About evidence based and beyond: a discourse-analytic study of stakeholders’ talk on involvement in the early development of personalized nutrition

Laura I. Bouwman* and Hedwig F. M. te Molder

Abstract

This paper draws on discourse analysis to examine how Dutch stakeholders in health education, health care, health insurance, social science, the food industry and the media make sense of innovations in the field of ‘personalized nutrition’ and their own role and significance in an early stage of technology development. Previous research has focused on factors that help or hinder collaboration between stakeholders, and on the development, management and implementation of joint programs. However, no attention has been paid to how stakeholders themselves handle issues of responsibility and initiative in relation to early technology development and collaborative interactions. The present study shows how such stakeholders establish themselves as gatekeepers of innovation by displaying authority on what consumers ‘want’ and ‘cannot do’, while avoiding a proactive role. Uncertainty in scientific knowledge, fixed roles and responsibilities and dependency on incompetent or biased others are drawn upon to account for a wait-and-see policy.

Introduction

Innovations in personalized nutrition

The growing rate of diet-related diseases has further encouraged calls for innovative health promotion (HP) approaches that motivate people to eat healthily [cf. 1, 2]. Personalization of nutrition advice is often depicted as one of the most promising approaches [3]. Recent reviews of health intervention methods [4, 5] and research on the effect of personalization [6–8] share this enthusiasm with some reservations. They show information targeted to an individual’s physical constitution, lifestyle and environmental situation to be more effective in influencing that person’s health behavior than general information. However, it has also been argued that personalized nutrition advice does not sufficiently match with the social and cultural contextual influences that occur during the purchase, preparation and consumption of food [9–11]. Dieticians already apply personalized nutrition interventions based on lifestyle, social, cultural and economic assessments and on physical parameters such as body mass index, blood pressure and cholesterol levels. With interactive computer technology (ICT) such as the Internet, personalized advice can be made available to a larger audience at relatively low costs. Also, added value is often said to lie in the high processing capacity and user control on place and time (on demand) of ICT-mediated interventions [cf. 12].

Another application in the personalization of nutrition advice has been developed by the newest discipline in nutrition science: nutritional genomics (also known as nutrigenomics). Nutrigenomics
examines the response of individuals to food com-
ounds using post-genomics and related tech-
nology (genomics, transcriptomics, proteomics,
metabolomics, etc.) [13]. It can be characterized
as ‘the study of how nutrients in food interact with
our genes at the molecular and cellular levels, and
the impacts these reactions have on our health’
[14]. There are promises and expectations that
the currently used physical parameters for assess-
ing personal physical vulnerability to diet-related
disease can be extended with information about an
individual’s genetic makeup (read Box 1 for more
information) [15, 16].

Personalized nutrition emerges at the junction of
different disciplines and technologies, and, as with
many projected innovations that may directly influ-
ence people’s lives, potential public concern ‘lurks
in the background’ [17]. This situation makes per-
sonalized nutrition candidate for the study of early
involvement of stakeholders such as health profes-
ionals and educators and the food industry, not so
much to smoothen the introduction of the technol-
yogy as to improve sociotechnical decision making
more generally [cf.18]. Recent work of Ronteltap
et al. [19] showed that there is no consensus among
Dutch experts from diverse stakeholder groups
about the demarcation of nutrigenomics, its de-
velopment over time and the factors that will deter-
mine market success or failure.

In this study, we focus on the contribution of
stakeholders who are potentially concerned with
implementing personal nutrition trajectories. A
technological development trajectory encompasses
the decisional stages of authorization, implementa-
tion and adoption of the technology [17]. In prin-
ciple, including a broader set of public and other
voices coshaping the development of the technol-
ogy is possible in each of these stages. The stake-
holder respondents in this study can be located
somewhere between the ‘insiders’, such as scien-
tists and technologists who try to realize a new tech-
nology, and the relative ‘outsiders’ of an innovation
trajectory, such as societal groups who mainly com-
pare the technology offered with possible or avail-
able alternatives [20]. This position may allow for
bridging activities between different sorts of ac-
tors. Before turning to our actual study, we first
discuss some insights about stakeholder involve-
ment from both a HP and a science and technology
perspective.

Box 1. Innovative personalized
nutrition

People in the Netherlands have an increasing
access to devices that assess their personal risk
to diet-related disease. For instance, digital devi-
ces that measure blood pressure and calculate
body mass index are not only sold in pharmacies
but also available in some supermarkets. But
next to this increased access, it is expected that
in the future, DNA test results can be added to
the existing physical indicators to measure indi-
vidual vulnerability to diet-related illnesses such
as cardiovascular disease [cf. 16]. Whether DNA
test results will influence how people perceive
healthy eating messages is not yet known. The-
oretically, test results can indicate personal vul-
nerability and hence serve as a cue to action to
become fully aware of the need to eat healthily.
But an adverse reaction is also possible. Given
the common perception that genetic risks are
immutable, test results might allow for feelings
of fatalism and decrease perceived self-efficacy:
it’s in my genes, so what can I do [cf. 15]?

HP and the need for collaborative
interaction

Research and experience show that development
processes benefit not only from the exchange of
expertise, experiences and access to networks and
resources but also from the generation of involve-
ment resulting in more commitment to initiating
and maintaining HP activities. From a moral per-
spective also, as Green and Kreuter [21] point out,
stakeholders should participate in the development
process of innovations that will influence their
working and living conditions. Principles about
whom to involve, and at what, stage diverge.
However, important preconditions for working together are shared:

- A shared problem and a known goal so as to effectively address challenges such as unhealthy eating.
- The existence of a shared social responsibility to make this happen [cf. 21–24].
- The recognition of mutual dependency [cf. 23, 25].

These preconditions are challenged by the variety of views that stakeholders bring to the table, as identified in recent reviews:

- Although the ultimate goal (healthful behavior) is clear, the road toward this goal is complicated by conflicting political, cultural and economic interests of participants representing different sectors.
- Social responsibility for ‘making healthy choices easy choices’ [26] may be endorsed by all sectors, but it does not necessarily supersede other responsibilities in some sectors such as industry.
- The recognition of mutual dependency is challenged by participants’ needs for individual power or position protection, conflicting roles, responsibilities and interests and a negative history on collaboration [cf. 22, 24, 27–29].

**Science and technology studies and the role of early stakeholder involvement**

Within science and technology studies, the assumption that innovation is a linear process in which scientists invent, businesses apply and consumers buy, has been replaced by the notion of innovation as a coevolutionary product of science, technology and society [for example 30]. Different forms of stakeholder participation more generally, and public upstream engagement in particular [18], have received considerable attention as important ways to bring a wider range of social and ethical issues into technological decision making and to turn coevolution into a more reflexive process. In the policy context, early stakeholder involvement has now become almost a prerequisite for innovation development processes [cf. 17].

Different methods and strategies have been developed to facilitate early collaborative interactions among stakeholders not only in relation to policy formation, such as various forms of technology assessment, but also with respect to technological design itself, such as constructive technology assessment [31]. Some focus specifically on including organizations in public and private sector, others on end users and again others on both. For the purpose of this article, we identify two assumptions in relation to stakeholder involvement and collaboration that differ at least in emphasis from those in HP studies:

- In contrast to collaborative processes as understood in HP studies, where healthy eating as the ultimate goal is not contested, science and technology and related methods such as constructive technology assessment do not conceptualize the innovation at hand as *a priori* relevant or useful. Science and technology scholars have been especially critical of involving stakeholders ‘merely’ to avoid immediate conflict and to help forestall adverse effects of a particular technology [see for example 32, 33].
- In science and technology studies more emphasis is put on changing roles and responsibilities because the negotiation of technical options between stakeholders is considered to be inextricably bound up with the restructuring and redistribution of current roles [34, 35]. More than in HP, science and technology studies underline the conflictive nature of most learning processes involving multiple stakeholders.

**A discursive perspective on early stakeholder involvement and collaboration**

Despite extensive research in HP on a range of factors that help or hinder collaboration between stakeholders, high early failure rates suggest that
more work needs to be done to better understand the way collaborative interactions do or do not work. Although science and technology studies have shown the value of, and need for, engaging a wider range of actors before innovation processes become locked, they have not focused on innovations within a HP context, in which different sets of issues and interests may be at stake. Overall, little attention has been paid to how potential participants of collaborative initiatives themselves handle issues of responsibility and initiative in relation to early technology development and collaborative interactions. Therefore, a research method is needed that moves from an analyst’s to a participants’ perspective, with a focus on how collaborative talk is constructed in particular settings and how it is oriented to responsibilities and initiative. The form of discourse analysis used in this study can be regarded as such a method. Discourse analysis in general aims to make visible the ways in which discourse is central to action (goals), the way it is used to constitute events, settings, identities and the various discursive resources that are drawn on to build plausible descriptions [36]. In this exploratory study, we draw on Discourse Analytic (DA) methods to analyze how Dutch stakeholders in health education, health care, health insurance, social science, the food industry and the media make sense of innovations in the field of personalized nutrition and their own role and significance in an early stage of technology development.

## Method

This study uses a form of discourse analysis developed by Potter and Wetherell [36–40]. The focus is on the discursive resources that stakeholders use to construct the nature of, and need for, innovations in personalized nutrition and collaborations and the responsibilities that are at stake. Rather than determining the truth-value of what people report—by looking at what a person really wants, thinks or feels or what the world really looks like—discourse analysis focuses on the interactional business performed with these reports. As discourse analysts have pointed out, speakers construct different, and sometimes contradictory, versions of reality to accomplish a range of goals such as blaming someone, building facts and managing their own accountability [37–39]. This study therefore examines not only a set of interpretative resources but also the interactional goals for which these resources are deployed.

## Participants

The study is based on 13 interviews with interviewees representative of sectors that, according to literature about collaborative initiatives [41 p. 138–40], play an important role in nutrition communication (Table I). They were selected based on their specific expertise and interest in personalized nutrition interventions in The Netherlands. All selected stakeholders agreed to participate with exception of the representative of the Dutch Ministry of Health.

As indicated earlier, the interviewees are not insiders involved in the technology itself, but neither are they distant outsiders [33] like spokespersons for societal groups that have no external control over the technology other than voicing support or concern. As actors who implement and/or

<table>
<thead>
<tr>
<th><strong>Table I. Participants</strong></th>
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<tr>
<td>Health care</td>
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<tr>
<td>One family doctor</td>
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<tr>
<td>One representative from the family doctors’ organization</td>
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<tr>
<td>One dietician</td>
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<tr>
<td>Health education</td>
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<td>One representative from a national health organization</td>
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<td>One representative from a departmental health education organization</td>
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<td>Health insurance</td>
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<td>One representative from a health insurance company</td>
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<tr>
<td>Social science</td>
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<tr>
<td>Two behavioral scientists</td>
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<tr>
<td>One applied philosopher with a special interest in nutrigenomics</td>
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<tr>
<td>Food industry</td>
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<tr>
<td>One representative from an industry-representing organization</td>
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<tr>
<td>Two representatives of food companies responsible for health/communication policies</td>
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<tr>
<td>Media</td>
</tr>
<tr>
<td>One journalist with a special interest in science and technology</td>
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</table>
communicate about personalized nutrition on the basis of their profession, they can be considered as positioned somewhere in between and in that sense form an interesting and largely neglected site for cogovernance of innovation processes.

For reasons of anonymity, the extracts used in this article only identify for the sector that the respondents represent.

Data collection, transcription and translation

The interviews were held by the first author. She is a social scientist who has also been trained in nutritional science. The interviews were held between December 2004 and March 2005 and took approximately 1–1.5 h each. The data were collected through open-ended, individual interviews about relative advantages and disadvantages of innovations in personalization of nutrition advice, and factors motivating, facilitating, hindering and reinforcing collaborative interactions, following a key topic list (Box 2) that was developed on the basis of a literature study [12]. From a DA point of view, interviews are forms of interaction in their own right. This involves the researcher educing and appreciating not only the contribution of the interviewee but also that of the interviewer, both in transcript and analysis. Because of this analytic focus, it is not necessarily desirable for the interviewer to remain passive throughout the conversation [38, 42]; for an extended discussion of using interviews in social science research, see Potter and Hepburn [43]. All interviews were taped with a digital voice recorder. The interviews were transcribed to world-level accuracy and included speech errors and long pauses. They were analyzed in Dutch. Fragments were subsequently translated into English with the help of a native speaker. Like transcription, translation is not a mere technical matter but already a form of analysis. In that sense, the translations must be considered as free translations.

Analysis

The transcripts were analyzed using ATLAS.ti, a software package for qualitative analysis. The analysis involved a lengthy process of reading and rereading the data and coding the fragments according to two research questions: Which roles and responsibilities with respect to the innovation trajectory of personalized nutrition are being constructed and what objectives are these descriptions designed to achieve? Three analytic levers were used to identify the different so-called interpretative repertoires (see below under ‘Results’) that participants deployed in their accounts of the innovation trajectory:

- Variability: the use of different versions of the same phenomenon is known to signal different interactional goals.
- Rhetorical character of the talk: the analyst inspects what version of reality is being denied or resisted by the present version as a way of understanding for what purposes the current description has been selected by the speaker.

Box 2. Interview key topic list

1. Product orientation related to the innovations
   - Relative (dis)advantages: effectiveness, accessibility, usability
   - Integration in working practice: complexity and compatibility

2. Social–ethical issues of the innovations
   - Collective issues/impact on society: e.g. responsibilities for health, societal values and norms, misuse, trust in health sector
   - Individual issues/impact on individuals: e.g. responsibilities for health, social-cultural habits, values and norms

3. Preconditions for collaborative interactions
   - History of collaborative interactions: experience
   - Motivating factors: e.g. common goal, power relations, mutual dependency
   - Limiting factors: e.g. distrust, insecurity about collaboration
   - Facilitating factors: e.g. participant’s characteristics, number of participants, power relations, leadership
Participants’ uptake of interviewer’s talk: how are participants treating the interviewer’s talk, what are they making relevant and to what interactional ends? [see also 36, 38]

In line with the nature of qualitative research, no claims are made for sample representativeness. This study can, however, be considered a grounded indication of a research phenomenon that deserves further attention and therefore may inform further analysis over a larger data corpus.

Results

Introductory observations

It is important to note first that the stakeholders did not offer one single version of their role and of their responsibilities in innovations and collaborative interactions. Rather, they drew on three different sets of accounts. All accounts except one were used to create distance between the innovation and the respondent’s own role and responsibilities, rather than constructing engagement in this stage of development as an opportunity to take action. The sets of resources that speakers used to construct the different versions are known in DA as interpretative repertoires: ‘broadly discernable clusters of terms, descriptions and figures of speech often assembled around metaphors or vivid images’ [44]. We distinguished three interpretative repertoires:

1. Waiting for certainty: innovation in relation to scientific evidence.
2. Gatekeepers of innovation: innovation in relation to the needs and wants of the public.
3. Fixed roles: innovation in relation to the flexibility of their own and other stakeholders’ responsibilities.

The repertoires were used to accomplish six different goals (Box 3) that we will discuss in more detail in the following sections.

Box 3. Interactional goals accomplished by respondents

1a. From practice to science: first deliver better evidence
1b. From behavioral science to practice: do not rush things
2a. Protecting the public against innovation
2b. Pushing innovation because people want it
3a. You know, it is not up to me
3b. You see, it is up to them

Repertoire 1: waiting for certainty

The first repertoire that respondents used presents personalized nutrition as not yet evidence based and therefore not meeting the standards for intervention in practice. This account is in line with what can be termed the golden working standard in HP. HP experts are nowadays expected to demand evidence so as to safeguard optimal effectiveness of interventions [cf. 45, 46]. Speakers constructed the innovations as not yet evidence based so as to account for a cautious, wait-and-see policy without compromising their expert identity. This repertoire counters potential accusations of just being uninterested or resistant to innovation. It formulates respondents’ attitudes as not so much being about unwillingness but about ‘not being able to’: they first have to wait for certainty. The repertoire also provides the respondents with a relatively safe position in yet another sense. It prevents potential accusations of being unprofessional by supporting innovations before evidence is available.

This repertoire was used in response to questions about innovations in relation to the effectiveness of nutrition interventions. By laying emphasis on the need for evidence, speakers suggest that, if the uncertainties were eliminated, their role and responsibilities would become more substantial. The ‘waiting for certainty’ repertoire was used to accomplish two goals. In the first version, ‘scientists’ were constructed as not able to provide the evidence needed. In the second version, ‘practice’ (health educators, industry) was constructed as being too
hasty, not allowing enough time to provide evidence about the innovations. Both versions will be discussed separately.

**Goal 1a. From practice to science: first deliver better evidence**

All speakers, except of one respondent from industry, constructed innovations in personalized nutrition advice as not yet evidence based, allowing for a wait-and-see policy while safeguarding their expert identity. The respondents drew upon uncertainties about the relation between nutrition and health on a personal level, about the effectiveness and social impact of using the Internet, and the utility of information about genes to create a distance between the innovations on the one hand and their current usefulness in nutrition interventions on the other. The following extracts are illustrative of how they accomplished this goal:

*Extract 01*

[Interv.—269] In genetic diagnostics, there are so many uncertainties that the contribution towards people changing their behaviour is not very big [270–86 omitted].

[IND—287] I think that solely individual advice could play a role if there’s a very direct relationship between findings and outcome, preferably one to one.

*Extract 02*

[Interv.—271] We still have five seconds for what you’d like to say about nutrigenomics.

[HE—274] I’m actually very skeptical, and the most recent European nutrition conferences have confirmed my views on this. I suddenly noticed that people were talking quite realistically about genomics, whereas before that they talked as if everything were possible.

In Extract 01, the interviewee builds on the interviewer’s remark about uncertainties in genetic diagnostics by stating that no advice should be given without clear evidence. Similarly, Extract 02 shows a waiting attitude attributed to a lack of convincing evidence. The respondent underlines the legitimacy of his doubts by referring to the fact that the scientists themselves have become more modest. The skepticism fits the attitude of a critical expert who does not support just any innovation. It is not that the speaker does ‘not want’ to play a more active role, it is because he cannot at this moment—he needs to let science find out first. In the next extract, the speaker not only distances himself from the innovations on the basis of evidence-based standards but also underlines the relevance of these standards with respect to general nutrition advice.

*Extract 03*

[Interv.—765] What’s the story with nutrigenomics?

[ME—768] That’s a hard one, things will have to be developed a lot more before that happens. I’d almost say, for example, current advice on nutrition. Someone has argued for, and I support it, they say, actually you should submit nutrition advice to the same regime as new medicines, the same test.

The speaker’s account that nutrition advice fails to meet evidence-based standards and his demand for ‘the same regime as new medicines’ [Extract 03—768] portray him as someone strict about scientific standards, i.e. not easily convinced by the promise of an early innovation. The extract defines the provision of evidence as the main problem faced by the field of nutrition advice. Evidence comes first and before that no actions can or should be taken. The use of the repertoire implies that, in an early stage of development, apart from asking for more scientific evidence, this group of stakeholders defines its ‘own’ role in coshaping the innovations toward consumers’ needs and aspirations as very limited, or rather, as non-existent (This is not to say that evidence-based working is not a valid approach; however, we want to point to some of the, often unnoticed, limitations of such an approach—see also ‘Conclusion and Discussion’.). Note that this is also true for an allegedly critical outsider, a journalist [Media]. Whereas this might be the phase in which the black box of technology can be opened up to wider public scrutiny [cf. 32], and not only with respect to its efficacy and benefits, stakeholders restrict their involvement to questions of evidence that others should resolve.
Goal 1b. From behavioral science to practice: do not rush things

Besides the first version, two behavioral scientists used another version of the waiting-for-certainty repertoire. As in the first version, they constructed the innovations in personalization as not (yet) evidence based. The difference between the two versions arises in relation to who is to blame for not living up to the respondents’ evidence-based standard. This version constructs stakeholders ‘in practice’, who already apply new personalized interventions or heavily invest in future gene-based applications, as the ones who should not be pressing for action. In relation to the validity of advice on a personal level, scientists are asked for more evidence (Extract 04). In relation to the uncertainties about the social impact of the innovations, these stakeholders refer to their own role as behavioral scientists (Extract 05).

Extract 04

[Interv.—251] But from your point of view, from that of Personalized Diets through IT, are there already issues there that you identify?

[SC—254] Well, I’ve said that comes down to a different level. You’re talking about risks, about extrapolating that epidemiological data to individuals, as I’ve said. You know that it applies to a population, you don’t know if it applies to an individual. That is one of the major fallacies that we apply [254–64 omitted]. And that is a great dilemma. Because if you say ‘you’ then people say that must be important. But in actual fact you’re giving false information.

[Interv.—270] Have you taken that into account?

[SC—271] Yes, we’ve had a fight about that with [organization]. Because [organization] wanted to include it and I tried to dissuade them.

The speaker constructs the lack of evidence as ‘fallacies’ that lead to providing ‘false information’ [Extract 04—254] while simultaneously (after being invited by the interviewer) managing his own responsibility: ‘I tried to dissuade them’ [Extract 04—271]. The responsibility for pushing applications that are not yet evidence based is attributed to organizations working in the field, suggesting that they should not be so impatient and give the scientists time and space to eliminate the uncertainties.

Extract 05

[Interv. —292] The government, they invest a great deal in nutrigenomics. They see that it might limit the costs of lifestyle-related disorders.

[SC—295] I’ve still got to see that, that’s been known for a long time. Prevention measures and promoting a healthy lifestyle, to be sure, are not yet completely broken down into specific risk groups, but we’ve known that for a long time [296–346 omitted].

[Interv.—347] The government and scientists claim: this will lead to better prevention of diseases of affluence. That only happens if people change their behavior.

[SC—350] That’s a strange rationale, because you first need to invest more in developing behaviour change interventions. But apparently it appeals more to the government to invest money in that, if you look at what goes into prevention research.

In Extract 05, the innovation is constructed as not evidence-based because of the lack of certainty with regard to its behavioral impact. Why invest in dubious innovations when other evidence-based opportunities to address health exist? The desire for more behavioral research is accounted for in terms of making the innovation more effective, thereby also avoiding the accusation that calling for such research would produce a job for themselves.

In both uses of the repertoires (1a and 1b), the call for evidence makes available a robust explanation as to why the stakeholders avoid collaborative interactions. Rather than engaging the public and/or reflecting upon the innovation with other stakeholders, they are waiting for certainty to arrive. The respondents present other parties as overly hasty, and wanting to push them, whereas there is no basis on which to do so.

Repertoire 2: gatekeepers of innovation

In the second precondition that stakeholders drew upon, they sought to construct the innovations as not yet providing a reason for them to initiate collaborative interactions related to the public (clients, patients or consumers). In this repertoire, speakers
established themselves as gatekeepers or controllers of the innovation trajectory by drawing upon experiential knowledge about the public. This repertoire was used for two contradictory goals: (2a) to create distance between the innovation and their own role and responsibilities, while preserving their expert identity and (2b) to allow for a proactive role in applying the innovations before uncertainties are eliminated, without compromising their expert identity. It is characteristic of both versions that respondents placed responsibility for the innovation process on the public, rather than making their own role and responsibilities explicit. Also, they constructed a homogeneous public that was in need of protection against, or demanding, innovations in personalization.

Goal 2a: Protecting the public against innovation

All stakeholders used the first version of the gatekeeper repertoire. It appeared in combination with the first repertoire about uncertainties in response to how the innovations could play a role in nutrition interventions. Speakers drew on their experiential knowledge about public needs to construct the innovations as not meeting societal preconditions, such as accessibility and simplicity. This experiential knowledge entitled them to establish themselves as gatekeepers who have to consider their public [cf. 47]. In this case, the public needs to be protected against current applications of innovations in personalization, thereby allowing for a—now reasonable—request to slow down the innovation process on behalf of the public. The wait-and-see policy that could already be achieved with the first repertoire is thereby further elaborated. Possible accusations of just being uninterested, lazy obstructionists, a luddite or a laggard in innovation can also be successfully managed: these stakeholders rationalize that ‘it’s not that I do not want to be involved, it’s because the public needs my protection’. The responsibility for moving the innovation process forward, or not, is thereby assigned to the public rather than to themselves. In this version, respondents often draw upon the complexity of handling risk information. Especially, in relation to information about genes, they treat the public as not capable of dealing with the uncertainties, as illustrated by Extract 06:

Extract 06

[Interv.—238] How do you regard the nutrigenomics story?

[SC—241] I think that people who hear, ‘you have an abnormal profile’: on the one hand that can be seen as terrifying information and people are not at all prepared to deal with that.

[Interv.—244] Drop the whole test?

[SC—47] That would also be possible. It is very important for there to be effective communication about this, so that people can interpret something like that properly. That’s already a problem. Then you don’t know how it will turn out. Some people will think: ‘oh no, I won’t do that, after all, I can’t do anything about it, so just leave it.’ People who get a test result with a favourable profile: you don’t have to be so concerned. They also don’t have to stick with anything. Those are the negative consequences that this sort of thing can have.

The speaker draws upon experiential knowledge to construct the innovations as leading to ‘terrifying information’ [Extract 06—241] and people who cannot deal with test data. Members of the public are constructed as homogeneous: their reaction is negative in relation to health behavior change, being either ‘I won’t do that’ or ‘don’t have to stick with anything’ [Extract 06—247]. Extract 7 shows how a public demand for zero uncertainty is being constructed:

Extract 07

[Interv.—133] Do you think that genetic predisposition plays a role somewhere? If your father dies of a heart attack?

[SC—136] I think that plays an enormous role. I think, and I can’t say that I’ve noticed it specifically, that ordinary people can do very little with genetic risk. The same with presenting it properly in scientific terms. It quickly becomes a kind of one-to-one relationship: you have a genetic predisposition, so you’ll fall ill.

This respondent constructs zero uncertainty as the thing that people want, as well as representing the
way in which science must communicate it to the public in the form of scenarios. Without this kind of gross simplification, the public cannot deal with the information about food, genes and health. The innovation itself is thereby formulated as more technology pushed than wanted. Note that we do not aim to treat these accounts ironically or expose them as untrue.

We seek to show that these deficit accounts of the public [cf. 18 about deficit models of public understanding] work to establish the almost complete absence of a role for the stakeholder. Speaking on behalf of the public is a discursive resource for presenting the innovation (trajectory) as something the public cannot deal with, rather than as something in and for which the stakeholder claims his/her own role.

**Goal 2b: Pushing innovation because people want it**

The gatekeeper repertoire was used to construct the innovations not only as not meeting societal desires but also, conversely, as being pushed by the public’s needs and desires. All speakers, with the exception of two respondents from health care and the journalist, built their argument by displaying experiential knowledge about the public wanting the innovation. The difference between this and the first version resides in how the public is depicted. In the first version, the preconditions (for an effective innovation) of accessibility and simplicity are based on a public in need of protection. This version designates the public as autonomous, capable of making their own decisions, decisions that gatekeepers need to consider. Enthusiastic reactions of the public to personalized interventions were drawn upon to allow for a facilitating gatekeepers’ role. This version was put forward in the context of current applications of personalized nutrition, as also in relation to speakers’ own initiatives therein in this field. In line with the prior gatekeeper version, responsibility for the pace of innovation lies not with the respondent but with the public:

**Extract 08**

[Interv.—262] What happens now with the people who stand on them? [=personal assessment devices in the supermarket, see Box 1] [265 omitted].

**HC—266** There’s a lot of interest. I thought that no-one would stand on them. But people just go and stand on them, right in the middle of the shop. After all, there are lots of people who want to look into it themselves. Without anyone else getting involved.

**Extract 09**

[IND—149] People really do like to find out their ‘real age’ [website and television program that calculates someone’s ‘real age’ based on physical and lifestyle risk indicators].

[Interv.—152] And there are lots of comments about it too.

[IND—155] Yes, but that’s us here, the scientists. Is that correct, those six years and such. But I find that doesn’t matter, they have lots of visitors.

This version enabled respondents to account for their own proinnovation attitude on the basis of what people want. Note that the distance between the people and their own professional role is carefully protected, either by emphasizing that the people want it themselves without someone pushing them (Extract 08) or by distinguishing a scientific assessment from what people think (Extract 09). This version also protects their expert status from being harmed by appearing to contradict evidence-based standards. They used their gatekeeper’s identity to manage possible accusations of not being critical, being proinnovation before uncertainties are eliminated, suggesting that it is their role as gatekeeper to consider public wants. In line with the first version of this repertoire, responsibility for the pace of the innovation process is thereby assigned to the public.

**Repertoire 3: fixed roles**

A third repertoire attributed the potential success (or lack of it) of the innovation to the flexibility or rigidity of roles and responsibilities. All participants except the philosopher used this repertoire. This repertoire was evoked so as to (re)assign responsibility for flexibility in innovation trajectories to others. It was deployed in response to questions about integration of innovations in society as well
as about the effectiveness of collaborative efforts. We distinguished a clear difference between making sense of one’s own role and appreciating the role of ‘others’ in collaborative interactions. Considerations about their own role were formulated as self-evident truths such as having a commercial stake, thereby presenting their (alleged) tasks in relatively fixed terms. In contrast, evaluations of other stakeholders’ roles were presented as based on the experience that they change over time, suggesting that these roles are subjective, situational and changeable. This repertoire was used to accomplish two goals, namely: (3a) to allow for a limited professional role in the innovation trajectory because that is how things work and what people expect of one and (3b) to allow for a limited role because other stakeholders do not facilitate innovations and should change first. The difference between the repertoires lies in what respondents construct as the cause of not being able to change. In (3a), changing one’s own role is constructed as beyond personal influence because it does not fit professional codes of what to expect from the different players in the field including one’s own, whereas in (3b) the focus is on other stakeholders’ roles that do not facilitate and support their willingness to change.

**Goal 3a: You know, it’s not up to me**

Participants drew upon characteristics of their own job in response to questions about effectiveness of nutrition interventions and their own role in collaborative interactions. They constructed a fixed role by building their arguments on the basis of normative assumptions about how things (should) work such as ‘industry has to make profit’ and ‘doctors work curatively’ (reactively rather than proactively). This is illustrated by Extracts 10 and 11:

**Extract 10**

[Interv.—145] So is an active role [in directing patients to health websites] for the GP all the same, and unsolicited?

[HC—148] That remains to be seen, I do that for myself. I don’t see it as the GP’s job to actively direct patients to all kinds of authorized health sites. That’s going too far. They come into the picture when someone’s ill. That’s when you get the most benefit from them. All that preventive business, you support it as a GP. There’s always the idea that if intermediaries don’t support such a step, it’ll come to nothing. But the active role starts when people are sick.

**Extract 11**

[Interv.—147] But what is the biggest problem if you want to have people working together? What are the conditions?

[IND—150] A company’s commercial interests always play a role. It’s really not a matter of the greater good, oh look, we want to make all Dutch people healthy. That doesn’t fit with a commercial company.

In Extract 10, the description of the GP’s role as mainly curative (for example: saying ‘they come into the picture when someone’s ill’) while simultaneously underlining his own active role enables the speaker to account for a relatively passive role on the part of GPs with respect to innovations, without endangering his own preparedness. In Extract 11, the speaker admits industry’s potential stake and thereby turns it into a fact of life, not something to be changed easily. The normative character of the accounts, i.e. in terms of what we can and cannot expect from GPs and industry, is helpful to counter possible accusations of not wanting to join early initiatives in coinfluencing the innovation. Their roles are not subject to personal influence, suggesting that this is about ‘inability’, rather than ‘unwillingness’.

**Goal 3b: You see, it’s up to them**

In the second version of this repertoire, speakers drew upon their history of collaboration with other stakeholders to play up their willingness to change and other stakeholders’ lack of facilitation of such change:

**Extract 12**

[Interv.—052] How do we in the Netherlands deal with this knowledge? [about determinants of behavior as known from literature]
Hardly at all. By the bodies promoting health, still hardly at all. We now know step 1, what the problem is and also the determinants. But how you now deal with determinants of behaviour, you have to use feedback, you have to use behavioural journalism, modelling, skills training, there’s still very little happening on that front.

Why is that?

Because it takes a lot of time. And that’s frequently not available. And the expertise is certainly not properly organized.

How do you see that, a collaborative project?

We’re still rather reticent in that respect [participation in a collaborative project initiated by a local health organization] because we first want to know, okay, what exactly is going to happen, everything has to be done from the basic grant, VWS [Dutch Ministry of Health] has no money for it. Well, we can scarcely get by on our grant so before we launch into that, we’ve said, first we want to see and hear everything.

This version was used in response to questions about effective nutrition interventions and about successful collaborative interactions, current initiatives and who should be involved. Speakers constructed their own fixed role based on other stakeholders’ practical restrictions such as a lack of time and money, but also a lack of expertise and prioritization of HP interventions. Thereby, they characterized their own role in the development of more effective interventions as currently fixed; they depend on other (unwilling or incompetent) stakeholders that need to change their role and responsibility first. The role of these stakeholders is, in contrast to the first version, dependent on change: it is up to others to change first.

Conclusion and discussion

We identified three sets of repertoires by which actors constructed personalized nutrition as an innovation that is largely beyond their current responsibilities. The repertoires were organized around three related themes, namely: (i) the status of evidence, (ii) the position of the public and (iii) the flexibility of roles. All repertoires were used for at least one purpose, i.e. to account for a wait-and-see policy concerning the innovation under development. This leads us to conclude that the stakeholders did not construct their own position in the innovation trajectory, or their relation with the public, as providing opportunities for the coshaping of an innovation that contributes to more effective nutrition interventions. On the contrary, personalized nutrition was conceptualized as an innovation that was not yet evidence based, a construction that allowed actors to build up and maintain their expert status. We are not claiming that personalized nutrition is a technology that should be accepted at face value. Our argument is that if one seeks to engage stakeholders in the early stages of innovation trajectories, one of the preconditions is that stakeholders themselves treat these stages as an opportunity for coshaping technologies (Note that coshaping does not presuppose facilitating the introduction of the technology; it may also include resistance). We will discuss this in more detail in the following sections (see also Fig. 1).

Uncertainties treated as a barrier to action: about evidence-based expertise

This study has shown that stakeholders treated uncertainties as ‘barriers to action’. Dealing with uncertainties as an opportunity for action and one’s credibility as an actor in the innovation process were constructed as mutually exclusive. The status of HP experts was built around evidence and therefore did not allow for uncertainties as a basis for action. As mentioned, evidence-based work has become an important principle in HP. It is therefore not remarkable that these standards play such an important role in the stakeholders’ accounting practices. However, one important consequence of limiting oneself to evidence-based work, and legitimizing one’s attempts accordingly, is that taking collaborative or any other initiative is not an accountable act as long as uncertainties cannot be excluded. As innovation
processes are particularly larded with uncertainties, this is a hard dilemma to resolve.

The more general dilemma about early involvement in times of uncertainty, and thereby bringing in a wider range of social and ethical issues into technological decision making, is known in the literature as the Collingridge dilemma: ‘in order to minimize any negative impacts of a technology, it is in theory most effective to influence the technology early on in the development process; once a technology has been designed, there is little left for stakeholders in society to do except either approve or reject it’ [48]. It is important to notice that influencing the technology encompasses more than modifications as to meet the consumer’s needs and wants, but also refers to more radical shifts in the definition of the problem that the technology claims to solve or the risks that are involved [see also 32, 49].

There may be an additional reason as to why early stakeholder involvement and collaboration is treated as problematic: from a stakeholders’ perspective, taking action can be viewed as acknowledging the a priori relevance and usefulness of the innovation. In contrast, this is not an issue in other collaborative HP interactions, where the relevance of promoting healthy eating and the benefits of doing this jointly are treated (at least theoretically) as a fact. Here, the debate is not so much about the shared problem and goal but about the road toward accomplishing the goal. Innovations, on the other hand, may be subject to fierce debate, especially at a later stage of development. In this respect, it is important to note that collaborative initiatives, either toward members of the public or a broader circle of stakeholders, do not need to be restricted to matters of efficacy and efficiency and/or focus on attempts to avoid public controversy. Early stakeholder involvement may, and in many cases should, also involve a much more critical perspective, such as revealing the tacit assumptions of technology development and opening them up to public scrutiny [see also 32 and below].

**Homogenizing the public: gatekeepers of innovation**

For stakeholders themselves, the gatekeeper role provides a neat distance between innovation processes on the one hand and current roles and responsibilities on the other. However, the construction of the public as a homogeneous group, either in need of protection or depicted as driving the innovation, also challenges the added value of diversification in expertise and experience in collaborative efforts. Deficit models of public
understanding [cf. 18] designed to explain a lack of acceptance of technologies were only possible on the basis of a singularized view of members of the public. A second and related implication of defining a uniform public [see also 33] is that the public is denied a more active role. Although the value of public participation is widely recognized in HP and innovation literature [18, 27, 46], most stakeholders in this study treat the public as in need of gatekeepers not able to voice their own ideas and concerns. In doing so, they do not have to question their own role and responsibilities in the process, or the validity of their construction of the public, while conceding only little attention to the possible value of participation by the public [for similar criticism, see 50]. The stakeholders also constructed a public that is not capable of handling uncertainties, as shown by the first version of the gatekeeper repertoire. Biotechnology experts were shown to use similar arguments about how lay people react to uncertainties in risk information, such as in their construction of the public as ‘needing zero risk’ and in stating that ‘the most important problem is ignorance of the public on scientific facts’ [49, 51]. Our results add to these findings by showing that stakeholders themselves actively use these arguments to create a distance between innovations and their own role and responsibilities. Uncertainties are drawn upon by actors themselves to construct barriers ‘before’ collaborative interaction even takes place.

Fixed roles: about immovable positions and responsibilities

In our study, the roles and responsibilities of stakeholders were more or less conceptualized as fixed. Such resistance to change is also known from attempts to include preventive actions, even evidence-based prevention, in the family doctor’s practice. These were hindered by the doctors’ curative paradigm [52, 53], an argument that was also found in this research (Extract 10). Technological innovation processes require even more flexibility, but the prescribed roles that stakeholders have been shown to construct seem to limit such possibilities. In the ‘it’s-not-up-to-me’ repertoire, they externalize their role as a phenomenon ‘out-there’, with the strong normative implication that most change is not subject to personal influence. Change is directed to other stakeholders in the second version of the fixed role repertoire, again excluding flexibility of their own job. The sense of mutual dependency needed for successful collaborative interactions is clearly challenged by the use of this repertoire.

Reflecting earlier findings about collaborative initiatives, our findings support the known challenges in relation to the preconditions for accomplishing more than could be done alone: setting clear goals, taking social responsibility for HP activities and mutual dependency. What we have added is insight into the issues of (uncertainty, selective usage of experiential knowledge and fixed job descriptions, or professional roles, that may interfere with collaborative initiatives among stakeholders (see also Table II). Also, the focus of stakeholders on evidence suggests that the relevance and usefulness of a technology is mainly determined by the availability of scientific proof. Critical reflection beyond evidence is thereby more or less blocked, limiting the multidimensional view needed to address issues such as (un)healthy eating and the complexity of settings in which efforts to influence unhealthy eating would be practiced. Questions such as: Is this the way we want to go in nutrition interventions? are hardly touched upon.

Macnaghten et al. [32] argue that the construction of technology as black boxed limits the framing of social questions to impacts or risk issues, to be handled downstream in the innovation process. Political questions about purposes, ownership and responsibilities in early stages of the development process are largely ignored. Attention to the ways in which these kinds of social and ethical considerations can be built into the technical and scientific agendas at an early stage will become even more urgent as the development of such agendas becomes more privatized.

The findings of this exploratory study need to be interpreted in the context of the limited number of participants that were all of Dutch origin and working in the Dutch context. However, we believe that our findings are sufficiently important and generalizable to other settings and health innovations to be
taken into consideration when collaborative initiatives are pursued. They show some of the discursive resources that stakeholders use to account for their participation, or lack of it, and place the known challenges in a new perspective. More research is needed among a larger group of stakeholders with specific focus on how evidence, the public, and fixed roles are treated with respect to stakeholders’ role, responsibilities and initiative in early phases of technology development. Repertoires, and their usages, may differ among different sorts of stakeholders, for example between immediate and distanced outsiders [cf. 33]. Greater reflexive awareness among stakeholders about their own discursive practices is needed before any change can take place. In this respect, it would be interesting to initiate action-oriented research by integration of our preliminary findings into existing needs assessment tools.

Although we cannot, and do not want to, predict how and whether personalized nutrition innovations will develop into actual advice and products, visions of the future can be beneficial for stimulating learning processes about possible impacts and future actions.

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### Conflict of interest statement

None declared.

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