by doing interventionist research than the three

standardized answers mentioned above. Perhaps the main question is whether it will be possible to combine critical analysis with design-oriented research in the context of analyzing and creating e-research practices and infrastructures (Hine, 2006b). This is not a new question, so let us first take a look at how earlier generations of researchers in science and technology studies have dealt with it.

A History of Hope and Intervention in Dutch STS

It is striking that the development of science and technology studies in the Netherlands has from its inception been strongly influenced by an agenda of engagement. The first more or less cohesive STS research group was formed at the instigation of the Dutch Science Policy Advisory Council (RAWB) in the early 1980s. Subsequent developments in the field have also been shaped by interaction with actors who wished to mobilize STS for particular epistemic and political goals. The most recent initiatives in STS in the Netherlands, be they large scale research efforts in constructive technology assessment of nanotechnology (http://www.nanoandsociety.com/projects/nanoned.htm), the study of the social implications of genomics (http://www.society-genomics.nl/), or the creation of the Virtual Knowledge Studio for the Humanities and Social Sciences (VKS) (http://www.virtualknowledgestudio.nl/en/), would not have come into being without an agenda of intervention and engagement. This may perhaps mean that STS in the low countries was never an entirely "normal science" (Kuhn, 1962), but rather a "regulatory science" (Jasanoff, 1990, 1994).

That is not to say, however, that STS was created by government action alone. From October 1975 onwards, a group of researchers had been meeting a few times a year in the form of the "Group of Science Researchers" (GWO) of the Inter-University Institute for Social Science Research (Wouters, 1999). The initiative came predominantly from Dutch physicists who were concerned about the impact of physics and natural science on society and the ethical and societal implications for researchers. This GWO comprised 34 scholars in 1977, but only 14 were able to devote most of their time to science studies. A publication list from May 1977 listed 47 publications by 24 different researchers. Of these, ten publications were scientometric in nature. The majority of the group was mainly concerned with the impact of science on society and, from that perspective, with science policy. The participants do not seem to have felt that they belonged to an integrated field of research. STS was too fragmented, the scholars had varying research interests and a coordinated approach was lacking. This was strengthened by the lack of institutionalization: One could not earn a Ph.D. degree in science studies, and research programs in STS did not yet exist at Dutch universities. In spring 1977, the Social Sciences Council of the Royal Netherlands Academy of Sciences (KNAW) asked the RAWB to advise on the question whether science studies should be stimulated in the Netherlands. This resulted in the Council's statement that "the science of science" was indeed important enough to begin developing the field. The council staff wrote a short report in February 1978 and discussed it with around 20 researchers.

They interfered because this specialty was of pre-eminent importance to governmental science policy.

The council was rather critical of the state of affairs in the Dutch science of science and deplored the lack of coherence of the field and of consensus among the researchers. It hoped that its action would end the impasse. In September 1978, the RAWB published its first advisory report on science studies. It reformulated the goals of the specialty as the study of the factors influencing scientific development, and baptized it Science Dynamics (RAWB 1978). It stressed in particular the need to reinforce "strategic research." This report was discussed by the Dutch government in April of the next year, leading to the political decision to finance at least one full professor in the field of "science dynamics" from January 1980 onwards. The advisory council was expected to take detailed measures in consultation with the researchers and universities. On 18 December 1979, it appointed a committee to prepare the creation of a university department of Science Dynamics. This did not prove easy because of the lack of consensus among the researchers. Moreover, members of the council were not very happy with the level of Dutch science of science and seriously considered inviting a foreign researcher to organize the field. After the proper consultations, the council gave its green light on the basis of a second advisory report on science studies (RAWB, 1980). A new team of science researchers at the University of Amsterdam won the competition and founded the Department of Science Dynamics.

As a result, science studies was predominantly shaped as a regulatory science (Jasanoff, 1990), rather than as a specialization within departments of sociology or history of science. It was different from the study of the history of science in that it was supposed to focus on post-World War II developments. It also differed from the "science and society" groups popular at the time in that it primarily studied the potential of steering science, not its impact on society (RAWB 1980, p. 5). Three topics of research were emphasized: the organization and institutionalization of research; scientific communication; and the influence of non-academic actors on scientific development (i.e., contract research and the effects of science policy itself). Not coincidentally, these questions were also central in the finalization program advocated by the Starnberger group in Germany (Schäfer, 1983; Weingart, 1997). Whereas their program of steering science by science studies was effectively rejected in Germany, it was embraced in Dutch science policy.

What can we learn about engagement in STS from this short and sketchy story? First, Dutch interest in STS was initially triggered by the international developments in the sociology and history of science. There was already an academic debate about the work of the physicist-historian Thomas Kuhn (1962), sociologist Robert Merton (1973), philosopher Paul Feyerabend (1975), sociologists Bloor and Barnes (Barnes, et al., 1996; Bloor, 1976), and others. This created the intellectual space for the GWO group. Yet for most researchers involved, science studies were a part-time concern. The group was unable to create STS as a new field without support from funding and policy. This support was granted on the condition that a research

agenda be pursued, in which the questions at the heart of science policy were central. In many of these activities and documents, it is impossible to demarcate a clear boundary in the intellectual agenda of science dynamics between "academic interests" and "political goals." They are merged too intimately, even at the empirical level. Over time, science dynamics became somewhat distanced from these early interventionist goals. It is clear, however, that engagement was crucial to this early phase in which the promise of intervention fuelled investments in the field.

These questions are not only relevant to us as ex-members of Science Dynamics, or even only to Dutch STS researchers. We see comparable developments in other countries. For example, in the U.K. and the U.S., STS has partly moved to new academic environments in such innovative directions as business schools (Coopmans, Neyland, & Woolgar, 2004), where intervention seems a given of the institutional context.

According to Gibbons (1994), a new mode of knowledge production has emerged in the past decades in which basic research has become intimately intertwined with contexts of application. The traditional distinction between applied and basic research is no longer the best way to describe the different modalities of scientific research. The new "mode 2" science is governed by different dynamics and different accountability regimes, precisely because path-breaking, basic research is a strategic asset for future applications in industry and commerce. The mode 2 thesis has been criticized because it tends to lump unrelated phenomena together, underestimates the extent to which mode 2 science was dominant in the past (for example, in chemistry), and often presents the emergence of new accountability regimes as inevitable and politically neutral (Rip, 2002a, 2002b; Shinn, 2002). This critique is even more relevant if we study the shifting contexts of STS research itself. Coopmans, Neyland, and Woolgar (2004) discuss the questions these changes raise, perhaps even pointing to a new phase in the development of the field. Instead of deconstruction of the way scientific knowledge is produced and reified, construction would become the main target (Collins & Evans, 2002). But, as Coopmans and his colleagues ask, for whom is engagement a form of progress?

> What forms of engagement (and what kinds of outcomes) will be counted as useful? Is Mode 2 or Third Wave knowledge production an ideal or a gloomy prediction? What other directions and forms of engagement might STS become involved in and what forms of assessment might these introduce? Will new areas of engagement introduce new criteria for progress, utility and/or value? The reverse side of these questions relates to non-engagement. If STS is not engaged in contexts of application beyond its traditional scholarly concerns with investigations of science and technology, will it be in a good position to continue? (Coopmans, et al., 2004, p. 6)

These questions are especially pertinent in our endeavor to apply science and technology studies to understand and develop novel research practices in the humanities and social sciences. We wish to draw attention to the fruitfulness of

differentiating kinds of interventions and highlight what can be gained, practically and intellectually, by interrogating the promises and practices that seem to open up in STS when there is entanglement within the field. The upbeat rhetoric of research funding with its targets, mid-term reviews, output and performance assessment and its Web sites, and the way STS research becomes entwined herein, needs to be examined for its particular effects. Equally important, the distance between those fields established by "pure" research should also be denaturalized. Ignoring these relations not only hides a potentially important driving force of current STS research agendas, but also deprives us of a highly interesting intellectual problem: the problem of reflexively constructing one's research object in an interventionist context.

To sum up these reflections, our starting point is that intervention-oriented STS may present many issues that feel "new," especially if one is newly dependent on research funding, but that can also be constituted as an opportunity for reflection and better interventions. This paper aims to explore what type of problems we may expect in the new institutional contexts of STS. We think these problems are relevant along three dimensions: theoretical, methodological, and political. We wish to explore these dimensions on the basis of our Virtual Knowledge Studio for the Humanities and Social Sciences (Wouters, 2004).

Hope and Intervention around the Virtual Knowledge Studio

The promise of the new and the promise of intervention are closely intertwined in the case of the Studio, and in this section we attempt to show the mutual shaping of particular hopes regarding new technologies and changing research practices. New technologies, in this case, information and communication technologies, carry a particular set of hopes about increased efficiency, relevance or novelty (Hine, 2006a). Funding bodies also foster particular hopes about doing something for a particular constituency. Indeed, by the time funding is on offer, what this "something" should be is already partly shaped. Expectations are, like hype, "constitutive, [and] mobilize the future into the present" (Brown, 2003, p. 6), but they do not determine it.

In May 2004, the KNAW issued an international call for a program leader in the area of e-science for the humanities. The mission, scope, and evaluation were defined as follows:

> The program needs to address a dual mission: (i) to stimulate the development of e-science in the humanities and social sciences, and (ii) to study the effects of e-science on the practice, activity, and quality of research in those fields. This mission is to be pursued by an integrated program of cooperative research between the humanities, social sciences, and information sciences. The program is set out for five years, with an annual budget of ¢ 900.000. Additionally, it is expected that the program leader will acquire substantial funding from third parties. Continuation after the first five years is possible, depending on the

> success of the program in terms of scientific output, embedment in the research community, and the level of external support. An evaluation will take place towards the end of the five-year period. (KNAW 2004, p. 1)[1]

This call is based on the notion that it should be possible both to support "e-science initiatives" in the humanities and social sciences and to analyze them critically. This can be seen as the result of a debate of a few years in which STS scholarly insights were mobilized in the framework of Academy research policy (Bijker, 2004). However, the idea that technology may drive new scholarly developments is also prominently present in the call: "Potentially e-science can have a profound influence on research, the questions researchers ask and the way research is carried out" (KNAW, 2004, p. 2.) A particular kind of hope for what ICT could do for the humanities was therefore embedded in the call, using language of impact, of newness, of overcoming difficulties via technology, while maintaining that both analytic and contributory work should happen under the auspices of the program.

The proposal that was successful in this procedure was written by one of us (Wouters, 2004) and will form the basis for a new KNAW program, *The Virtual Knowledge Studio for the Humanities and Social Sciences*. It aims to support researchers in the humanities and social sciences in the Netherlands in the creation of new scholarly practices, as well as in their reflection on e-research in relation to the development of their fields. A core feature of the *Virtual Knowledge Studio* (VKS) is the integration of design and analysis in a close cooperation between social scientists, humanities researchers, information technology experts, and information scientists. This integrated approach should provide insight in the way e-research can contribute to new research questions and methods in the humanities and social sciences. Significantly, the proposal entails a subtly different formulation of what the "problem of e-science in the humanities and social sciences" actually means (Wouters, 2004, p. 3). It therefore effects a shift that can be seen as a first concrete intervention, not only at both the institutional and organizational levels at which the future of the program is being decided, but also in the way the Studio presents itself to the researchers in the fields where it is mandated to intervene.

The program shifts the notion of e-science as an electronic science, towards the notion of *e* for "enhanced," and towards the more general notion of "e-research" rather than e-science. These shifts create a space for interventions, where "e" is decoupled from a particular type of technology (which is evoked by the e for electronic). Second, the shift from "science" to "research" establishes the Studio as recognizing the particularities and specificities of the humanities and social sciences (Bijker & Peperkamp, 2002; Boonstra, Breure, & Doorne, 2004; Kircz, 2004). This formulation aims to turn threat into promise, and aligns the proposal with social sciences and humanities, in the face of the e-science movement. When encountering researchers in the humanities, it can be effective to signal understanding and to formulate hopes in relation to e-science that are especially appropriate to them or to their location within their field:

> In so far as ICT has been tailored to research needs, it has been based on computational research and often assumes mathematical and programming skills on the part of the researcher. In many fields scholars have different needs, such as the representation of ill-defined data, analysis-oriented visualization of manuscripts and multimedia sources, and specific source-oriented analytical tools. These needs are often not met by standard computational and mathematical analytic methods. (Wouters, 2004, p. 10)

By showing awareness of the limitations of particular e-science promises, and sensitivity to the particularities of research within the humanities, we hope the program can becomes a solid basis for humanities researchers. The promise is one of help in reaping the benefits of ICT, without having to conform to what is articulated in e-science dreams of physicists. In this way, identifying the hype may perhaps help develop other hopes. By contrasting inflated promises to more localized, context sensitive stories of potential benefit, the moral valence of the Studio's intervention seems grounded, and benefits from what might be seen as the hype in other areas. The VKS program may become one of the sites where actors come to share a belief in the promise of interventions. If this is successful, they share not only expectations, but also obligations. These relations between funders, researchers and those who believe they will benefit from the interventions promised can be thought of as a network (Van Lente, 1993, 2000).

Finally, the VKS program specifically aims to maintain an analytic stance with regards not only to current practices, but also to current technological paradigms. It argues that important fields in the humanities and social sciences are characterized by a huge epistemic diversity; by specific, sometimes person-bound, roles of the researcher; by the lack of consensus about the research agenda in a host of specialties; by a relatively low-tech research environment (often aggravated by the scarcity of university funding); by the specificity of writing and reading as features of knowledge creation; and by a historically grounded and relatively large share of solitary research practices (Becher, 1989; Whitley, 2000). In all these dimensions, many fields seem ill-suited to become enthusiastic adopters of the e-science paradigm as it now stands. Therefore, if e-research should make sense to a variety of specialties in the humanities and social sciences, new non-computational and computational paradigms of e-research may need to be developed (Wouters & Beaulieu, 2006). The Studio therefore promises to be a clearing house of expertise, partner in the development of new practices, and provider of insight into new dynamics of knowledge creation in ways relevant to STS research.

Conclusions: Managing Expectations

As will be clear by now, the expectations that underlie the funding and support of the Virtual Knowledge Studio are related to "modernization" or "rationalization" of humanities and qualitative social science research. The expectation is for improved

("enhanced") research, through the mobilization of technology. This is not something the Studio explicitly embraces, but this element is present in its discourse, if only as a "straw man" or "bogeyman." In approaching possible constituents, it may be able to leverage STS sensibilities to disciplinary differences as a way of differentiating the Studio from those who would unilaterally impose natural science processes on the humanities. This discourse may perhaps also posit the Studio as an obligatory passage point, through which particular segments of social scientists and humanities scholars might get access to some of the funds associated with ICT, while also maintaining their distinct identities through our "validation" of the particularities of their practices.

It bears repeating, at this point, that the interface with actors in the field is a fruitful site, not only of funding, but also of important insights for STS. For example, the definition of e-science is not strictly a technical issue. It also raises important questions for STS itself, regarding the dynamics of innovation, processes of academic agenda setting, and the role of "promises" in the development of new tools and practices (Fry, 2006; Vann & Bowker, 2006). These questions are addressed by researchers in STS in a scholarly manner (in contrast to our discussion here about the pragmatics of the initiative). Yet, the scholarly and pragmatic dimensions intersect in this kind of work.

The problem as formulated in the program is strongly shaped by the STS tradition, and a constructivist approach to technology that seeks to open up black boxes and questions the ways they come to be closed. It emphasizes practices rather than technologies, for example, to prevent a tool-push approach. Nevertheless, it seems that the existence of particular promises associated with e-science has been very important in giving the means to realize and conceptualize the VKS. Shaping hopes as a kind of intervention is furthermore present in some of the earliest work in the Studio, in writings about the kinds of hopes that fields such as women's studies might like to see taken up in the way e-science develops its promise (Wouters & Beaulieu, 2006). Hope therefore enables this work and forms a site of intervention.

The double role of STS research in the management of expectations is our answer to the question whether it is possible to combine critical analysis with design. The Studio will therefore have to play a complicated game in which it alternates positions in order to enable a critique of *both* the present scholarly practices in the humanities and social sciences and of the modernist critique of these practices. This may be enabled by the fact that the Royal Netherlands Academy for Arts and Sciences (KNAW) itself is an organization in which intellectual excellence is highly valued and in which a variety of philosophical positions about the value of knowledge can be found. We propose a sharpened analytic for understanding the relationship between STS and intervention. It is an approach that is prospective, reflexive, and strategic, and in which STS has been so sensitive to the power of promises and hope in science that it also becomes aware of the power of promises and hope for its own goals. Following Brown (2003), we believe that "situatedness of expectations" is an important goal in diminishing the costs of hype/unfulfilled promises: "We need to reflect

upon the actual contexts and conditions in which expectations, hype and future imaginings are embedded" (p. 10). But also, in our view, this is a way to produce better STS research. Again, it is important to note that we are not trying to do away with hype/hope, because it is constitutive of present and near future activities, as has been argued by Brown (2003). Intervention also implies power to change situations.

As may be clear, three distinct epistemic strategies have been embedded in the Studio proposal. One strategy is to level the playing field, by insisting on the notion of partnership between the Studio and researchers in the field. Second, bringing these researchers into the laboratory, into our glass tower, is a mode of intervention that enables some control. Finally, the brief and affiliation itself is a mode of power. In the Netherlands, the KNAW is a source of accreditation for "research schools,"[2] and the position of the Studio within the KNAW network may function as a means to open doors, if not always enroll the goodwill of research groups.

To reformulate these strategies in more general terms, our first pragmatic conclusion is the importance of developing a critical stance with respect to the underlying motivations of STS funding in interventionist contexts. These motivations (whether they be constellations of more or less distributed ambitions, drives, or needs) should first of all be taken seriously. At the same time, these motivations should be approached critically and this critique should be an integral part of the research project. Our second conclusion is that it might be a good strategy to open up the research process to a variety of actors and conflicting influences. In the case of the Studio, the research program is under discussion with the funder (the KNAW) and the scholarly communities involved (STS community, humanities communities, social science communities). It is presently still unclear what this will mean in terms of the management of the Studio, but it may increase the pressure on the Studio research and may help to bolster the quality of our work. This strategy might also be useful in other contexts, such as society and genomics or the social impact of nanotechnology, since it prevents a monopoly position of the funding agency.

Our third conclusion is that it is increasingly important to work pro-actively on the criteria of one's own assessment. The traditional indicators of academic quality (publications in high-reputation journals and publishers) are perhaps not enough, since they cannot capture the relevant dimensions of the role of intervention in present scholarly practices. Other criteria may become important in this respect: participation of scholars in the Studio, invitations, new software tools, accessibility of data sets and digital resources, in-links to our Web sites and, not least, success in acquiring additional funding. This signals the need for theories that can be mobilized to develop assessment indicators and approaches, knowing that not every important dimension can be measured quantitatively.

We have tried to draw out the ways in which the requirement for intervention, in its precise formulation and counter-formulation (or reformulation), have shaped the approaches and structures of the Studio. While some of the stage has been set, much of the initiative is still ahead. In that sense, some of the material discussed in this paper could be seen as tentative. Yet, this is also an important moment for the

Studio, since it is at a point where some of the "prospective" work that will determine the assessment of its potential success can be done (Vann & Bowker, 2006.) By opening up this area of expectations, our article is not only a reflection upon and critical analysis of the management of expectations, but also an invitation to participate in it and thereby shape the Studio into what it may become.

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Notes

1 Note how the assessment criteria pre-figure some of the dynamics of intervention of this research program, beyond strictly deliverables.
2 These are supra- or inter-institutional, thematic, or disciplinary "networks" of research, which must be accredited every five years. This occurs via peer-review, on the basis of past performance and research programs. Membership in a research school is a must for obtaining external funding (research grants and Ph.D. stipends).

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