

The Social Nature of 'Global One Health'

An analysis of life science and social science interactions within Wageningen University and Research's 2014-2018 investment theme: 'Global One Health'

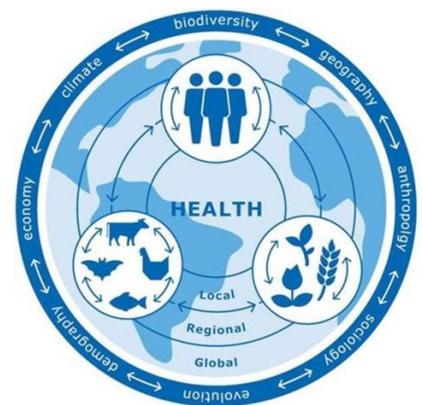
Summary: The contemporary study looked into the extent and nature of supradisciplinary collaborations within Wageningen University and Research's 2014-2018 investment theme Global One Health. An analysis of year reports showed the extent to which projects were supradisciplinarily operationalized, was fairly limited. Interviews with scientists from life sciences (LS) and social sciences (SS) revealed constraining, facilitating and undecided factors with regards to successfully effecting supradisciplinary collaborations between LS and SS. For all three categories, results yielded a significant role for interpersonal communications and relationships. Recommendations for future supradisciplinary work based on the study are: altering the (self)image of SS, facilitating space to explore the unfamiliar, and using the available knowledge on successfully executing supradisciplinary collaborations. It seems more focus on the Social Nature of Global One Health could have been beneficial for the extent and nature to which the investment theme effected fruitful supradisciplinary collaborations between LS and SS.

1. Introduction

Research transcending multiple disciplines, also called *supradisciplinary* research e.g. by Kotter, Balsiger, Bailis & Wentworth (1999), has been on the rise for nearly a century now. This integration of different disciplines in research can be done on multiple conceptual levels, the main three being: multi-, inter-, and transdisciplinarity (Oliveira, Amaral & Pacheco, 2018). Supradisciplinary research is a desired concept for problem solving, yet putting it to practice in a fashion that reaps fruitful results has a tendency to be highly complex and is influenced by multi-levelled barriers and drivers (Oliveira et al., 2018). Whilst contemporary research is characterised by both intense specialization as well as supradisciplinary approaches (Mazzocchi, 2019), more insight is needed in how effective the true nature of supradisciplinary research is, and why barriers still have not been overcome.

Wageningen University and Research (WUR) is an institution that likes to advocate its integrated approach, or “the close collaboration between different fields of expertise including both natural and social sciences”, as WUR states it (Wageningen University and Research, 2019). Yet how integrated is WUR when it comes down to it? Researchers at WUR are generally aware of the norm on integration, but the ways these researchers go about their professional activities and integrated collaborations have remained inexplicit until now. Explicitly stating these is essential, as they could serve as a first step towards a future approach that effects fruitful, smooth collaborations between different disciplines at WUR.

In 2014, Wageningen University and Research (WUR) decided on five investment themes for the period of 2014 until 2018. One of these themes was a Global One Health (GOH), which is an approach integrating the One Health and Global Health concepts, focusing on both the interconnectedness, as well as the global nature, of arising wicked health problems regarding humans, animals, plants, and the environment (Fresco et al., 2015). An important aspect of the GOH approach was its focus on interdisciplinarity.



The GOH theme was able to fund a total of nine research projects. Eight of these projects were initially granted funding from the GOH theme; these were all initiated and led by researchers educated and working in life science (LS) domains, although attempts were made to get projects initiating from social science (SS) funded as well. Additional factors, such as the ratio of researchers educated in life science, as well as the diversity in domains of social science contributions, raised some questions around the nature of supradisciplinarity, the role of social science (SS), and the LS-SS interactions within the GOH theme. And so, the final ninth GOH project that was granted funding, is the contemporary study: The Social Nature of a Global One Health. The contemporary project was the only GOH project led by social scientists and was effected a ‘smaller’ version of the proposed project.

The projects subject to the present study were titled:

1. *Reduction of airborne endotoxins in animal production to improve human and animal health*
2. *Sustainable food systems for healthy people*
3. *Blood-feeding midges as models for the role of microbiomes in the transmission of diseases*
4. *Risks of livestock manure application*
5. *Emerging zoonoses in relation to changing socio-economic environment*
6. *Reduction of obesity and related diseases by targeted nutritional treatment*
7. *Modelling multi-scale exploration of synergies between human and environmental health*
8. *Role of wildlife in the dispersal of antimicrobial resistance*

These projects looked into different aspects concerning Global One Health. The eight projects were initiated by intra-institutional WUR research groups, and six of the eight projects were supradisciplinary, meaning more than one discipline was involved in the execution of the study.

1.1 SUPRADISCIPLINARY RESEARCH

Supradisciplinary scientific practice was defined by Kotter et al., (1999, pp. 99-100) as “*all forms of scientific collaboration where the field of a single discipline is transgressed*”. Supradisciplinary can happen in two types of collaborations, international and intra-institutional (Larivière, Gingras, & Archambault, 2006), and it consists of three main concepts: at first multi-, then came inter- and, finally in the 1970’s, transdisciplinary approaches to doing research. The term ‘interdisciplinarity’ is however often used as a collective term for all these components, sometimes complicating what is meant by each of these individually; hence, the use of the term supradisciplinary in this paper.

These conceptual levels of integration incrementally increase when going from multi (non-integrative) to transdisciplinary (fully integrated; become one) research (see Figure 1: Oliveira et al., 2018). In order to solve multi-levelled, highly complex societal problems, it is repetitively claimed the most intensive form of collaboration is needed: transdisciplinary research (TR). What is looked for in this study are collaborations that transcend simple multidisciplinary; the aim is for at least an interaction (interdisciplinarity) but a preference for collaborations that result in a total that is more than merely the sum of its parts ($1+1=3$). Thus, the term supradisciplinary when used in this paper is a collective term for interdisciplinary as well as transdisciplinary practice.

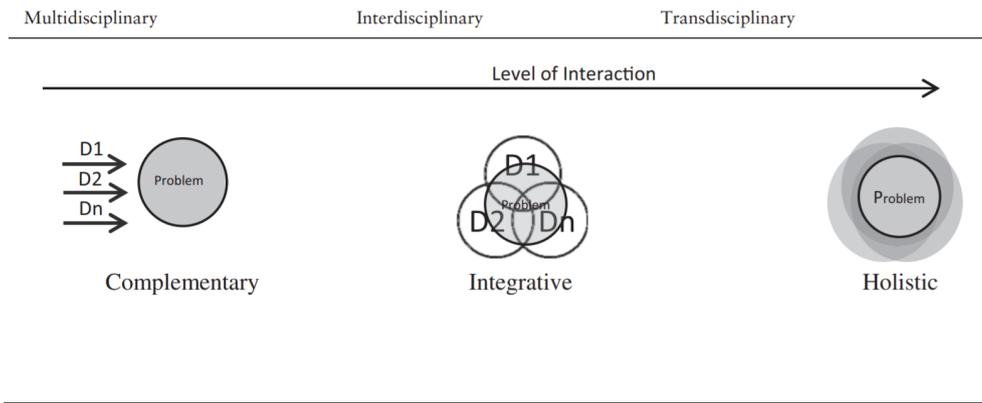


Figure 1. Overview of different supradisciplinary approaches (Oliveira et al., 2018)

The world of today is facing many dynamic, complex societal problems. These wicked problems consist of multiple relations at several different levels that are hard to grasp, and there is an enormous diversity of perspectives on how these problems ought to be solved. However, for a considerable amount of time now there has been a general agreement on the point that monodisciplinary no longer seemed to suffice for moving the world away from complex societal wicked problems. Historically, Klein (1986) described that the conceptual development of all forms of supradisciplinary was initiated by the existence of these unsolved problems; i.e. supradisciplinary mainly functioned as a way to solve complex societal problems. Pohl and Hadorn (2008) built on this by describing TR as a goal to help solve, mitigate, or prevent life-world problems and that TR attempts this by developing descriptive, normative and practice-oriented knowledge.

Highly integrative ways of working tend to increase the legitimacy, ownership and accountability for the problem and the solution (Lang et al., 2012). This is in line with the general consensus on the purpose of supradisciplinary research: providing solutions. In these attempts for solutions, goals, norms and visions need to provide society with guidance for transition and intervention strategies for these wicked problems (Lang et al., 2012). Yet even as early as the 1920's, records of low success rates (due to high expectations) started to develop and thus many accounts surfaced discussing the disputability of supradisciplinary research (Klein, 1986). Was this because supradisciplinary approaches are truly ineffective, or was this because barriers still had to be overcome? This leaves to wonder about the purpose of supradisciplinary research. To what extent can it fill the shoes of the silver bullet that is supposed to mitigate complex societal issues? Is one purpose

of supradisciplinary research perhaps not also merely the cultivating of knowledge? And to what extent are these two mutually exclusive?

1.2 SOCIAL SCIENCE AND LIFE SCIENCE INTEGRATION

So knowing supradisciplinary research is supposedly needed, how does the integration of social sciences¹ and life sciences² fit into this? Wicked problems have a tendency to both relate to the social sciences arena (human behaviours and institutions), as well as the natural or life sciences arena (technological challenges). Therefore it is crucial for social scientists to have more effective collaborations with life scientists. Benefits of well-effected integrative collaborations could include more fruitful results working towards mitigating wicked problems when compared to merely monodisciplinary or multidisciplinary work.

Barthel & Seidl (2017) investigated the prevalence of interdisciplinarity between natural and social science in groundwater research, and found that a general awareness of the added value of TR exists, as interdisciplinarity was mentioned 10 times more often when compared to 50 years before the study, and the mentioning of SS keywords increased from 2% to 30%. Yet simultaneously they showed that, while there is a lot of talk about TR, the actual effecting of integrating LS-SS in operationalizing groundwater research has remained a truly negligible amount. But then, if it is so effective for LS and SS to collaborate, and it appears concomitant awareness of the necessary reasons for doing so exists, why can more effectively integrated LS and SS collaborations not be seen throughout?

When planning a study, at least three elements determine the setup, namely the world view of the researcher, the research designs related to this world view and the concurrent research methods (Creswell, 2014). These lead to several challenges that become relevant when practicing TR. General barriers for integrating approaches are differences in epistemological assumptions (Lowe,

¹ The connotation of social sciences in this paper is broader than the strict definition of social science; by social science in this paper is meant any and every discipline not part of life sciences, meaning SSH, however in Wageningen mostly (although not confined to) social sciences

² For the purpose of this study, the terminologies of '*natural sciences*' (as used by WUR), '*hard science*', and '*technological science*' are regarded as synonymous to the term '*life sciences*'

Phillipson and Wilkinson, 2013), of which the majority of differences tends to be explained by differences in methodological preferences (Pohl, 2008). Clinch, Shaw, Ashcroft and Swinglehurst (2019) make a distinction between institutional barriers and epistemological barriers for interdisciplinary research between life sciences and other sciences.

Also, there are barriers that specifically apply to LS-SS collaborations³. Specific barriers for LS-SS collaborations include involving SS as an end-of-pipeline role, or separation of financial resources (Lowe, Phillipson and Wilkinson, 2013). Also, Jaffe (2014) points out that SS and LS differ in their research strategies, because they have adapted to different knowledge landscapes, which might serve an additional challenge. Viseu (2015) pointed out that asymmetry between LS and SS can be seen in various aspects of the collaborations, such as power relations, funding, team make-up, knowledge production, and levels of independence. Also, Viseu describes that years of working in LS-SS collaborations as a social scientist has taught her these collaborations are deeply asymmetrical, due to the fact that SS are typically brought in after the project has taken shape.

The timing of involving SS into a project is a critical note that is mentioned by a plethora of other studies (Fox et al., 2006; Holm et al., 2013; Lowe et al., 2013; Viseu, 2015). This can of course happen in different stages, e.g. at the very start of the project before it starts to take shape. Other possible moments for involving SS are after the project has taken shape, but before the operationalization stage has begun. Another option would be after the operationalization stage when it is questioned how the results are going to be translated to the general public. Literature mentioned the preferred stage of involving SS to the projects is at the very beginning before anything of the research projects is designed (Holm et al., 2013), yet showed that the most common practice tends to be involving SS at the finalizing stage(s) of the project, fulfilling an 'end-of-pipeline role' (Fox et al., 2006; Holm et al., 2013; Lowe et al., 2013; Viseu, 2015).

Barthel and Seidl (2017) indicated that citations are another dimension which might form a barrier, as articles deriving from SS receive less citations than articles within natural or life sciences, as well as the fact that multidisciplinary articles receive considerably less citations than monodisciplinary articles. This last

³ *LS-SS collaborations* meaning a collaboration between life sciences and social sciences, disregarding whether LS or SS initiated a project

point is especially relevant, as desired high impact factors for career advancement in the academic world could be constraining the production of supradisciplinary articles (and thereby research), which indicates the importance of the institutional context to LS-SS collaborations. The institutional context was indicated an important barrier by several other studies as well (Fischer, Tobi and Ronteltap, 2011; Holm et al., 2013; Clinch et al., 2019). A final interesting point raised by Barthel and Seidl (2017) is that the vast majority (70%) of SS contributions was made by the economic domain, which could indicate LS-SS collaborations might not be as diverse (and therefore fruitful) as they perhaps could be.

With regards to the epistemological assumptions specifically for LS-SS integrations, Urbanska, Huet and Guimond (2019, p. 1) reported that *“group membership in the more prestigious hard sciences is related to a stronger tendency to downplay the intellectual contribution of social science disciplines compared to other hard science disciplines”*, while vice versa this tendency was not present within social scientists. Also, mutual negative evaluations of another discipline ceased to exist once a collaboration with said discipline was experienced. So Urbanska et al. (2019) propose policy measures to instigate more transdisciplinary collaborations, so as to decrease negative evaluations of other disciplines, hoping this might contribute to more (effective) LS-SS collaborations.

However, from other literature it seems more barriers exist than merely negative evaluations of the other discipline. In order to effect intense, smooth LS-SS collaborations, these multi-level barriers of LS-SS integration must be overcome first. Only then a transition towards much-needed solving of complex multidimensional problems can begin, as the effective, intense integration of LS and SS is needed for this.

That is why goal of this study is to gain more insight into LS-SS interactions within the projects funded under the umbrella of the GOH program at WUR. The objective is to identify perceived constraining and facilitating factors, as well as utopian ideas on LS-SS collaborations. The intent is to lay bare the ideals that might shape a utopian scenario with regards to future LS-SS collaborations in order to create a clear image on where possibilities lie for future LS-SS collaborations. The perceived barriers and facilitating factors will be investigated by means of a case study: the Global One Health investment theme at Wageningen University and Research.

- What is the level of supradisciplinarity of the GOH projects?
- What are perceived barriers for LS-SS interactions?
- What are perceived facilitating factors for LS-SS interactions?
- Where do possibilities lie for future LS-SS collaborations?
- What would an ideal or utopian LS-SS interaction look like?

2. Method

2.1 ANNUAL REPORTS

2.1.1 Content

For this study, an analysis of the eight annual reports of the projects was done. These annual reports included an introduction, objectives (scientific relevancy, problem definition, target group and knowledge), a description of the workplan (activities, go/no-go moments, results, dissemination), realisation (output, expertise, publications), info on project organization (team members WUR, external team members), and information with regards to the economic and social relevancy. The annual reports varied with regards to how extensive they were (range: 1754 to 2729 words). Prior to analysis, a categorization structure for the annual reports was created top-down based on three research stages: problem definition, operationalization, and translation to public. This was done because of an interest in the extent to which projects were operationalized supradisciplinarily, in order to separate them from projects which had merely the semblance of supradisciplinarity, e.g. in the formations of problem definitions or approaches towards translating their results to the grand public.

2.1.2 Analysis

Analysis of the annual reports was done by hand, i.e. without help of a computerised programme. All aspects in the projects that in some way could be related to social science were identified. Thereafter these aspects were structured according to the initial top-down categories involving the stages of research process this aspect belonged to (problem definition, operationalization, or

translation to public). Based on these lists, the level of supradisciplinarity of a project was determined by the number, legitimacy and relative contribution of social science items within the operationalization stage.

2.2 INTERVIEWS

Besides analysing the annual reports, a total of 10 interviews within WUR were conducted over a period of seven weeks.

2.2.1 Interviewees

Two (2) of the interviews were with overseeing coordinators of the GOH investment theme (of which one was simultaneously a project leader). Interviews with five (5) project leaders were conducted (6 when said overseeing coordinator is included). The seven (7) project leaders and overseeing coordinators that were interviewed, were life scientists. Three (3) social scientists involved in the GOH projects were interviewed, bringing the total to 10; none of these social scientists were originally trained as such, thus all interviewed social scientists were dually competent⁴. Two project leaders were not interviewed: one was unable to due to timewise constraints; one refused to participate. The participants' experience with LS-SS collaborations ranged broadly from scientists who have had extensive experience with LS-SS collaborations with various LS- or SS-domains, to scientists for whom the GOH project(s) initiated one of very few LS-SS collaborations they have had (or might have in the future). The total of 10 interviews thus had a LS-SS division of 7-3.

2.2.2 Interview overview

The line of questioning was determined prior to having conducted any interview and it was roughly followed during the interviews. The interview questions were based on the research questions and were enhanced after substantial discussion. The questions focused on personal profile, the perception of (social) science, the nature of LS-SS collaborations, and ideas on a future utopian LS-SS collaboration (for the full line of questioning, see *Annex 1*). At the beginning of the interview, interviewees signed an informed consent form (see *Annex 2*) and were made

⁴ meaning these scientists were educated in LS but presently work in SS

aware of the fact that the interview would be recorded; one interview failed to be recorded due to technological reasons. The interviews were conducted in Dutch (mother tongue of both interviewer and all interviewees) and lasted on average about one hour. It was decided prior to the interviews that analysis of the interviews would be done bottom-up.

2.2.3 Analysis

The researcher who conducted the interviews summarized them within one day after conducting. This was done with help of the audio recordings; in the case of said failed recording, summarizing was done immediately after the interview. After the interviews were summarized, opinions or statements with regards to LS-SS interactions were highlighted and then clustered into one of four general meta-groups: general points, institutional WUR-related points, GOH-related points, and project-specific points. From these lists then a subset of factors was identified, and clustered within three groups: (1) constraining factors (barriers), (2) facilitating factors (drivers), and (3) undecided factors. The latter category could be either drivers or barriers, depending on the state of the factor (e.g. valuation of other discipline can be either a driver when positive, or a barrier when negative) or the interviewee mentioned contradictory aspects of a factor. Also a list of several distinctive remarks per interview was made.

A thematic overview was created manually, based on interesting points in the lists of the meta-groups, the frequency with which they were mentioned in the interviews, the perceived importance of the raised points, and the list of distinctive remarks. Two thematic overviews were created: one for social sciences and one for life sciences. During the analysis the coding scheme was enhanced several times. Eventually the two thematic overviews were merged into one thematic impression taking into account overarching themes.

After the thematic overview was created, both for LS as well as for SS, an analysis per theme was done to see on what themes or (sub)topics statements of interviewees concurred or clashed with one another.

Towards the final phase of the project, after conducting all the interviews and analyses, a meeting was held with the full research team. The retrieved data was looked at in another way: how could they be structured in such a way that it would

become clear where pitfalls and possibilities lie? It was then decided to structure the issues again in the three main categories: constraining factors, facilitating factors, and undecided factors. Per main category, the most interesting and/or frequent subcategories that were identified earlier in the analysis, were extracted over discussions by the team. One interview at a time, a list of noteworthy, important or frequent issues of constraining, facilitating, and undecided factors was built.

3. Results

3.1 ANNUAL REPORTS

Six out of eight projects had involved SS into the actual research process, of which one project was interdisciplinary; the other five were multi-disciplinary at best. For a full overview of the collaborations, see Table 1. Multi-disciplinarity in the GOH projects was for instance exemplified by a cost-benefit analysis of interventions by the economic domain in a project studying the reduction of airborne endotoxins in animal production to improve human and animal health, otherwise conducted by LS chair groups such as WLR, ADP, FTE, and WBVR⁵. An example of the interdisciplinary collaboration was a Delphi analysis executed by both WEcR⁶ and WBVR in a study looking into emerging zoonoses in relation to the socio-economic environment. This collaboration is considered interdisciplinary, as it was done by mutual interactive collaboration between two groups from different disciplines, instead of merely cooperating alongside one another. There were two projects that did not involve any social sciences with regards to the actual research process. The vast majority of SS contributions came from the economic domain: out of the 15 identified SS contributions, nine (60%) were executed by, derived from, or aimed at contributing to, the economic domain. These can be found underlined in Table 1. Other SS domains involved were Health and Society, or Consumption and Healthy Lifestyles.

⁵ Wageningen Livestock Research; Adaption Physiology; Farm Technology; Wageningen Bioveterinary Research

⁶ Wageningen Economic Research

Title project	Multidisciplinary collaboration	Interdisciplinary collaboration
<i>Reduction of airborne endotoxins in animal production to improve human and animal health</i>	<u>Cost-benefit assessment of interventions</u>	-
<i>Sustainable food systems for healthy people</i>	<u>Existing models for economy will be adapted</u> SHARP model; consumer diet as research level	-
<i>Blood-feeding midges as models for the role of microbiomes in the transmission of diseases</i>	Risk model for prediction	-
<i>Risks of livestock manure application</i>	<u>Risk analysis of the whole chain</u>	-
<i>Emerging zoonoses in relation to changing socio-economic environment</i>	<u>Making use of a behavioural economics framework</u> Researching incentives to change behaviour <u>Cost-benefit analysis</u> Identifying anthropogenic drivers <u>Identifying targets for intervention measures</u>	<u>Delphi analysis done by WEcR and WBVR</u>
<i>Reduction of obesity and related diseases by targeted nutritional treatment</i>	-	-
<i>Modelling multi-scale exploration of synergies between human and environmental health</i>	<u>Economic indicators were included in multi-level scale portfolio</u> Social or urban perspective included in developing model <u>Econometric models were produced</u> LSMS (living standard measurement study) data was produced	-
<i>Role of wildlife in the dispersal of antimicrobial resistance</i>	-	-

Table 1: Overview of SS contributions to GOH projects at WUR from the period 2014-2018

3.2 THEMATIC IMPRESSION INTERVIEWS

The interviews that were held, showed several recurring themes in them regarding collaborations between life sciences (or natural sciences) and social sciences. These could be divided into several grouped themes: GOH, contextual factors, contextual conceptions, and utopian conceptions.

1. Global One Health investment theme;

2. Contextual factors

- A. Constraining factors
- B. Facilitating factors
- C. Undecided factors

3. Contextual conceptions

4. Utopian conceptions

3.2.1 Global One Health Investment Theme

With regards to the GOH theme, statements varied broadly. Interviewees mentioned that LS initiated all GOH projects, and that all projects had a project leader from LS. It was mentioned more than once that the funding for GOH came from a medical domain and that this could have influenced the type of projects that were granted. Interviewees also agreed on the fact that there was limited budget for GOH. General agreement also existed on the fact that SS contributions to GOH projects were mostly of qualitative nature (except for contributions from the economic domain), and that the respective role of LS was relatively bigger in projects when compared to the role of SS. It was mentioned the definition of 'One Health' does not name or stress the importance of SS, and that SS contributions were mostly of economic nature. Interviewees tended to have difficulties pinpointing the relative role of SS to the projects. The interviews also indicated that, to the project leaders who were aware of the fact that a preference for involving SS existed, the framework on how to do this was not clear, resulting in a lower incentive for realising SS involvement.

A tendency for disagreement existed on whether it was clear that SS should have been involved in the GOH projects; overseeing coordinators indicated they had stressed this, however project leaders' answers indicated that to some it was

indeed clear, but others indicated having no clue at all about having to include SS in their projects. Additionally, there was no general agreement on as to what part or stage (i.e. problem definitions or operationalizing) of the projects SS had contributed to most. Also, some interviewees indicated that the role of SS within the whole GOH theme was not clear, while others indicated the perceived weighted importance of adding SS to the GOH theme.

3.2.2 Constraining, Facilitating and Undecided Factors

The results were divided into three categories: constraining factors, facilitating factors and undecided factors. The most interesting or frequently mentioned constraining factors were value judgments, the institutional context, and preferred practice. The most interesting or frequently mentioned facilitating factors were personal factors, overlap in (desired) practice, mutual adaptability, respect and benefit, and organisational factors. Interesting or frequently mentioned undecided factors were a systemic approach (top-down enforcement), and knowing specific scientific groups very well.

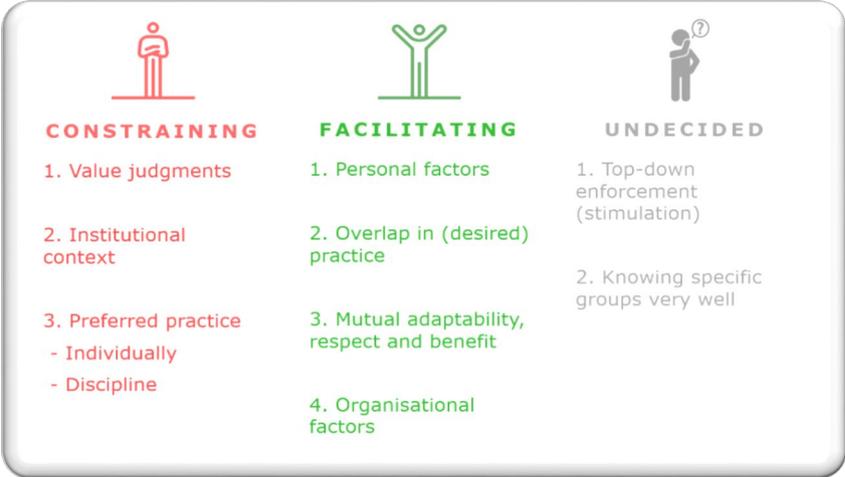


Figure 2. The most interesting or frequently mentioned constraining, facilitating, and undecided factors of the interviews

3.2.2.1 Constraining Factors

1. Value judgments

Each of us has a different world view: different DNAs, different situations growing up, followed different educations, read different books, learnt different life lessons. Every individual has their own set of goggles through which they view the world, which defines what questions they ask and in what specific way they look at the

world; additionally, each of us also has an individualized toolbox in hand, composed of individual skills and competences. These invisible goggles and toolboxes are taken with everyone into each and every collaboration. As part of this world view, each individual has (sub)conscious value judgments on concepts they have encountered. And thus, one constraining factor that came forward very frequently in the interviews was that of value judgments. This includes both negative value judgments towards the other party, as well as positive value judgments with regards to one's own capabilities, thus fuelling dualistic thinking and acting, instead of transdisciplinary collaborations. These value judgments had to do with e.g. the valuation and hierarchical perceptions of the work of the other's discipline, or acknowledgement of the role of SS, both externally, as well as from LS.

Disagreement existed around the idea of a hierarchy between LS and SS. Nobody indicated seeing SS as ranked lower hierarchically than LS. However, some interviewees mentioned this did tend to be the global conception in their fields, mentioning how SS were seen by describing it with words such as: 'fuzzy', 'vague' and 'unpredictable', due to a lack of 'hard', 'measurable' and 'tangible' results, asking 'unnecessary research questions' and answering them 'with an excessive number of words'. The same disagreement within LS interviewees could be seen on the topic of valuing scientific production from SS, either by one's individual valuation, or the valuation of SS scientific production in the overall respective fields of expertise. Some indicated to see SS production as a legitimate equivalent of LS production, others indicated having lower to zero valuation for SS production (or seeing this tendency in their fields, as e.g. book chapters were mentioned as lower valued than scientific articles in a particular scientific LS branch). Another aspect fuelling the LS-SS divide was that, according to some participants, the results produced by SS are often truisms.

Although monetary considerations are not a main focus in this study, it seems crucial to note that value judgments might impact the amount of money circulating in a certain academic discipline through proposal granting by people who themselves might be dissolved in (sub)conscious value judgments. As a result of this possible monetary consideration, a plethora of other factors in LS-SS interactions might consequently be influenced, indicating its relevance. An

example that was mentioned in the interviews is that SS generally tend to have a smaller role in projects.

2. Institutional context

Interviewees generally tended to agree on the large role of money in LS-SS integrations. Interviewees indicated that in their experience, budgets in general were limited, which in turn affects many aspects of collaborations. Also mentioned were smaller flows of money going around in SS than in LS; as big sums of money tend to go to technological research, interviewees from social science thus mentioned that they sometimes found it hard to become involved in research. They indicated a feeling of exclusion, being forgotten or 'not being allowed to play with the big guys'.

One aspect of limited budgets mentioned more than once was the pressure to perform or successful execution of projects, as financial limitations did not allow for room to fail and thus experiment or take risks. Besides this, there was a tendency for general agreement on opportunism: research proposals generally tend to be influenced by what the sponsor wants to have researched. It was also indicated by interviewees that sponsors do not grant as much LS-SS integrative projects, as they generally prefer monodisciplinary projects; interviewees indicated sponsors were 'not ready yet' for supradisciplinarity.

An interesting point noted by several interviewees is that intra-institutional supradisciplinarity actually tends to be hindered by international collaborations between institutions across different countries, as chair groups do not want to divide their assigned part of the budget with other chair groups within WUR.

With regards to the institutional system of WUR specifically, interviewees tended to agree on the fact that there was a tendency for general agreement on the fact that difficulties exist in connecting different scientific pillars. Therefore, they thought that people should be actively motivated or stimulated to initiate transdisciplinary collaborations between SS and LS. Also interviewees mentioned more than once the existence of the positive success bias: when no valuable results are obtained, it was said that it is very hard to get one's study published; thus, there tends to be a general bias towards positive, valuable results, which co-occurs with risk-averse behaviour and the pressure to succeed. Also, according

to the interviewees, WUR has a system that judges one on the number of projects they have, how many articles they publish, and how much money they bring in. One interviewee mentioned:

"It's very often about money here at WUR: that people try to claim a large chunk of the funding for themselves. That is kind of ingrained in the WUR performance criteria, because well, every euro that goes into my pocket, will not go into yours of course. And my boss always appreciates it when I bring in as many euros as possible".

This performance criteria also relates to the positive success bias. Another point indicated by the participants was that LS chair groups tend to hire gamma-related people themselves, so LS chair groups can do the SS-related aspects of their research within their own chair group, without having to collaborate with the SS chair group. Additionally, it was mentioned that there is a significant difference between the university part and the applied science part of WUR. Whereas the university part is not bound to external limitations of the sorts, the applied research part of WUR is confined to clients' demands and cannot decide for themselves to take up a collaboration with another discipline when a client does not request this.

Another point agreed on was that there is a relatively small supradisciplinary-minded network within WUR, and that once you get to know the people in this network, you know who you can reach out to. What interviewees however tended to disagree on was whether it was generally clear to them how they could find somebody they needed in the other chair group. Some mentioned it was clear to them and described the way they would go about it, while others expressed having more difficulty with this. Other aspects interviewees did not agree on were the extent to which education prepares well enough to effectively deal with LS-SS interactions, and the extent to which pressure to perform has changed over time.

An example regarding external acknowledgement (outside of the WUR system), is that the interviewees indicated that it was harder to publish an article related to (or produced by) SS than an article that is merely LS. This could in part also be related to possible value judgments, as the scientists deciding what does or does not get published might be influenced by their (sub)conscious value judgments.

3. Preferred practice

Anywhere work is delivered, practices are formed. This can happen on several different scale levels, but two of these proved relevant from the interviews with regards to LS-SS collaborations. The first is the way scientists within a discipline prefer to work, in other words, the preferred practices of a discipline. The second scale level of practices is the individual level; in other words, the preferred working practices of an individual scientist. It seems likely these two categories are not entirely separate, but function more as two ends to a spectrum.

With regards to discipline related working practices, the interviews showed that there are clear differences between LS and SS, and their concurrent methodological preferences (quantitatively vs. qualitatively). Also mentioned more than once, was communicating at 'different wavelengths' and thinking in different time scales (crisis management vs. long term improvements).

Also, it was mentioned that LS generally tend to prefer an in-depth focus in the sense of scale level, e.g. a focus on molecular or cell biology, while SS tend to prefer taking a look at the broader picture and taking contextual factors into account as well. When disciplines prefer different scale levels at which they like to work, this hinders transdisciplinary research, as this makes it hard to formulate a shared research question interesting to both parties. Another interesting aspect mentioned in the interviews was that LS tend to work towards technical discoveries whereas SS work on developing new theories and the scientific production of these disciplines is valued accordingly. A final interesting point mentioned frequently in the interviews is the fact that LS institutions, chair groups or project teams hire people that have some sort of affiliation with gamma sciences themselves, or LS scientists do SS aspects themselves once they have seen how it works, resulting in the fact that it is no longer necessary to collaborate with SS. Additionally, it was mentioned that it is easier to publish straightforward LS research, than articles produced by or including SS.

Besides discipline-related preferences, there are also individual preferences constraining LS-SS collaborations. Examples include lack of intrinsic motivation to collaborate, resulting in "working in a cocoon". Another factor mentioned from the interviews was an individual preference to generate knowledge, instead of finding solutions to (wicked) problems. When a scientist has a preference for generating knowledge instead of working towards a solution for a wicked problem, this also

hinders transdisciplinary collaborations. This point relates to the factor of preferring to work monodisciplinary on in-depth subjects.

General agreement existed on the preferred way of connecting with scientists from other domains, namely: one's personal network. When personal network was not an option, interviewees tended to turn to asking around among colleagues (back channels) or searching through literature. When these were also exhausted, only then would they generally turn to lists, or systems, such as We@WUR⁷, because these were perceived as quite inefficient, unprecise and they only look at what somebody has already done (and not at what their current, perhaps new, interests or intentions for the future are). As a final point with regards to connecting, one interviewee mentioned they considered it more important *who* the person was, than necessarily what they were *capable of*, thus seeming to prioritize familiarity with someone over one's competencies.

3.2.2.2 Facilitating factors

1. Personal factors

In the end, collaborations are always dependent on individuals, their motivations and their concurrent actions. So, factors that were mentioned to be of a facilitating nature were personal factors. Mentioned more often were the characteristics of taking initiative, and having an intrinsic motivation to collaborate trans-disciplinarily. Another interesting point mentioned was the personal trait of taking risks, instead of playing it safe. Because of the pressure to perform in the institutional context, interviewees indicated there was a general tendency to play it safe when collaborating. As mentioned, cooperating with the same people, the same chair groups, because you know them, and you know what they can do:

“When researchers of different disciplines are asked to collaborate with one another, they will become much more aware of that collaboration and they will start to think more positively about it”.

But this does not stimulate LS-SS collaborations, so perhaps taking risks could help with creating more or higher quality transdisciplinary collaborations between LS and SS.

⁷ A digital system that allows for searching other researchers by keywords, areas of expertise etc.

Other requirements for smooth LS-SS collaborations mentioned by interviewees were: trustworthiness, goodwill, having a shared goal, flexibility, open-mindedness, attitude of equality, initiating, and respect. Another point with regards to intrinsic motivation is perhaps best explained by means of a quotation:

“Scientists are not necessarily busy trying to solve things; they are busy with generating knowledge. That is something different entirely. When you want to reach solutions, you need an integration of disciplines. For the development of knowledge, I do not need any social science, a bit simplistically said; but to take the knowledge and pour it into a solution, you probably do need social sciences.

I think this is the crux: what I like to do best is generate knowledge.”

Another interviewee noted they were not able to fully answer the questions as they did not see social sciences and life sciences as ‘separate disciplines’, but indicated that collaborations depended more on *people* than necessarily on what discipline one worked in.

2. Overlap in (desired) practice

Factors mentioned to help transdisciplinary SS-LS collaborations were common or joint aspects, such as a joint start (even when it is not clear yet what everyone’s role would be), a joint problem definition, a shared substantive focus (in the sense of scales: in-depth or contextual), a clear shared research question relevant for both LS and SS parties, a common language and shared well-developed methodological toolkits. But the most focus lay on a joint start, i.e. not involving one party later than another, especially not only at the end of the project.

3. Mutual adaptability, respect and benefit

A third facilitating factor that was mentioned is mutuality, in the sense of mutual adaptability, mutual respect and mutual benefit. Mutual adaptability regards not merely the willingness to adapt, but also the capability to adapt to the other, and become one well-oiled machine as is a prerequisite for transdisciplinary research. According to the interviews, this requires all parties to have an intrinsic motivation and willingness to be flexible when cooperating. Also, it requires a certain set of tools from the individualized as well as disciplinary toolboxes from all involved parties, i.e. capabilities that allow the collaboration to go efficiently. This includes

aspects involved and already mentioned in the 'Overlap in desired practice'-part (such as flexibility, taking risks, intrinsic motivation). As put by one interviewee:

“The experience within GOH is that when researchers from different disciplines get to know one another, they will develop more understanding of the importance of each other’s discipline”.

Also, mutual respect was considered important for good collaborations. Finally, mutual benefit was considered vital to collaborations. According to the interviewees, cooperation with one another merely for the sake of cooperating should not become the norm; there should be a legitimate reason for becoming involved with one another in a project.

4. Organisational factors

The final facilitating factors have to do with how projects are organized. An organisational factor that resulted from the interviews and is of facilitative nature to LS-SS collaborations, is a project leader who has an intrinsic motivation for and valuation of SS-LS interactions. The project leader has a crucial role in projects: deciding who is going to be part of the team, steering the research in a certain direction. According to the participants, the role of the project leader determines the whole course of a project, so it would likely be helpful to SS-LS interactions if project leaders have a certain interest and belief in the fact that LS-SS collaborations result in more than the mere sum of its parts. More facilitative organisational factors that resulted from the interviews were attention and care for the LS-SS collaborative process, e.g. by assigning a person to guide the LS-SS interactive process. A final facilitative organisational factor interviewees agreed on was the importance of having linking pins in the team, as they tend to have the ability to switch quickly from different perspectives and therefore connect various views with one another, ultimately contributing to a more smooth and pleasant supradisciplinary collaboration.

3.2.2.3 Undecided factors

1. Top down enforcement/stimulation

Contradictory opinions existed on whether a top-down systematic approach (or framework) to LS-SS collaborations should be introduced, dictating how and when (LS-SS) collaborations should take place. Benefits mentioned were: clarity on how to realise collaborations, a higher frequency of collaborations and working with more, different people, expanding one's supradisciplinary network and thus familiarizing disciplines with one another. Drawbacks mentioned were: the ineffectiveness of forcing people to do something they don't want to do, as forcing instigates resistance, leading to LS-SS collaborations becoming a simple requirement, a 'must-do'.

2. Knowing specific groups very well

It was mentioned that once one gets to know a certain group of people within another discipline, collaborations generally only tend to take place between these people who know each other well. People were not unanimous about whether this practice was beneficial to LS-SS collaborations or not.

3.2.3 Contextual Conceptions

During the interviews, many specific conceptions of life sciences and social sciences came up. These are important to make explicit, as these underlie LS-SS collaborations within GOH.

3.2.3.1 Life Science

Notions of life science from the SS interviewees included ideas that technical researchers prefer to work monodisciplinary and that society does not need a whole lot more of technological advancements. Additionally, both interviewees from SS as well as LS mentioned they feel that life scientists feel SS is more of an addition, a nice bonus, to what they are doing themselves:

“In general you can see that social sciences are often thrown onto life sciences research, kind of like a fig leaf”.

3.2.3.2 Social Science

One SS interviewee mentioned they could understand that SS could perhaps be seen as one 'vague, amorph substance', which could be complicating the process of finding the person one needs. Another notion on social sciences from one LS interviewee included that SS tends to feel superior with regards to knowledge on connections. As an LS interviewee mentioned:

"Sometimes I get the idea that social sciences think that we have no clue how relationships work and that we shouldn't meddle ourselves in that".

It was also mentioned was that there is a lot of SILO thinking and working perceived in SS, i.e. that there are more monodisciplinary people to be found in SS than in LS. Another notion on the understanding and role of SS from a LS interviewee was that the core business of SS in their eyes is communication. Some interviewees mentioned a past underestimation of SS and reported clearly seeing the added value and growing importance of involving SS in LS projects, while other life scientists indicated that they see SS as a mere instrument to their own research, or an addition. One LS interviewee admitted to not seeing any added benefit of involving SS in LS projects. Another participant wondered whether awareness exists on the fact that it should not be forgotten the human side to problems is becoming incrementally more important:

"Does the awareness on this topic exist in society? Are people aware the key position is to be found within social sciences, and not within technology?".

One LS interviewee mentioned that, if they were to bring up the topic of involving SS in a new research project, that would have been cause for a big discussion with other life scientists. They mentioned this would be because colleagues would both not see the added value of SS and also said colleagues would think it would be too early in the project to involve SS at such an early stage. A final LS interviewee wondered whether SS feel underappreciated in general, and expressed sincere hope it was not because of them.

3.2.3.3 Trends

During the interviews, interviewees mentioned some trends within (levels of) supradisciplinarity and how it has developed over the years. The assessments of

these trends generally do not concur with one another: one SS interviewee mentioned that 5 years ago, most work was mostly monodisciplinary, in the sense of SS just giving a spin to beta research. By LS interviewees, it was mentioned that about 30 to 40 years ago a trend came up to include SS in the research more, and that involvement of SS is better now than, say, 20 years ago. Another LS interviewee however mentioned that about 15 years ago it was a trend to have beta-gamma interactions, i.e. interactions between LS and the branch of science that studies anthropological endeavours such as psychology, sociology and economics. Yet they mentioned that this trend has slowly started disappearing again over the last 10 years, while again another LS interviewee mentioned the last 10 years there is more of a general focus on multidisciplinary within WUR.

3.2.4 Utopian Conceptions

When asked about their utopian or ideal conceptions with regards to LS-SS interactions, a general tendency to agreement existed on careful consideration of (monodisciplinary) specialisation vs. (supradisciplinary) general contextual research. Also agreement existed on the wish to transcend current scales of time and level of detail, as well as a wish for ways to connect intrinsically motivated people. Interviewees also agreed on the fact that, if they wanted to collaborate across disciplines, they felt it would be helpful if (either virtual or physical) settings existed that facilitate a good cooperation. Furthermore, more than one interviewee agreed on the fact that shared interest should be created. As explained by one interviewee:

“for wicked problems, no one culprit can be identified, and when there is not a single person or entity responsible, there is no interest, and when there is no shared interest, no one will start moving toward change”.

Moreover, interviewees agreed on the fact that for LS-SS collaborations there should be a mutual need, or a mutual added value and interest for collaborating; collaboration should not merely happen because it ‘has to happen’. Some interviewees mentioned a rewarding system to be part of their utopian LS-SS collaborations (e.g. publication with LS-SS collaborations getting a bonus point compared to mono-disciplinary publications), others feeling resistant towards this. Yet everyone agreed on the fact that stimulation should happen more persistently and visibly:

“It sounds a bit childish, but it will only sink in with people when they are being told over and over, time and again; then they might start to think ‘oh, right, maybe we could do something together sometime’ ”.

A final point mentioned with regard to ideal future scenarios was that more than one interviewee (including interviewees from SS) indicated that perhaps it could be beneficial to abolish the social sciences group in general, and make SS an integral part of all other chair groups at WUR.

4. Discussion

4.1 THEMATIC DISCUSSION

Funding

In the interviews it was indicated that the funding for GOH originated from a medical domain. In effect, the GOH funding consisted of strategic money and it came from WUR itself. Thus, what was likely meant by this statement was that the original idea for this investment theme would be that the funding would be used as seed money of some sort, in order to hopefully inquire into bigger One Health projects (which do generally tend to receive funding from the medical domain). Also indicated in the interviews was that the funding was not ‘pooled’. This means that the funding of each chair group or discipline originated from a different flow (origin) of money, with the possible consequences that entails, while Lowe, Phillipson and Wilkinson (2013) had the factor of pooling of funding as a lesson from their study. This could in part be why LS-SS collaborations were not effected fully as intended. The importance of pooling in this case was underlined by the fact that interviewees perceived smaller flows of money within SS than within LS.

Another aspect possibly limiting LS-SS collaborations mentioned was the fact that LS chair groups hire gamma-related people themselves. This is probably done out of financial considerations, as hiring a gamma related person within one’s own chair group takes less time to perform gamma related tasks when compared to the time a supradisciplinary collaboration would take, thus saving time and

thereby money. It seems likely this barrier might also be overcome when the funding for collaborative projects would be pooled.

Practices

With regards to the scale level of discipline related working practices, the interviews showed that there seem to be clear differences between LS and SS, and their concurrent methodological preferences: it was the general impression that LS tended to have a preference for quantitative methods and SS tended to have a preference for qualitative methods. Self-evidently there are exceptions to this perceived tendency, e.g. the economic domain tends to work quantitatively. This could be an explanatory factor in the prominent SS role the economic domain fulfils within LS-SS collaborations, as was also found in the present study: the vast majority (60%) of SS contributions stems from the economic domain, which is somewhat comparable to numbers around 70% found in the study by Barthel and Seidl (2017). It is important to note that the extent to which this perception on methodological preferences of a science group is a legitimate reflection of reality leaves to question; perhaps SS do not principally use qualitative methods and when the general perception prevailing within LS is that they do, this perception might be an unnecessary barrier keeping current practices in LS-SS collaborations in place. This could create opportunities both for SS to clarify this possible misconception, and for LS to readjust their perception on methodological preferences of SS.

Publishing pressure

Similar to a myriad of other academic institutions, WUR has a system that judges one on the number of articles published as well as the extent to which these articles are cited. Literature states that supradisciplinary articles are harder to get published as most journals tend to have a monodisciplinary focus. Inherent to respondents' view could be that the journals which are to them perceived as most important do not prefer interdisciplinary work. As people might feel the pressure to get published, and supradisciplinary collaborations constrain them in this, scientists might divert to more monodisciplinary research. This could thus limit the severity and prevalence of LS-SS collaborations. Also, the positive success bias seems to be partly related to this phenomenon: people might be reluctant to get

involved in LS-SS collaborations because these might not lead to success as easily as monodisciplinary projects and publications. Feeling the pressure of these performance criteria thus appears to reinstate the existence of the positive success bias. As a final point, these performance criteria could in part also be related to possible value judgments, as the scientific editors deciding what does or does not get published might be influenced by their (sub)conscious value judgments.

Dichotomy LS-SS

There was strong disagreement on the prevalence and nature of trends: everybody is different, and perspectives can have enormous diversity. This also affects the value judgments, as everybody has different perspectives and often these are not easy to grasp. This could be because of unexpressed value judgments due to the norm of political correctness in contemporary society. Not explicitly finding them stated thus does not mean value judgments do not exist.

Sometimes however these value judgments are very clearly expressed, as was the case with one project leader of the GOH theme. They were unwilling to cooperate, as they thought this study was 'asking the wrong questions' and that SS first should figure out what their added value is to LS, after which this added value should be communicated towards LS. From this response it becomes clear this person did not see the added value of SS to projects in general. Other interviewees however clearly expressed acknowledgement of the importance and added value of SS, yet were less capable of indicating what the precise nature of this added value then was.

It was mentioned frequently that SS among LS are generally seen as an addition, a nice bonus to LS projects, and not as an independent branch of science with their own status. Also, SS was often mentioned to only be involved at the end of a project. This all concurs with the literature, as e.g. Visue (2015) identified SS to generally having a 'service-role' in projects. What could be taken from this, is that within WUR, there appears to exist a general image of SS among the LS domain, but that individual LS scientists did not admit to also having this view, mostly explicating this by using phrases such as 'in general among life sciences...' or 'among colleagues I do notice the tendency of...'. Also, this indicates it is perhaps not entirely clear to LS (and perhaps also to SS themselves) what the exact added value of SS to a supradisciplinary collaboration with LS is.

It could be wondered why this is the case. This condescension towards social sciences, seems to date back to several decades ago. Even as early as 1972, Andreski, a social scientist himself, published his book '*Social Sciences as a Sorcery*'. In this book, he made his views evident on as to why social science is more a practice of sorcery than that of true science, naming his chapters e.g. 'Quantification as Camouflage', 'Evasion in the Guise of Objectivity,' and 'The Smoke Screen of Jargon'. The disdain seems to have its roots in interactions and historical influences, and the effects these have on the results of social sciences (Hedges, 1987). Other points of resistance towards the social science Meehl (1978) i.a. mentions, were the extent to which causation might be extracted, due to many unidentifiable confounding factors, as well as the extent to which studies in social science are replicable.

A notion based on the responses in the interviews could be that perhaps interviewees were unaware of the wild diversity of domains and concurrent added value within SS, as one interviewee mentioned the likeliness of SS being perceived as a 'giant vague, amorph substance'. Also, one interviewee mentioned they considered it more important *who* the person was, than necessarily what they were *capable of* when collaborating with someone, thus seeming to prioritize familiarity with someone over one's competencies. This similarly suggests SS are not successful at conveying what their added value is, and especially *how* SS can contribute to LS projects. This might cause collaborations to not transcend the mere multidisciplinary level. Additionally, the present state of affairs could perhaps in part be attributed to the difficulties SS face with transferring the added value of their work to LS.

Also, SS were very often mentioned in to be seen as or fulfilling a 'victim-role', i.a. by feeling excluded, not having equal amounts of funding, or underappreciation of their scientific production. Additionally, in the beginning of July 2019, the Dutch government agreed on a redivision of the educational budget in higher education: the technical universities would receive more money than institutions offering a whole range of sciences (Engelshoven, 2019). This would therefore put the social science to a disadvantage, as the surplus money for technical universities will be taken from their respective parts. It seems that the general perception of social science not being a 'true' science might not only be embedded in the academic culture, but also more generally in society itself.

Less often mentioned, however, was the fact that, without disregard for (perceptions of) the prevalent situation, perhaps SS has a responsibility to take more initiative in the role they are currently fulfilling. Imaginably it could be perceived as easy by SS to tag along on a project that has already taken shape, or to simply fulfil an additional approach to a study, instead of having to integrate approaches, or develop common toolboxes or languages with other disciplines. Although an attitude of condescendence towards SS and its scientific production was very much present in the interviews, the point attempted to be conveyed is that the interviews showed a tendency for seeing LS as the culprit and SS as the victim, while perhaps the question about whose responsibility it is to work towards shifting the interrelationship is of equal importance.

As a final point of the thematic discussion, several interviewees mentioned a difference exists between solving problems and generating knowledge, leading to (lack of) intrinsic motivation to collaborate supradisciplinarily (or solve wicked problems), as their intrinsic motivation might be more devoted to generating knowledge.

“Scientists are not necessarily busy trying to solve things; they are busy with generating knowledge. That is something different entirely. When you want to reach solutions, you need an integration of disciplines. For the development of knowledge, I do not need any social science, a bit simplistically said; but to take the knowledge and pour it into a solution, you probably do need social sciences.

I think this is the crux: what I like to do best is generate knowledge.”

The quote above (identical to that already mentioned in the results section) is taken from a LS perspective and it could possibly indicate three scenarios. An extreme possible interpretation of the statement of said interviewee could be that the interviewee could have a value judgment towards the contribution of SS: LS produces knowledge and they acknowledge the importance of SS, but SS in itself does not *produce* knowledge; SS is then merely seen as a nice tool to *apply* the knowledge that was generated within LS. Secondly, and most innocently, it could indicate that what life scientists like to do best, is play around and discover inside of their own monodisciplinary field. The expression could however also indicate that the interviewee does acknowledge that SS in itself indeed produces knowledge, just like LS does, but that *collectively* created information is perhaps

not seen as created additional *knowledge*. Fundamental to this interpretation however is the assumption that supradisciplinary research in itself does not lead to knowledge, but that it is merely relevant for the application of knowledge.

Yet, inherent to all these statements is that the two (solving problems and generating knowledge) are mutually exclusive. So, perhaps more wide-spread knowledge on what supradisciplinary is and what it could lead to, could contribute to more supradisciplinary collaborations. As can be taken from the interviews, the domain within SS that currently perhaps best succeeds at the creation of knowledge in supradisciplinary collaborations is the economic domain.

Possible adjustments

Examples of possible adjustments to enhance, improve or stimulate SS-LS interactions were mentioned in the interviews. One of these was: familiarizing LS and SS more with one another and their added value (e.g. internally educating employees on this, or thinktanks for people who are supradisciplinary-minded without monetary incentive to expand this network). Another example mentioned for facilitating external circumstances under which LS-SS collaborations could take place was contextually stimulating LS-SS more thoroughly and consistently, e.g. by means of a rewarding system of LS-SS publications, or perhaps by stating LS-SS interactions as a requirement in the research call from a funding instrument. Another example of an adjustment mentioned was that proposals should very explicitly start more often from the SS after which LS can be involved (instead of the other way around which generally tends to be the contemporary situation), or developing a systemic approach to LS-SS collaborations. If collaborations should only happen based on intrinsic motivation, the question then is: how can an upsurge of LS-SS collaborations be realised, and how can these collaborations be effected most optimally (i.e. in a more efficient and equal manner)?

Currently, chair groups tend to cooperate with people they already know very well. Favourable about this is that collaborations tend to work well, and people like each other. Arguments against this phenomenon could be that working with the same people all the time does not stimulate an integration of LS-SS collaborations in the bigger picture. Also, it means that only certain parts of disciplines make the jump towards the other disciplines, and merely familiarize themselves with those aspects

of the other discipline. This could mean a lot of opportunities for collaborations may not be seized as of right now. This also connects to 'taking risks' under personal factors. Thus, part of such a systemic approach could be facilitating collaborations between different chair groups.

Two final adjustments mentioned were that shared interest should be created for LS-SS collaborations, because if nobody is responsible for it, it won't come to be more frequent in the future; and a final adjustment mentioned was that perhaps the SS group should be abolished in general, and instead be made an integral part of all the other disciplines at WUR.

4.2 LIMITATIONS

The total of 10 interviews had an LS-SS division of 7-3, yet one should take note the three social scientists involved in the GOH projects were educated within life science fields and made the switch to social science later on in their careers. Therefore, a limitation of this study is the limited representation of social scientists who were also educated in SS. It is therefore important to take this into account when interpreting the results, as these might be biased, while perhaps they might also shed an interesting light on the perspectives of social scientists who have previously experienced collaborations when working as a life scientist. This is interesting, as they have been in both positions, and thus could be expected having a tendency to have a larger understanding of LS practices and the reasoning behind those. Simultaneously, the LS-SS division might also be a result of the current situation around LS-SS interactions within WUR or GOH, or perhaps it could be explained by the make-up of the LS-SS division within the institution the study was conducted at. Another limitation of the current study is that each project in this study is represented by the viewpoints of merely one scientist from the project group; thus, other scientists having worked on the same project might have different views on the project. As a final limiting point, the number of interviews was quite low, however towards the final interviews the point of data saturation was incrementally attained.

4.3 FUTURE STEPS AND FURTHER RESEARCH

It could be argued a systematic framework to LS-SS collaborations should be introduced offering more tangible tools for collaborating. This should be created for people who do want to collaborate and it should not be imposed on anyone. This systemic framework would ideally address intrinsic motivations as well as systemic approaches in the institutional context. To successfully create such a framework however, more insight is needed in how to go about this.

Thus, suggestions for further research are: looking into what aspects of such a framework would be accepted by scientists, and where exactly the border lies between effecting many supradisciplinary collaborations, while not imposing this upon anyone. Future studies could also look into the different SS disciplines and what their respective contribution is to general knowledge gained from supradisciplinary collaborations. A final suggestion would be to investigate the supradisciplinary nature of the publications resulting from the GOH theme, e.g. whether different disciplines published together or separately and in what magazines.

5. Conclusion and Recommendations

5.1 CONCLUSION

The annual reports indicated that the level of supradisciplinaryity was not as high as intended with only one interdisciplinary collaboration, and multidisciplinary levels for the remaining collaborations. Interviews indicated many different factors that could possibly influence LS-SS interactions. These collaborations do not allow for a single factor that would solve the challenges currently faced; an interplay between prerequisites, people, and the enormous diversity within LS as well as within SS precipitate a complex nature of LS-SS collaborations.

Constraining, facilitating, and undecided factors were revealed with regards to SS-LS collaborations. The barriers mostly revolve around value judgments, the institutional context, and the preferred way of working from both disciplines as well as individual scientists. These factors are a mixture of intrinsic individual aspects and more systemic contextual aspects. Facilitating factors revolve around

personal factors, commonalities and mutual adaptability. These factors are also a mixture of both intrinsic individual aspects as well as more systemic contextual aspects. Undecided factors indicated the twofold nature of a systemic, top-down approach, and frequent collaborations between the same chair groups. Both of these factors were applicable to both intrinsic factors as well as more systemic contextual factors.

5.2 RECOMMENDATIONS

What can be taken from this is the fact that new paths need to be carved in order to influence both the systemic context as well as intrinsic motivations, as these are where possibilities lie. For both these approaches applies that both LS as well as SS have some steps to take (i.e., it might not merely be life sciences who could make some leaps into transdisciplinary collaborations, but perhaps also SS have some steps to take and barriers to overcome). Further studies need to be conducted to provide a clear insight into what these intrinsic and contextual adjustments could be, however some general recommendations that follow from the contemporary study are as follows:

- ◇ **Alter the prevailing (self)image of SS.** From the study, notions of SS (such as: always working qualitatively, being perceived as merely an add-on, and vagueness around the makeup of different SS domains) resulted as a significant barrier in engaging in supradisciplinary collaborations. At this stage, the wide variety of SS is not considered a strength. SS has a wide diversity and range of opportunities to collaborate with supradisciplinarily, and the common denominator of contemporary wicked problems is (the behaviour of) the human being; consequently, SS has a significant contribution to make in tackling these. It is therefore time to shift current notions towards more productive ones, that are more analogous to reality. The general prevailing image of SS is interwoven with the image SS has towards itself, which means opportunities lie in altering both the general perception of SS, as well as the perception SS has towards itself.

- ◇ **Use the knowledge available.** A plethora of studies has focused on generating guides with hands-on information and practical tools for effecting

successful and efficient supradisciplinary collaborations: there is widespread and extensive knowledge available and this should be used when engaging in supradisciplinary collaborations. Pivotal measures that should be taken are for example appointing an individual to specifically facilitate and monitor the process, and the importance of quality should always outweigh that of quantity (e.g., rather three well-executed supradisciplinary research projects as a result of investing in several measures, than twice the amount of monodisciplinary projects that do not need investment or monitoring to that extent).

- ◇ **Create space to experiment.** Scientists should be granted the time and space to explore individual relations to other scientists in freedom, as pressure merely leads to practices already in place. The results from the contemporary study indicated that the social aspect is an inherent and pivotal aspect of any well-effected supradisciplinary collaboration. Thus, a new multi-year investment theme should for example use the first year to (in a well-facilitated manner) explore and map opportunities, connections to other scientists, and personal interests. Randomly creating project groups, some might have good chemistry, others might not. Exploring and uncovering this would be the point of this initial phase. At the end of this explorative phase, it could be interesting to look at what next steps could be towards fruitful collaborations. This phase would also include looking critically at research questions for supradisciplinary studies, so that these might be relevant to several disciplines. Resulting from these critically generated research questions, it should also be decided if and when to introduce different research groups. This means that SS does not necessarily without exception need to be involved in research projects from the very start of the project. However, it is important that the timing of involving different domains (i.a. SS) has been the result of careful consideration based on for example the scope of the research and the research questions posed, instead of thoughtless practice.

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Annexes

Annex 1: Template interview questions

Algemene vragen

Kunt u wat over uzelf vertellen?

- Hoe lang zit u al in het onderzoek?
- Wat voor soort wetenschapper zou u zichzelf noemen? Idzv binnen welke faculteit/onderzoeksgroep/leerstoelgroep zou u zichzelf categoriseren?
- Wat vindt u het meest waardevol aan uw onderzoek?
- Haalt u voldoening uit uw werk/onderzoek?

Wat houden de **Social Sciences** in voor u?

- Waar houden de social sciences zich volgens u mee bezig?

Zou u zichzelf louter categoriseren als 'levenswetenschapper' of ook als sociale wetenschapper?

- In hoeverre vindt u dat u zelf bijdraagt aan de sociale wetenschappen?
- **Hoe vaak** komt u in contact met de sociale wetenschappen?
- **Op welke manier** komt u in contact met de sociale wetenschappen?

Hoe ziet u de **huidige rol** van de sociale wetenschappen *in het algemeen*?

- Rol van sociale wetenschappen **buiten** GOH?
- (Rol van sociale wetenschappen binnen GOH?)

Hoe ziet u de **interactie** tussen sociale wetenschappen en levenswetenschappen?

- **Wanneer** komt deze interactie vaak tot stand?
- **Hoe** komt deze interactie tot stand?
- **Wie** neemt het initiatief?
- Is het **duidelijk** wie erbij betrokken moet worden?
- Van welke **factoren** hangt het af of zo'n interactie wel of niet tot stand komt?
- Is er een bepaalde vorm van **hiërarchie** tussen de LS-SS?
- **Waarom?**

Wat zijn denkt u de **knelpunten** van de sociale wetenschappen?

- Waar lopen interacties op spaak?
- Wat kunnen knelpunten uit de levenswetenschappen zijn?
- Wat kunnen knelpunten uit de sociale wetenschappen zijn?
-

Wat is volgens u de huidige **toegevoegde waarde** van de sociale wetenschappen?

Hoe ziet uw **utopie** eruit omtrent sociale wetenschappen (binnen GOH thema, maar ook wetenschap als geheel)?

- Hoe denkt u dat we die utopie kunnen bereiken? Welke **concrete stappen** kunnen/moeten daarvoor gezet worden?
- Wat zou de toegevoegde waarde zijn van een SS-LS utopie?
- Welke potentie ziet u voor een SS-LS utopie?

Projectspecifieke vragen

Was het **duidelijk** dat er SS betrokken behoorden te worden bij uw project?

Hoe ziet u de **rol** van sociale wetenschappen binnen uw project?

- Welke **domeinen** waren betrokken? (economie, sociologie, communicatie etc)
- Was de bijdrage van sociale wetenschappen **kwalitatief** of **kwantitatief** van aard?

Wat waren de **afspraken** die van tevoren waren gemaakt tussen de onderzoekers SS & LS? Denk aan rolverdeling/taken/verantwoordelijkheden etc

Hoe is de **interactie** tussen sociale wetenschappen en levenswetenschappen binnen uw project gegaan?

- Op welk vlak was er de meeste interactie?
- Hoe was de verdeling qua draagkracht/werk verzetten?
- Hoe verliep de SS-LS interactie op het gebied van het **proces**?
- Hoe verliep de SS-LS interactie **inhoudelijk**?
- Hoe vond die interactie plaats? Online/fysieke meetings, puur schriftelijk contact?
- Vanuit welke instantie kwam het initiatief?

Bij welk deel van het onderzoek denkt u dat de sociale wetenschappen de grootste bijdrage hebben geleverd bij het onderzoek waarvoor u projectleider bent?

- (bijv. probleemdefinitie, het onderzoek zelf, vertaling/implementatie) -> alleen melden bij onduidelijkheid

Afronding

- Is er iets wat ik in uw mening gevraagd had moeten hebben dat ik niet gevraagd heb?
- Zijn er nog mensen in uw kring waarvan u denkt dat het goed zou zijn dat wij die zouden spreken t.b.v. SNGOH?
- Symposium 24 oktober info workshop van resultaten
- Dank voor bijdrage (uitleg over hoe deze uren geschreven kunnen worden)

Toestemmingsverklaring (Informed consent)

Naam onderzoeksproject	Social Nature Global One Health (SNGOH)
Doel onderzoek	Het doel van dit onderzoek is inzicht krijgen in op wat voor manieren sociale wetenschappen en levenswetenschappen elkaar kunnen versterken op het terrein van Global One Health (GOH).
Gang van zaken onderzoek	<p>U neemt deel aan een interview waarin wij benieuwd zijn naar uw kijk op de maatschappelijke wetenschappen en de interactie tussen deze en de levenswetenschappen, o.a. in het project dat u geleid heeft voor GOH.</p> <p>Van het interview wordt een audio-opname gemaakt. Het transcript van het interview wordt gebruikt voor analyse.</p>
Potentiële risico's en ongemakken	Er zijn geen fysieke, juridische of economische risico's verbonden aan uw deelname aan deze studie. Uw deelname is vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.
Vertrouwelijkheid gegevens	<p>Uw privacy is en blijft maximaal beschermd. Onderzoeksgegevens worden geanonimiseerd. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht.</p> <p>De audio-opnamen, formulieren en andere documenten die in het kader van deze studie worden gemaakt of verzameld, worden opgeslagen op het beveiligde (versleutelde) netwerk van Wageningen Universiteit.</p>

<p>Vrijwilligheid</p>	<p>Deelname aan dit onderzoek is geheel vrijwillig. Zonder opgaaf van redenen kunt u uw deelname voortijdig afbreken.</p> <p>Als u vragen of klachten heeft, neemt u dan a.u.b. contact op met shanice.campbell@wur.nl.</p>
<p>Toestemmings- verklaring</p>	<p>Met uw ondertekening van dit document geeft u aan dat u goed bent geïnformeerd over het onderzoek, de manier waarop de onderzoeksgegevens worden verzameld, gebruikt en behandeld.</p> <p>Ik ga akkoord met deelname dit interview.</p> <ul style="list-style-type: none"> - Ik verklaar hierbij op voor mij duidelijk wijze te zijn ingelicht over de aard en methode van het onderzoek, zoals uiteengezet in het informatieblad voor dit onderzoek. - Ik stem geheel vrijwillig in met deelname aan dit onderzoek. - Mijn anonimiteit is gewaarborgd en mijn antwoorden of gegevens zullen onder geen enkele voorwaarde aan derden worden verstrekt, tenzij ik hier van te voren uitdrukkelijk toestemming voor heb verleend. - Deelname aan het onderzoek zal geen noemenswaardige risico's of ongemakken met zich meebrengen, er zal geen moedwillige misleiding plaatsvinden en ik zal niet met aanstotend materiaal worden geconfronteerd - Ik geef de onderzoeker (s) toestemming om tijdens het interview opnames (geluid) te maken en notities te maken. - Het is mij duidelijk dat, als ik toch bezwaar heb met een of meer punten zoals hierboven benoemd, ik op elk moment mijn deelname, zonder opgaaf van reden, kan stoppen. <p>Datum:</p> <p>Naam:</p> <p>Handtekening:</p>

Contactgegevens

Onderzoekers: lenneke.vaandrager@wur.nl, marcel.verweij@wur.nl, caro-lynn.verbaan@wur.nl en shanice.campbell@wur.nl

Functionaris Gegevensbescherming van Wageningen Universiteit:
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Kijk op <https://www.wur.nl/nl/Over-Wageningen/Integriteit-en-privacy.htm> voor meer informatie over uw rechten die te maken hebben met uw gegevens.