Integrating social and biophysical researching in R4D

African Food Security Initiative Researcher Perspectives

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Cover image
Larelle McMillan, CSIRO: On a small farm in western Kenya, Maureen Atieno prepares blood samples from pigs during proof of concept testing of rapid techniques for confirming the presence or absence of African Swine Fever virus; AusAID-CSIRO-BecA-ILRI African Swine Fever Epidemiology Project 2012.
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Summary

Although much has been written about what is normatively desirable in better integrating different research approaches and disciplines there is considerable evidence of persistent constraints to praxis and to institutionalising new modes of practice within an enabling donor-programme-project governance system. The research reported here sets out to elucidate researchers’ understandings of opportunities and constraints to development of praxis in their own project and institutional contexts. Seventeen researchers from some AusAID funded agricultural research for development projects managed through a partnership between CSIRO and BecA (Biosciences eastern and central Africa) were engaged in reflective conversations on the topic of disciplinary integration in research practice, particularly integration between social and biophysical sciences. The report presents their perspectives. The researchers mostly identified with specific disciplines, dominantly in the biophysical sciences. Disciplinary collaboration was seen by many of the researchers as important to the complex interaction of problems for increased food security in a developing Africa. Researchers considered the tensions and stereotypes across disciplinary perspectives and the influence of institutions on effective collaboration, while also commonly conveying excitement of engaging with new and expanding perspectives on problems, working out relationships and ways of operating that involve heterogeneous knowledge and methods. Multiple dimensions of impact from research were highlighted by the researchers. Many saw their integration challenge as framed by the needs of the communities that are experiencing the problems they are researching. Building African research capacity through improved curricula and expanded interdisciplinary networks was also important in the researchers’ conceptions of impact. Specific suggestions about ways forward in research for development also highlight broader questions of the capacity-building and support for scientists to integrate knowledge across disciplines and with stakeholders for innovation in agricultural systems.
1. Introduction

Much has been written about what is normatively desirable in better integrating different research approaches and disciplines. Nevertheless, integration remains a new undertaking for many researchers. Further, constraints persist both to praxis and to institutionalising integrating modes of practice within an enabling donor-programme-project governance system. We sought to better understand challenges and opportunities for integration between social and biophysical (bio-) sciences in agricultural research for development (R4D) through the perspectives and experiences of some researchers involved in research projects. Such research projects have been resourced through the AusAID African Food Security Initiative (AFSI), 2011-2013, and managed through a partnership between CSIRO and Biosciences eastern and central Africa Hub at the International Livestock Research Institute (BecA-ILRI).

This report discusses the ways in which the researchers who participated reflected on the integration of social, economic and biophysical sciences in AFSI research and R4D more broadly (Burns, 2010; Ravillion et al., 2010). The report is premised on the understanding that it is not the products of research that require integrating but the doing of research – hence in the report’s title we have used the word “researching” which is a form of practice (Ison, 2008; Ison, 2010).

The report draws out how participating researchers described both dislocations and collaborations between the sciences, and the circumstances in which they argued for a greater degree of cooperation. In so doing the report attempts to notice the language people used and practices people described that could be seen as collaborative R4D. The research that underpins this report did not set out to examine how participating researchers actually integrate different science methods and ways of knowing in their own practice or project. Rather, the research draws out some reflections on the concepts of ‘integration’ and of ‘research for development’ (R4D) and makes some tentative observations on key features for the integration of social and biophysical sciences in development. Interviewees were asked to suggest ways forward for this integration in projects they are engaged with and the report also summarises these suggestions.
2. Background to the research

The research reported here sits within two larger ‘projects’. These projects are described below ahead of reporting the specifics of the research on social and biosciences integration.

2.1. AusAID African Food Security Initiative (AFSI) investment

In 2010 the Australian Agency for International Development (AusAID) commissioned CSIRO to coordinate two research activities in Africa focussed on food security through partnering relationships. The Africa Food Security Initiative (AFSI), AUD$30M initiative, involves Africa and Australia-based activities in two multi-layered partnership programs, namely: 1 (i) the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) and (ii) Biosciences eastern and central Africa Hub at the International Livestock Research Institute (BecA-ILRI). CORAF, whose members include the National Agricultural Research System organisations from 22 countries in western and central Africa, works to improve agricultural productivity, competitiveness, markets and the efficiency and effectiveness of small-scale producers. BecA-ILRI focuses on building African capacity in biosciences to address Africa’s agricultural, nutritional, food safety and environmental problems. AusAID contracted CSIRO to manage distribution of resources to both CORAF/WECARD and BecA for projects competitively selected and administered through their project management systems.

Through the CORAF and BecA-ILRI partnerships, CSIRO is involved in a range of research for development (R4D) projects operating in 10 countries. In addition to the ‘on the ground’ projects contracted through CORAF and BecA-ILRI, CSIRO sought a way to facilitate reflection by Australian scientists involved in AFSI with the aim that individuals as well as the organizations involved could ‘learn to do R4D better’. To address this brief the Learning Project (LP), led by the Systemic Governance Research Program within Monash University Sustainability Institute (MSI), was designed to produce and test a learning system for reflexive, action-oriented

research for development (Ison et al., 2012). Monash University Human Research Ethics Committee gave ethics approval to the LP in February 2012.

2.2. Learning project conceptual framework

The theoretical underpinnings to the LP include concepts from research praxis, co-researching and enthusiasm, social learning, the ‘most significant change’ technique, integrated agricultural research for development (IAR4D), innovation platforms, systemic inquiry and systemic action research, and systemic and adaptive governance (Ison et al., 2012:5-7). The overall intention is to support personal reflection, and share and capture learning from researchers’ experiences in ways that are individually and collectively informative and useful.

The first phase of the LP involved Australia-based CSIRO scientists and comprised three elements: the formulation of a theoretical framework for cross-disciplinary understanding and discourse (Ison et al., 2012), the production of guidance in Notes for the Field (2012)2, and the construction of a collaborative on-line learning environment (Confluence). Further activities conducted in the second half of 2012, comprised a series of one-on-one reflective conversations3 (a technique explained below in ‘methods’ section of this report) and some group conversations amongst some LP participants (Ison et al., 2012)4.

At the group conversations, it was emphasised that:

- No-one was carrying out research on anyone else.
- The aspiration of the Learning Project was to move into a co-research mode.
- The vehicles for co-research are themes that emerge from our joint inquiries.
- Each inquiry would have to develop protocols for working together and co-authoring papers that emerge.

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2 Version 1 of Enhancing learning from AFSI research: Notes from the field is available in hardcopy and on file with the authors.
3 The methodology for reflective conversations is discussed in Designing AFSI Phase 3: lessons from the learning period (version 1), December 2012. On file with the authors.
4 Participation in the LP amongst CSIRO AFSI scientists is voluntary. A little over 20 people ‘signed up’ to be involved in the LP. Of these, 5 were involved in the group conversation held in Alice Springs, August 2012; others participated in telephone conferences and a workshop at Monash in February 2013.
As these emphases indicate, the LP was not designed as a ‘project’ in the traditional sense. Rather it has been designed as a ‘systemic inquiry’ with the aim of fostering the emergence of important, researchable, themes from the R4D practice experiences of LP members. In this co-research mode participants jointly identified themes for learning inquiries into situation(s) of interest or concern (Webber, 2000). The themes that emerged in 2012 are outlined in Table 1.

Visits by LP researchers led by Ray Ison to west Africa (Senegal) and east Africa (BecA-ILRI, Kenya) complemented the Australian-based activity. The learning inquiry into ‘integration of sciences’ (Table 1) that is reported here provided a focus for the east Africa visit in January 2013.

**Table 1. Learning inquiries emerging from the AFSI Learning Project**

<table>
<thead>
<tr>
<th>Inquiry</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning system design&lt;br&gt;The ‘learning project’: design and testing of a learning system for reflexive, action-oriented research for development</td>
</tr>
<tr>
<td>2</td>
<td>Science and food security&lt;br&gt;Relationship between good science and enhanced food security</td>
</tr>
<tr>
<td>3</td>
<td>IAR4D, Innovation Platforms&lt;br&gt;IAR4D and Innovation Platforms in the context of farming systems research: the AFSI experience</td>
</tr>
<tr>
<td>4</td>
<td>Integration of sciences&lt;br&gt;Integration of social, economic and biophysical sciences in AFSI research</td>
</tr>
<tr>
<td>5</td>
<td>Power relations&lt;br&gt;Power relations in AFSI research, within project teams and more broadly</td>
</tr>
</tbody>
</table>
2.3. Emergence of the LP inquiry into integration of sciences

The LP inquiry into the relationship between social sciences and biophysical sciences was predicated on an assumption that there are general issues of concern in R4D that warrant airing. In particular, BECA-ILRI AFSI projects there may be evidence of good progress in a demanding arena. CSIRO researcher experiences and observations in these projects had prompted questions along the following lines:

- whether team building, which is important in any project, had possibly been under-resourced in AFSI projects, especially to achieve integration of sciences
- whether the right people or enough of the right people, had been allocated to projects to achieve integration of sciences
- whether social and economic components could be more fully integrated into project design rather than ‘token’ additions
- as can be seen these are questions pertaining to research design and research practice, and to praxis (theory informed practical action).

Amongst the CSIRO researchers involved in AFSI and the LP, the inquiry on integration of sciences has been championed by Jocelyn Davies (CSIRO). It was identified as a potential area for LP inquiry as a result of Davies’ reflections to other LP participants in early-mid 2012 about the efforts of CSIRO and Africa-based researchers to integrate social and bio- sciences in the BecA-ILRI African Swine Fever Epidemiology project. Davies observed that the term ‘IAR4D’ was little recognised by researchers who she was working with in BecA-ILRI partnership projects even though the LP had been framed to encourage and promote learning about this concept. IAR4D (integrated agricultural research for development) was the framework for integration between research and development championed in AFSI projects managed in partnership between CSIRO and CORAF, in western and central Africa. In contrast, application of expertise and integration of knowledge from different disciplines was commanding the attention of researchers in at least some BecA-ILRI partnership projects, suggesting that it could be an alternative entry point for reflective practice and learning.
An opportunity was identified to utilise the relative independence of Monash Sustainability Institute LP researchers (Ison and Holder) to generate qualitative research data about disciplinary integration through semi-structured interviews with researchers engaged in BecA-ILRI AFSI projects, notably the African Swine Fever epidemiology project, so as to promote learning and reflection that might help to inform further research in these projects, and also generate further inquiry and publication on integration by collaborations of these various researchers.
3. Integrating biophysical and social sciences: perspectives from literature

Concerns about the absence of integrating forms of practice in R4D across social, economic and biophysical researcher domains are not new though the manner of formulating what is at issue, and thus what needs to be done, have changed over time. Concerns and contestation, though often unarticulated, have been engendered by different understandings of what requires integration, and what would have to happen to claim that integration had occurred. Associated contests include (i) what constitutes social science, with some only including economics and others seeing economics as a separate domain; (ii) which science might lead the integration process, at problem formulation stage or beyond; iii) how validly anyone outside a local development context could formulate research or development problems; this may prompt a suite of participatory approaches as championed by Robert Chambers and others that engage with the integration of local and science knowledges. Some have championed modelling as an activity embedded in a ‘learning approach’ as one of the best ways to integrate different knowledges (Carberry, 2002; Carberry et al., 2004; Carberry, 2005) through approaches that are said to have not required any specific social science expertise (McCown, 2001). However unacknowledged—or if acknowledged, unaddressed—epistemological and worldview differences limit integration of local/stakeholder and science views, and the actual impact of these approaches on development is largely unconfirmed (McCown, 2001).

Simon Maxwell (1989:25) wrote that ‘the involvement of social scientists in agricultural research institutions has contributed to the improvement of research methods but has often been associated with conflict.’ He wrote within the then relatively new discourse of ‘farming systems research’ (FSR) which was gaining adherents throughout the Consultative Group on International Agricultural Research (CGIAR) - (for a recent overview of the FSR discourse see Darnhoffer et al., 2012). Maxwell (1989:25-34) has provided five explanations for conflict development: “personal inadequacy; interdisciplinary communication barriers; poor group dynamics; inadequate institutional structure and power struggle.’ He concluded that, ‘structural problems are more important than is usually recognised’ and that, ‘a
multidisciplinary perspective require[s] institutional change as well as programmatic change.'

What can be understood as the ‘environmental turn’ came about after the early FSR years. Now there is widespread recognition in diverse disciplines such as sociology, geography and the environmental sciences that research into contemporary natural resource management (NRM) issues requires interdisciplinary capacity between the social and natural sciences in a partnership arrangement (Nowak et al., 2006; Nuijten, 2011; Robinson et al., 2012). This is in response to acknowledging the complexity in human-environment relations over time and space as coupled social-ecological systems (Folke, 2006; Walker and Salt, 2006). Systems theory is sometimes used to integrate the different claims made within multiple disciplines regarding managing the earth system and agro-ecological systems (Jansen, 2009; Palsson et al., 2013). Collins et al. (2011) and Mooney et al. (2012) claim that research collaboration between ecologists and social scientists has only recently developed, with the Millennium Ecosystem Assessment in 2005\(^5\) as an exemplary illustration of interdisciplinarity incorporating a global scale analysis of the societal benefits from ecosystem services. Such a claim might be contested by earlier FSR and ‘learning and action research – oriented’ researchers in agriculture and rural development (Carberry et al., 2005; McCown et al., 2002).

Interdisciplinarity as an integrated research process provides the opportunity to consider research praxis from multiple methodologies and knowledge sources (science, political and citizen communities) to support a comprehensive understanding of a situation framed as uncertain, contested or ‘wicked’ i.e. systems learning (Ison et al., 1997). The normative argument is that such a process will build social capacity to sustainably manage social-ecological systems since there is consideration of human-environment interactions, dependencies and impacts across different scales and domains (Jansen, 2009; Liu et al., 2007; Nuijten, 2011). However, integrating the social and biophysical sciences also poses challenges: overcoming differences in technical language of each discipline; aggregating data from different methodologies using various scales and measurement units (Robinson

\(^5\) To access the reports from the Millennium Ecosystem Assessment appraisal process, please visit http://www.unep.org/maweb/en/index.aspx
et al., 2012); encouraging interdisciplinary research work when professional rewards are not comparable to those received from single disciplinary work (Fischer et al., 2011); relying on researchers to be flexible and open to alternative research paradigms outside their area of expertise (Kerkhoff van, 2001) and investing in a time consuming process (Nuitjten, 2011). These challenges are worth overcoming as the key value of interdisciplinary research, as a systemic practice, is more effective engagement in complex and uncertain situations that characterise the R4D context.

Interdisciplinary research in agriculture is well represented in agroecology (as a science, movement or practice), whereby agricultural sciences and social sciences are incorporated into researching an agroecological system. Within this science, the biophysical components such as climate, soil health, topography and hydrology are considered influential as to what can and cannot be readily produced in situ, while socio-cultural and political factors are acknowledged as shaping the choices and breeding systems of crop or animal varieties, adoption (or not) of certain farming technologies and practices and power relations within farming systems (Jansen, 2009; Nuijten, 2011). Nuijten (2011:198) refers to two broad dominant scientific paradigms evident in agricultural science:

1. Conventional agriculture that views science as holding all the solutions, delivered through top down governance structures reducing the system to stand alone sub-components.

2. Sustainable agriculture views problem solving at the community-level using a mix of approaches including a non-reductionist and participatory approach.

While integrating the two approaches is considered problematic, Nuijten (2011) proposes the use of grounded theory, triangulation and systems thinking to relate these approaches to each other. Jansen (2009:181) refers to the work of Fresco and Westphal (1988) who conceive the agro-ecological system through a framework that distributes single disciplines horizontally (e.g. soil science, hydrology) and multidisciplinary fields vertically (e.g. human ecology, environmental economics) as a hierarchical system of knowledge. The main criticism of this framework is that it ‘disconnects’ the social or multidisciplinary fields from the single, natural science disciplines by restricting the social to higher levels and locating the biophysical at the lower levels (Jansen, 2009). This thinking does not take into account that the social
and biophysical sciences can act upon the system at the same level e.g. the social shaping of seed breeding through cultural traditions, and that the whole can actively structure the sub-systems so that the whole is not merely the sum of the individual parts. Jansen (2009) proposes to think about the relationship between the social and biophysical sciences as the plurality of sciences whereby phenomena are structured by the interplay of natural and social mechanisms at various levels (stratification). It is a non-reductionist understanding of hierarchy. Palsson et al. (2013) consider an interdisciplinary research process as providing a space to create joint framings of key research questions amongst biophysical and social sciences thus drawing attention to an important practice – that of framing situations. This could be extended to include involvement of other research stakeholders (farmer groups, governance representatives, policy makers) (see Ison and Russell, 2000a; Ison and Russell, 2000b). Involving a range of stakeholders in the research design as a part of the interdisciplinary research practice increases the possibility of managing social-ecological systems as a learning and negotiation process (Jansen, 2009) with one outcome being the development of appropriate technologies for farmer groups, rather than limiting knowledge production to biophysical sciences alone in top-down decision making procedures that may miss important social elements. Indeed IAR4D approaches aim for such modes of integration, generating innovation that draws on knowledge from multiple actors with continuous feedback between research, development, diffusion and adoption of new knowledge, rather than a linear path from research to development (Adekunle and Fatunbi, 2012; Ayanwale et al., 2013).
4. Methods for inquiry into integration of sciences

AFSI projects based mainly in east Africa and managed through a partnership between CSIRO and BeCA-ILRI\(^6\), a state-of-the-art biosciences laboratory and facility platform located in Nairobi, Kenya, were chosen as primary contexts for the inquiry. The research focus was on the experiences of researchers in projects which had both social and bio science research components. Potential interviewees working with and alongside these projects were identified by the AFSI program administrators and, in November 2012, were invited to participate in an interview. Potential interviewees were provided with brief information about the Learning Project and the proposed interview approach.

4.1. Interviews and analysis

Interviews with scientists involved in or associated with aspects of the AFSI were conducted in Kenya in English language during January 2013 by Ison and Holder. The scientists were provided with written and verbal information about the inquiry, and the intended use of the information they might provide in interviews. They were invited to give their written consent. Consent was provided for use of de-identified information from the interviews, such as in this publication.

The 17 scientists interviewed comprised predominately African scientists (11), and with slightly different proportions of men (10) and women (7). All of the interviews were recorded through contemporaneous note-taking and in three instances a digital recording. Interviews were transcribed and coded by Holder using preliminary *in vivo* codes, second order categorisation and thematic analysis (Bazeley, 2009; Saldaña, 2009). A general inductive approach to interpretation accompanied the *in vivo* coding (Thomas, 2003). Individual transcripts were not returned to interviewees; a draft report was produced by Ison and Holder (to whom interview data were confidential) and interviewees were invited to both comment and contribute to the next iteration of the report. Feedback and comments were received from 10 of the interviewees and the report modified when concerns were judged substantive.

The interviewees included professional scientists at different career stages, including some PhD students and research managers or administrators. Some were field researchers and others were laboratory based. Research was the sole or primary career of some of the interviewees while others previously or contemporaneously had other careers in government, private enterprise, academia and the not-for-profit sector.

Interviewees encompassed a broad range of disciplinary fields including: mathematical modelling, molecular biology, genomics, anthropology, sociology, environmental management, conservation, epidemiology, ecology, veterinary science/epidemiology, agronomy, economics, socio-economics, livestock economics, and bioscience engineering.

Readers will note in the presentation of themes from the interviews that some terms are used interchangeably – collaborative, integrated, interdisciplinary, multi-disciplinary, and cooperative. We have followed the terminology used by the various interviewees, without interrogating similarities and differences, and have tended to use ‘collaboration’ as the most encompassing term.

The approach taken to the interviews was of reflective conversations, as described below.

4.2. **Reflective conversation**

There is much debate about the terms ‘reflectivity’ and ‘reflexivity’. Different disciplines and different practice sites not only use the terms differently, but tend also to use them interchangeably.

However, if reflexivity is a process of giving meaning to, and being critically reflective of and acting on experience, then reflectivity is the beginning of the process (Taylor and White, 2000). At its simplest, reflectivity is a form of ‘benign introspection’ (Woolgar, 1988:22). Assuming that researchers already engage in reflection in various ways, the LP inquiry into integration of sciences during the east Africa visit provided a further opportunity for reflection, through reflective conversation.
Initiating and guiding reflective conversation is not necessarily nor in itself a research method. In essence both persons are conversationalists engaged in deep, thoughtful, meditative and, on occasion, light and humorous conversation.

What reflective conversation in the context of the LP does share with research is that it is bounded by a particular set of circumstances, overarching subject matter (here the AFSI partnerships and projects), and other constraints felt by the conversationalists (time, other commitments, etc.).

The initiating conversationalist (in this context, the LP researchers) will have starting subjects of conversation and broad subjects around which to converse, but these should shift to areas that emerge from the other conversationalist. Therefore as a social interaction the reflective conversation may be experienced by the conversationalists – at least initially - as awkward, uncertain, unstable and unpredictable.

The intention for reflective conversation is that people have the experience of being listened to. A conversation is an opportunity to tease out concerns, enthusiasms, and constraints (personal, organisational, political, and professional). Participating in reflective conversation presents:

• a modelling opportunity,
• a mechanism for articulating, identifying (and potentially acting upon, parking or discarding) emergent ideas/issues,
• an occasion to notice and pay attention,
• a means of clarifying and elevating particular reflection, and secondarily
• building stake holding and developing longer life to the CSIRO learning community.

A person initiating and conducting reflective conversation uses a range of skills, a key and central one being to be highly responsive to the conversationalist and that person’s cues. Others include:

• being curious and enquiring (but not analytical)
• displaying ‘ethicality’ and integrity
• attentively listening
• clarifying, reflecting and re-framing (where appropriate)
• making connections between the current experience/practice situation and previous similar/related situations
• furthering contextualisation, with the conversationalist, within the person’s accumulated and synthesised knowledge base and their understanding of their role
• make transparent, rework and/or deconstruct assumptions (if appropriate)
• sharing of similar/different experiences and reflections (where appropriate), and
• exploring the understanding or rationale related to questions of what, why, how and by whom

A reflective conversation touches on related methods from mentoring and coaching practice. It may be experienced as therapeutic and/or problem-solving but is not designed to elicit these as primary goods. A reflective conversation may draw on interview skills but is not an interview. Reflective conversation may explore particular experiences and the meaning the conversationalist has drawn from these. Reflective conversation may or may not lead to insights or to adaptations or future-oriented commitments and practices.
5. Introductions

5.1. Disciplinary and professional positioning

Invited to introduce themselves and their involvement in their respective projects, people chose to outline their discipline, its evolution and the various contexts in which these were enacted. Positioning themselves in disciplinary and professional ways in the first instance was an extension of the research logic – people were interviewed in their work environments on an inquiry about that work. The majority of interviewees came from a predominately bio-physical science background. Those with past careers in non-research fields, for example, within government and not-for-profit sectors also referenced the usefulness of multi-disciplinary research products or outputs. Here interviewees were likely to make reference to the demands of public policy-makers and public service practitioners, to communities (in all their diversity), and to the impact of interventions as being influential on research scope and design. Others spoke of how their bio-physical research led them ‘slowly, slowly’ (Interview #12) into broader inquiry. Some of those with an epidemiology or agronomy background claimed a discipline that was at ease with and understood the value of linkages with social sciences. Many discussed the progress of their broadening intellectual academic enquiry and/or a series of projects as leading them to “asking themselves” different questions, and “realising” more complexity than hitherto understood (Interview #14). Realisations came from a range of quarters including, for example, “… talking with the village women I learned that …” (Interview #2), and “getting into the field and seeing the reality on the ground,” (Interview #3).

However, interviewees rarely problematised or interrogated their disciplinary background directly and, when they did, this usually came embedded in a reflection from a past project. For example, discussing a project that struggled to gain traction in a particular area, one person said “all those on the ground were lab technicians and this was a major mistake. We didn’t have social scientists to be able to immediately listen. It took us three years to find out what was going on” (Interview #2). Another reflected critically that survey methodology had delivered considerable quantitative data but a colleague, speaking with a single family, “in one whole day
the perspective he got we had no idea about. It made me understand our population way more” (Interview #7).

Attempting to illuminate how fundamental were different ways of seeing the world, one interviewee offered another scientist’s comment that “it must be because we deal with animals that we never think about people” (Interview #6). Others spoke critically of disciplinary characteristics that potentially undermined the capacity of research to influence. For example, in presenting social science research findings to public policy makers one person found that reliance on qualitative data is ineffective: “a lot of text is good but you have to match it up with some numbers to give people an idea about the magnitude of the problem” (Interview #4).

5.2. Stories

Anecdote and narrative hold a strong place in how identities and knowledge are constructed (Maclean et al., 2012). Storytelling further acts as an organising device in situations of complexity including a scientific setting (Millerand et al., 2013) and facilitates both change and stability (Peirano-Vajo and Stablein, 2009).

The interviewees commonly used stories to illustrate relationships, learning and place. Sometimes these were other people’s stories. One interviewee, for example, mentioned the rejection of insecticide-impregnated mosquito nets by a local community when discussing how an overbearing bio-physical science approach can rebound on a technically sound intervention (Interview #4). At other times people related their own stories, revealing the deep roots of their positioning of themselves. For example, associations with particular people that were meaningful - “a friend who is a pastor who asked me to come to the village” (Interview #11), and “we realised we knew each other from school” (Interview #4); or reflections on personal histories - “when I was young … in my village” (Interview #5). These reflections served as connections to place and to people, dramatized ways of seeing, and revealed personal and professional identities that were not fixed in space and time.

5.3. Networks

People also positioned themselves within or connected to networks that were disciplinary, institutional, problem focussed and within particular localities. There
were many ways in which these networks were referenced in the interviews. People actively used their contacts to pursue research and professional careers, to draw in expertise and knowledge for research projects, to build coalitions and other working arrangements, and to develop research practices and project ideas.

Positioning was not one description and not one definition. It encompassed the individual and the various collectivities people recognised and associated with. For example, some interviewees referenced their association with government ministries\(^7\) or professional associations\(^8\) or regional and global bodies\(^9\). Others were nestled within faculties and had strong links with, mainly, European universities from their time as PhD scholars. For some these European contacts extended to work with or alongside different NGOs or donor bodies. In all interviews, drawing on these networks was a key feature to interviewees’ depictions of an integration of the sciences.

Doctoral studies were particularly revealed as widening the scope of interviewees’ appreciation of their own disciplines and inter-disciplinary domains and also with the application of research. Furthermore, those who combined teaching with their research careers all spoke of the capacity they were building not only for their disciplines but more for the problems of their country or region. The ways in which people contextualised themselves in these networks was also a way of projecting into the future. The following selection of quotes exemplifies this interest:

- “For me the main thing is capacity building.” Interview #1
- “We want to train students in biotech tools who can return to the field to their universities.” (Interview #11)
- “Now I train my students in qualitative methods and socio-economics. My thrust is that, especially in the developing world, every research should matter. We don’t have the luxury of doing research and leaving it on the bookshelf. Whatever research I do I want it to have impact.” (Interview #12)

\(^7\) Including Ministries of urban planning, agriculture, development, population health

\(^8\) For example, veterinary professionals.

\(^9\) Food and Agriculture Organisation, Organisation of African Unity, Consultative Group on International Agricultural Research
• “On all the projects I do I attach students to build capacity.” (Interview #12)
• “If you have students things work very well – this leads to quality work – partnering with Universities adds value”. (Interview #15)
6. The relationship between the sciences

6.1. Why (or why not) argue for collaboration in the sciences

For some interviewees there was matter-of-factness to awkward or difficult relations between disciplines. Said one, there was “always a tendency to just pull apart. Each just wants to do what it wants to do. Each needs to show the added value to collaboration” (Interview #8). Equally, the various sciences were recognised for their own strengths. One person remarked that:

“Both are important. I wouldn’t say social science is complete on its own, and biosciences are not complete on their own. We need both. We need the bioscience to learn the technologies. The disease is taking part in human dynamics so without understanding this, the technology can’t work. I like a mix – we have looked at examples of work that have not worked. We have been biased in social science…” (Interview #4).

Others felt simply that there was a reality ‘in the field’ that required collaborative effort. One stated that “you cannot research the animals unless you talk to the people. Through talking you realise that there are so many aspects of a disease … Getting samples is a social process (Interview #9). And another that, “you can't do research without involving people. You really need people, need to understand how they think, why they do things - work together” (Interview #13).

Others invoked stories that demonstrated failure or problems especially with adoption of research findings or outputs. Referring to an earlier project, one person exclaimed that “we couldn’t understand the changes that were happening, we were not listening. And our counterparts were simply saying that they would instruct the planting. But in the end they had little influence. We were deaf people talking to each other” (Interview #2). Others described a vaccine not being deployed (Interview #3) or its production becoming politicised in unhelpful ways (Interview #10). Others shared stories that went to constructive possibilities. Interview #8 said that it was his “background working with NGOs and in the field leads me to ask ‘what is the use of things?’”
For a significant number of interviewees it was simply the context of a developing Africa that argued for a collaborative engagement of the sciences. This was about the complex interaction of problems (Interview #3) but also “very specific” problems: “From my first observation there are many people suffering poverty who have no assets and no resources but they have this animal. What can we do for this?” (Interview #11). Thus, interviewees argued that, “you have to try to do research where the outputs will roll out to the community. You have plenty more outputs which will be of benefit to the community. The only way to do this is to look at the most important people who are playing within the value chain – for ease of adoption, for ease of doing whatever you do, for accelerated uptake. So those are key things or ingredients you need if you want to succeed in doing research in the African context” (Interview #17).

In situations of scarcity, complexity and competing priorities the argument was also that failures were themselves problems. Said one person, “action research is what I advocate for. In Uganda there have been a lot of agricultural interventions where they put in lots of money but there is no component imbued for action, for the future. Nobody thought about outputs to future intervention so mistakes and problems are repeated” (Interview #12).

In such situations there is humility in recognising that “we can’t do it alone. We aren’t that good” (Interview #7).

6.2. Dislocations in relationships amongst the sciences

There were a number of ways in which people discussed dislocations and tensions that exist amongst the sciences. These included the ways in which the different sciences claimed or pursued knowledge, the ways in which problems or situations were framed, underlying and unacknowledged assumptions, and how organisations and situations ‘set up’ problems.

Knowledge claim or pursuit came tangled with reflections on methods and program design. One person commented that it’s “how you collect data so that results aren’t rubbish. I’ve seen a few other projects designed from perspectives with, for example gender,…[where] getting questions on the value chain is the only useful thing and bioscience just tags along and is not getting much data” (Interview #3). Others
simply acknowledged a degree of ignorance about and between the different sciences. Said one person, “many who come want to do research in economics. Most of the time people think research is quantitative. So [it’s important] to bring to their mind you can get data that is qualitative. They think that it is not quantitative then they haven’t done their science” (Interview #12). Perhaps inevitably stereotypes were voiced such as:

- “with hard sciences you… saw cause and effect but without feedback. You always looked in one direction.” (Interview #1)
- “biophysical scientists [can be] very hard and critical when qualitative social-economic methods were used” (Interview #15)
- “Agricultural researchers didn’t ask … Scientists work from top down” (Interview #5)
- “The social sciences get sucked in and can get stuck in one system, one culture.” (Interview #16)
- “… is lab led and snooty about the nature of data” (Interview #7)

These stereotypes can lead to issues about the different value placed on research results and hence on their legitimacy. One interviewee commented that “sometimes the vets wouldn’t understand the value of the data – the narratives and stories. They wanted to see numbers. So you’re always at pains to say why it is important. So it was, how do you fit your learning into their learning? Not just your use in the field” (Interview #4).

At the same time, self-criticism of their discipline arose from some interviewees: “we thought our technology was good and the trees were better… Some of the project people were very angry and behaved like alpha males” (Interview #2); “for social scientists there is ‘paralysis by analysis’ and we need to show if and how the insights are useful to the bio-science and beneficiaries. And for the bioscience there is a certain tendency for box checking” (Interview #5); “we look at systems but we don’t really look at systems” (Interview #16) and “scientists are very individualist and like doing research for itself” (Interview #8).
Simply posing a binary between ‘hard’ and ‘soft’ science was itself seen as unhelpful as well as inadequate. One person commented that the sciences themselves were “not homogenous.” There were:

“All different methodologies and different ways of looking at things. Agricultural economics is very quantitative and anthropology is very qualitative. You can’t put it all into one box and say they are the same. Also where you have been trained is an influence. At the interplay of social and bioscience perhaps the diversity in social science is confusing. A molecular scientist is definite but can the same be said for a historian or an anthropologist? So unless you know what you want then you just ask for a social scientist. A social scientist will not know all the sub-disciplines unless you direct them to a particular one. It is the same for bio scientists. For example veterinary or medical science[s] are big categories but then there are different sub categories” (Interview #4).

The way in which problems or situations were ‘framed’ was acknowledged by some interviewees as a source of tension between the sciences. One person reflected on a project where “the leader was a ‘hard scientist’ being told to incorporate gender. Framing was the problem. They thought just adding questions would deal with it. If you want to understand gender dynamics you have to mainstream, not just write it in one section” (Interview #12). This issue of framing or bracketing out was then characterised as imposing unwarranted time and cost.

Institutional mandates or characteristics were also seen as contributing to some tensions. One person commented that:

“The challenge depends on which institution you work in. Some institutions are built around either individuals or teams and some teams are so disciplinary they find it so difficult to embrace what anybody else is doing and don’t have a clear marriage in working together. You can get a team where people want to preserve their territory have a fear of other people entering that system and upsetting (or taking?) control” (Interview #14).

Another person noted the culture of research practice as constraining with the comment that “it is not easy to get specialists talking. They are all looking at their pieces of research” (Interview #4). These tensions were not, however, viewed as
inevitable. A number of interviewees spoke of ways of circumventing: “we make geneticists talk in ways that farmers will understand. It makes it fun” (Interview #5).

6.3. Contexts for collaboration in the sciences

This element of adaptability, flexibility and negotiation between the sciences carried through into reflections on projects and situations where the collaborations were perceived to be constructive, appropriate and helpful. From experience of such collaborations, one person reflected that there was “… a lot in common between statistics and social sciences” (Interview #1). For others, what was central to collaboration was openness to ways of seeing and looking as the following quotes exemplify:

“I learned things I didn’t know” (Interview #4).

“Although my interest is on the people side, I also have to take an interest in the virology” (Interview #6)

Central to perspectives of constructive collaboration was context – both awareness of it and the surprises that it throws up. Simply engaging with others in the field served to open the research space. As one person said, “there were times you’d interview farmers and they’d give very interesting opinions that we had not thought about before” (Interview #1). More than one person commented on this. Said one person, going into the field from the laboratory “was very useful for me to learn without saying I became an expert. It gave me an insight and experience into peoples’ context. It was sort of forced on me … so I understand” (Interview #3). The insight about learning in the field “leads to many different stories” (Interview #10) as well as adjustments to research practice – “if you want to collect from animals, said one person – “it is not must but a request and … you have to really learn to be humble” (Interview #9).

Others recognised failures or weaknesses in research projects as being influential in opening the research space to other questions. In one case it was the failure of a vaccine to curtail the spread of a particular disease in a particular country (Interview #10); in another a particular finding “surprised us therefore where was the virus coming from?” (Interview #3). For others it was the simple recognition of complex
research situations that drove collaborative projects involving social and bio-physical sciences. As one person said, “when they went to the farmers the information was not adequate … disease control has to involve people, that is, it is both social and biophysical” (Interview #15). This was emphasised in another project:

“We realised as much as we can understand the epidemiology of the disease in terms of vectors and hosts then the issue is more complex than just the biology … Then I realised that the weak point was that we didn’t invest into these other interactions that would be influenced by the epidemiology of the disease. So it was very obvious that this was lacking in the study … Just the fact that the social science side is helping me now ask some more questions than I could have ordinarily answered with a simple biology and epidemiology [study]” (Interview #14).

The argument for better interdisciplinary science was also about complementarity. As one person said “both are important. I wouldn’t say social science is complete on its own, and biosciences are not complete on their own. We need both. We need the bioscience to learn the technologies. The disease is taking part in human dynamics, so without understanding this, the technology can’t work. I like a mix” (Interview #4).

The recognition of complex problems extended to recognition of complex institutional environments. For example, understanding the different ways in which research evidence is understood by those in positions of influence. As one interviewee commented, “If there is not direct technical success in containing the disease then the best way is to use a socio-economic approach. First you need to see impact, to define it in socio-economic terms. MPs don’t understand high tech terms but they understand if this problem is not solved then people are devastated, and also to hear how people will flourish” (Interview #12).

Another person commented in a different way about adapting research practices in order to influence. He said, “I got more into social science in service of bioscience. I try to provide insights that are feasible, reasonable and what makes sense. The basic lesson – a way of adapting – is mostly to let the biological agenda drive my agenda rather than emphasising the economics and using the biological as just data. It’s more about shaping the biosciences” (Interview #16). Conversely, another interviewee indicated that some social scientists would “refuse to go into a project
that someone else has designed and respond to a brief that says work out what to do [for] the social science” (Interview #6).

Critically the interest in longer term influence and change to the problem at hand was understood to inform the logic of collaboration in scientific effort. In responding to a question about why a project might integrate social and bio- science, one person said “the question of why you do that, I can see now, has an important relationship to adoption and change on the ground. That’s where I am at now in terms of thinking about the next phase of the project. So it’s going from the how, and “oh yeah, that’s why”, and now we have to go back to how” (Interview #6).

In discussing the impact of the integration of the sciences on their work most reflected positively. Said one person, “it has improved my science’ – a lot of information accompanies sampling … It added value to doing the science” (Interview #10). It also added value to ways of seeing the problem:

> Once you’ve been introduced into system dynamics and you perceive the world as a system and how things work, the loops and the cause and effect – you shift into a different world. You see things differently…[W]ith hard sciences you … saw cause and effect but without feedback. You always looked in one direction. Two things fascinated me – measuring the feedback and the non-linearity of things” (Interview #1).

Looking anew and holistically at problems made simple good sense: “no one has answered this question so making a difference is important” (Interview #13). It also made for positive outcomes:

> “We have the example in Uganda of human disease controlled by human behavioural change – HIV – and we have seen drastic improvement” (Interview #12).

Attention to the benefits of collaborative science did not necessarily extend to arguing for researchers to themselves become multi-disciplinary. Most people were realistic: but saw that scientists at least needed to know the basics [of other disciplines]” (Interview #4). One important reason was ethical. As one person said, researchers:
“have to have some understanding and experience of participatory and qualitative methods even if these aren’t going to be used in the project …[F]or… scientists to be responsible players in that situation they need to have some experience or sense in their head of what’s it’s like at the coalface so they have some kind of accountability and some understanding of the underlying ethics of their engagement with policy-makers. I don’t actually expect all projects [we are] involved with to be like this one where there is actually quite a big on ground field commitment, but I think there needs to be some kind of understanding of that, some understanding of the culture and history of the place they are going in to and its institutions.” (Interview #6).

6.4. Changing organisational and environmental requirements

Scientists and researchers work in contexts that can facilitate or constrain collaboration between the sciences. A significant proportion of interviewees reflected on structural rigidities as well as changes to organisational and environmental requirements as influential on shifts in relationships between social and bio-sciences.

The organisation of research within organisations was seen as important. Some organisations have “difficulties in silo-isation” (Interview #7). Agreeing with this another person said that in the work place “research is compartmentalised. Biologists are just biologists, social scientists just social scientists. Rarely do we get opportunities to interact” (Interview #14). Another person agreed saying, with regard to another context, that social science was still generally an “add on” (Interview #12). Here there was recognition that “little bridging work has been done to date but [organisation leaders] are now talking more about joint proposals” (Interview #7).

Others noted that effective collaboration between sciences was hampered by the political economy of international research funding. However desirable scientific collaboration was, one person felt that the organisational executive “can’t afford to be holistic because he’s trying to keep the lights on” (Interview #3). The way in which donors and donor institutions worked similarly constrained collaborative work. One person, for example, said that they “wanted inter-disciplinary PhDs but the funders couldn’t work this out. Which school would people be in?” (Interview #7). The person
further commented that interdisciplinary work needed “more money to do this properly. We didn’t win the money battle but eventually drew the additional funds from within the project” (Interview #7).

In another workplace an interviewee had a different experience. This reflection noted “the Director had realised the importance of social science in the [medical and veterinarian] research. They understood the basis from where socio-economics came in. So there was quite a demand for social science - whenever they went into the field especially in helping with communities (Interview #4). “[A] healthy culture of challenging the biological agenda by asking the social and economic consequences” was viewed as important (Interview #16).

However, a number of people also noted changing requirements for collaborative research work especially from funding and donor bodies: the “train had changed” (Interview #10). In previous years “everything was technically focussed but with time people realised there is no funding for core basic science. To get funding you must talk about solving the problems of the people. With donors and funders if you don’t show this then [the project] doesn’t happen” (Interview #12).

The shift was not just in relation to the design and construct of work but also in relation to other vital elements. With regard to ethics requirements one person commented that “standards are going up and … Donors are also becoming more demanding” (Interview #8).

The changing environment meant that social science was called for “in proposal development and when a group is seeking funding. They realise that they need social science expertise because a lot of donors are requiring this” (Interview #4). Furthermore, “social scientists are very good at building teams for these applications … You have to develop multi-disciplinary teams in consultancies. You need all these characters to come together to put up a proposal for funding” (Interview #5).

Researchers nonetheless experienced these shifts as dynamic, evolving and experienced by all ‘players’ in the field. As one person noted “the funders were also trying to work out what it meant to have integrated research. For them too there were different pots of money, different boundaries, who had influence, [there were] different publishing priorities” (Interview #7). While resources were not everything to
collaboration between the sciences, it was stated that “the most limiting factor is funding” (Interview #12).

6.5. Representations of collaboration

The research revealed different features to representations of collaboration or integration of the sciences notably in the language people used and their reflections on ways of doing.

6.5.1. Language

Commonly people spoke in the language of enthusiasm (Ison and Russell 2000). One person was “excited by this opportunity - The whole process has been interesting and exciting” (Interview #13). Still others said the collaborations were “fantastic to experience” (Interview #6), “very stimulating” (Interview #7), and “quite mind boggling at times” (Interview #9). The collaborations were described as opening ‘my horizons and also expand[ing] my talent’ (Interview #14), and “an awakening … being in a formal place of working with other disciplines has really grown my thinking” (Interview #7).

The language of excitement carried through to the ways in which collaborations occurred. New ways of seeing “really sparked their attention … [the issues are] quite new and expanding” (Interview #6). Another person said that “what is exciting the most is that it is a very exciting team. And everybody has learned to work together” (Interview #14). People – scientists and stakeholders - were described as “developing confidence” (Interview #5).

Eventually working across disciplines was seen to influence terminology and concept: “There’s a change in the words the team uses because of … the way the project has restructured. Yes I think there has been an impact there” (Interview #6).

6.5.2. Ways of doing

The language of enthusiasm extended into reflections about the different ways of doing collaboration. Interviewees spoke in terms of talking together, talking with, listening, brainstorming, having relationships, and trying to see together.
Partially the relationship development was simply about “getting the right field team … Picking the right people who can work together and heading off any issues about who’s getting more or less. The right team [is] key” (Interview #3). Critical to relationship development was trust building. This worked at a number of levels:

- As professionals, “with people who had come to know me a little and had started to trust” (Interview #6)
- With communities, “I had to spend so much time; it took weeks to gain back just a little bit of trust” (Interview #2)
- Within projects, “what is important is that there is enough trust to begin something” (Interview #2)

In addition, working out relationships and ways of doing between the sciences was, in many ways, seen as a matter of emerging practices. “[G]etting the art of the combination” between the sciences (Interview #12) was described as a process as much as it was an objective. Discussing one project, an interviewee said that “we had different needs and had to find a middle ground. The sociologists understood ‘population’ differently to epidemiologists. So a lot of this planning time was spent discussing our different perspectives and interests and where we were coming from” (Interview #7). Discussion time was viewed as “building a shared picture … I was asking lots of questions and asking them to explain things … what is it that people do that causes these things” (Interview #6).

Building these relationships did not appear to be dependent on compulsion. As one person said about a project “there is a lot of communication. They talk a lot, have meetings and everyone in the project understands what’s going on. They were forced to work together but it was not unsuccessful” (Interview #7). Interviewees understood the need for ‘scientific diplomacy’ coming into play … we need to learn this … the recognition and skill that [we] need to work together to address this problem” (Interview #10).

Developing the research project also featured fluid processes. Said one person, for example, “it was developing relationships and shared learnings in the field, sitting down with farmers as well as being at a big workshop with vets … [being able to]
ask naïve questions” and doing “a lot of thrashing through of the sampling framework” (Interview #6).

Developing perspective through relationships was not the preserve solely of the different researchers. It also extended to others in the field. One person said what was needed was “developing rapport in the community before working with the community’s animals … talking to chiefs and local administrators” (Interview #4). And also to other stakeholders:

“we are interacting very closely with other partners in the development field especially FAO and AU¹⁰ and the regional bodies like the east African community. These are usually these forums where vet professionals are brought together to discuss trans-border diseases … So in packaging all these things it needs more than the immunology and the biology. You want to get into how these institutions that govern disease control work and [learn] what the players are involved [in] and how you engage farmers to adopt some of these things so they can make impact. These arose out of these roles that have come out of the forum so far” (Interview #14).

An expanded perspective or picture of the nature of the research problem and associated collaboration in the sciences was also shown to ask for a more open approach to methods and modes of inquiry. Collaboration asked researchers “to think in social terms which is different to thinking in terms of diseases” (Interview #13); and also to stretch into unknown areas: “I didn’t have any theories on markets so I tried anything that would work” (Interview #5).

The way in which science collaboration expanded perspective was acknowledged as “not easy” (Interview #7) and “coming to terms with the conceptual framework” that was outside one’s particular discipline was itself a project of on-going attention that required “being conscious about learning” (Interview #6). In essence, the process of opening out and including other disciplines asked researchers to be in uncertain or ambiguous places. As one person commented, “everyone could see the point of the other’s interest even if they didn’t understand it all” (Interview #7).

¹⁰ Food & Agriculture Organisation of the United Nations; African Union.
How the research was designed and its different components can become important not simply as an accommodation of difference but for particular reasons of choice. Said one person, “we avoided creating work packages – one group doing this, one group doing that. Rather it was, for example, here’s the public health component and it needs epidemiologists and population planning specialists … This expansion to the scale and scope of data collection will have knock on consequences” (Interview #7).

Addressing this point in another way, someone commented that “what I don’t like in participatory research [is] you go to people and say what are your problems and you go away and then come back and say ok this is what we do. In operational research the work is done completely by the recipient. You are just the facilitator. You provide, you organise, you teach how to interpret” (Interview #11).

Some interviewees mentioned particular developments as facilitating deeper social and bio-science integration. This happened even after the stage of formal approval: “as we went along re-shaping it or looking at how the social science dimensions and questions and data collection could fit in with the virology ones, it became clearer to me that it wasn’t an experimental situation but it was an investigation. We weren’t trying to change the base conditions because we were trying to find out unknowns” (Interview #6).

Some practice developments acted as instruments to widen scope and method. An example was the development of a questionnaire where “we did not want two questionnaires – one for bio-science and one for social” (Interview #9). For those involved there were “lots of issues to talk through about what you could talk to farmers about and what you couldn’t” (Interview #6). In addition:

“..for [the questionnaire] to be comprehensive, everybody did their output to make sure all the components of the social science, spatial mappings, the components of the biology, virology, epidemiology [were] put together in one package. The person interviewing for all these questions is just one person who is not necessarily the biologist or the social scientist” (Interview #14).

The end result of bringing “everybody on board” during the questionnaire development process was “that when you see the questions you understand from where each question has come from even if that question is not [your] speciality”
(Interview #14). In the end, as one person said, the questionnaire “has become very beautiful … the flow” (Interview #13).

The process of developing an approach to research ethics was noted by some interviewees as performing a similar expansive function. Drafting a questionnaire “in the probing language where everyone was comfortable”, learning to “seek consent from the beginning not at the end” and then working collaboratively “to bring the ethical situation to a situation where it was acceptable” (Interview #17). This was similar to another project where it was commented that: “some of the questions that were raised [through the ethics protocol] are very useful in our interaction with the farmers. …[I]t really prompted us into thinking through the issues even before we interacted with the farmers. I found that very useful” (Interview #14).

Finally many interviewees mentioned the need to “communicate, communicate and communicate … be accommodating … timelines are very important … communicate … regular follow-up” (Interview #17) amongst the team, in different modes. For example, one person said that “the main channel for communicating is the internet. We have a common agreement with a joint plan. … I remind them of deadlines, milestones and so forth” (Interview #11). Stressing communication another interviewee said that “wherever you are there is no excuse; wherever you are, we will link you in. If you are not in the meeting, wherever you are, we link you in with the feedback” (Interview #14).

6.5.3. Locating collaboration in the research cycle

Some interviewees stressed the importance of collaboration outside of specific projects. As one person commented “we need to strengthen fora that bring scientists together and encourage them to bring out the benefits of the [integrated] approach” (Interview #8).

Existing developed knowledge – lay, as well as scientific— was also discussed as a reservoir from which to draw. Thus one person noted, “the questions I got from these villagers most, I put as research questions – What do we feed them? Where can I buy them?” (Interview #11 w.r.t pigs). And another person said “I’ve been involved for five years and became very familiar with the literature and gaps in the knowledge of its epidemiology on the continent” (Interview #3).
Most emphasised collaboration early: *involve people in the research at an early stage* (Interview #3). Some emphasised why early involvement was important: “*the steps to take are to engage social scientists right from the beginning … Scientists need to know that they don’t need to rush. Until communities are at this level then you don’t need to rush. It will be a waste of money*” (Interview #5). Indeed, a number of interviewees generally felt that late stage collaborations were unproductive. One person said they were ineffective “*when groups come together in a five year project only at implementation stage*” (Interview #10).

Integrated science, however, was not an assumption but rather something that had to be worked through. One person commented:

> “so if you are going to integrate social science, what sort of social scientists are needed to do that and to do it well, and what sort of preparation do they need rather than [having] to learn it all on the fly? …[Is it] going to give you the best research if you don’t have appropriate social science expertise involved right from the start?” (Interview #6).

If not thought through well, a research collaboration may be ineffective. One person commented that:

> “I believe strongly in the design phase including social aspects [however] it is not enough just to add it on. This is what tends to happen. We can start with the problem and draw together a team to address that problem. At other times this is done too randomly. There is the whole issue of bringing in the technology as part of the research – or is it just hopefulness at the end that people will take it up” (Interview #8).

Involving different perspectives from the beginning was emphasised in relation to the inception phase. One person described the process and its benefits. He said:

> “So we spent around ten days looking at possibilities in areas in the sector of food and nutrition security where we would have a lot of impact. We focussed on five projects and then two were shortlisted for the next phase … from the beginning we knew who is who and whom you would be able to work with easily from the beginning. And also you could see who has participated in project training, who had some management skills, who has been involved in
A, B, C, D. That was an eye-opener. Then after that we were given tasks and then [as] the tasks were done you would really know within two days [that] this person has experience with this, then we had very important social evenings which opened us to each other” (Interview #17).

Another person described inception less as a discrete activity and more as a dialogue. He reflected that:

“We had an inception workshop … for three days and developed the proposal, and then we also reviewed the plan again. The workshop was very exciting because we had people from the field (farmers), researchers and NGOs. Almost all stayed involved. They influenced the direction because they tell us what they want. They focus on what’s in the basket and tell us if it’s not what they expected” (Interview #11).

A further comment illustrates this dialogic process: “biophysical scientists started and then the social scientists came in. They first thought of concepts as a means of how to understand the collaboration so they developed a conceptual framework; the questionnaire followed” (Interview #13). Early dialogue enables collaborators “to define the research objectives as a multi-disciplinary group” (Interview #7).

Furthermore, the definition and refinement process is on-going: “it was good we started very early. We had so many meetings to marry science and social together” (Interview #9).

In the main, peoples’ reflections pointed away from the research cycle as a series of concrete and progressive linear steps and more as a process of adding, refining and iteration of questions that lead to other, new questions. As an illustration, one person said:

“So we are thinking that this is a gap that needs to be developed further because the social dynamics, the market dynamics are things which were not captured in this phase. So we think it would be very nice to be able to put this into a bigger picture” (Interview #17).

It was viewed as problematic, although perhaps not insurmountable, if collaboration was “retro-fitted” (Interview #6). While “there is recognition of the importance of
social science” it was often “not explicitly recognised and budgeted. It is the same for communications: it is not about just scrambling around at the end” (Interview #8).

6.5.4. Reflecting on ‘integration’

A number of reflections give different perspectives on the nature of ‘integration’ or the question of ‘integrate what with what, why, how and to what end(s)?’

One person felt that integration was “dependent on the assignment” (Interview #1). Other comments suggested it could be “purposeful” (Interview #1) as well as “accidental” or “serendipity” (Interview #7). Others felt that integrated scientific inquiry needed to be more demanding and “should have a design phase that should be started sooner. We need more structured thinking and more interface to explore the interface and how it could work in better ways” (Interview #3). In discussing integration a number of people appeared also to conflate ‘socio-economic analysis’ with ‘social science’. A further perspective looked forward along the continuum saying “we need to integrate the bioscience into research for impact” (Interview #8).

Integration was also discussed in design terms and practice terms. One example offered of integrated design suggested it “helps a lot. We had previous work in multi-disciplinary teams and we know we have to spend six months on each. So each aspect is related to the other in the design” (Interview #10).

An example of integration described in research practice terms was that:

“The team works together to collect the full range of data and I think that that’s a big thing. There’s an approach that the whole team is collecting this data and that’s required that the whole team is trained in ethics and understand the principles and what this means in the project. I did that and … also required this. Yes, I think that is a characteristic that everyone collects the one data set that slices off to different people for analysis and writing up” (Interview #6)

The interviews exploring the relationship between social and bio-physical sciences suggest that integration could be described along a spectrum. At one end, there might be the manner in which social scientists could “help with communities” and “allow acceptance” (Interview #4). Then there might be ways in which bio-physical...
scientists could acquire and deploy certain methodologies, for example, ways of “linking the samples” (Interview #1), add a “soft touch” to questionnaires (Interview #17), and learn “how to do focus groups” (Interview #4). Or social scientists learn how to do “some of the bioscience techniques” (Interview #4). Then there is a way that could be described as separate but equal where components are constructed into a project and where “we work in a team of three but are doing different things” (Interview #1). An integration of components may or may not have an agreed overarching conceptual or theoretical framework.

Finally, at another end of the spectrum, integration could describe a process where crafting inter-disciplinarity was a specific objective. One example was outlined where “relationships are still evolving” (Interview #7). For this particular project “the funding body had foresight – they planned how they would get people to work together. We competitively won a pre-project proposal and this led to a preliminary phase (funded for a year) where we got together to learn and to design the project together. We got to define the research objectives as a multi-disciplinary group. I found the preliminary process revolutionary” (Interview #7). In this project stakeholders were also “core partners and intellectually involved” (Interview #7).

The matter of how an integrated research project or program might position itself along the spectrum between social and biophysical sciences is possibly a function both of problem scope and analysis, as well as a result of deliberate decision-making. Reasoning a decision (or even set of decisions) might look to “whether it is going to give you the best research” (Interview #6) and/or to “a moment where thinking will change” (Interview #1) and/or whether it “might push the boundaries of understanding” (Interview #7).
7. Research for development

7.1. The R4D context

The development context to the conduct of integrated social and biophysical research was clearly important to interviewees. The distinctiveness of the worlds of research and of development raised questions about the “two stools” as well as what “fall[s] between” them (Interview #3). How researchers experienced and understood the differences was to some extent dependent upon who was asking (and paying) for what. This is illustrated in the following comment:

“there will keep being issues with donors and timeframes. From them it can be a bit – here are the dollars, you will be grateful, these are the results I want and in this time frame. [Funding] recipients tend to say ‘yes’ but don’t give feedback about the process. There needs to be negotiation about scope. Everyone wants to do more things but research needs to be integrated together to deliver in the right way. If the delivery teams are working together then the full project can be shown with the right milestones to the donor. This is about building trust along the total value chain” (Interview #2).

The comment highlights the politics as well as the practicalities of research funding. Some interviewees argued for recognition of particularities. One person said “you cannot continue lab work on soft money. It is unsustainable… lab work is hard to fund because it is so long term. The path to impact discussion [by the development community] needs to take this into account. It’s ten years of investment and even then not everything will succeed. We can put in a theoretical pathway, but we are kidding people” (Interview #3). Some acknowledged also the hard reality of “what the first world would be interested in and would fund” (Interview #6). Another commented that:

“So I know that when we have partners who are more interested in the development side you need quick results, but these are few. Those with research outputs that impact take a lot of time. We have changed three times in our focus on this issue – is it ticks?; is it wildlife?; no, it is more complex than that, we need to address the whole system - and this has taken seven
years. Therefore if it takes seven years to get to something that can make a difference then we really need to be patient in terms of research ... It is not as simple as R4D and making solutions. So we need short and long term goals. 

But we need funding for both. Funders are impatient with long term strategies” (Interview #14).

Conversely, others emphasised the developing world context. Said one person, “if it is just about the science then it is not worth it—not for people, just for science. The amount of research that has been done in Africa is an embarrassment to researchers. But farmers are still doing what their grandparents did. There is a major disconnect between science and farmers” (Interview #5). Just focussing on technologies was argued to be ineffective. Said one person there had been a “lot of technologies but the transfer to farmers was a big flop because there were no adequate studies before trying to transfer the technologies and the technology may not have been affordable to farmers” (Interview #15). Another concurred by saying:

“I have been involved in other projects and we realised what works within Europe does not work within Africa because here we need to do much more practical… research. We need problem-solving research but not basic fundamental research. In Europe you can sit in your office and do a lot of basic research. Funding here will be more like problem-solving research” (Interview #17).

This view was not shared by all interviewed as one person commented that basic research is needed to build knowledge around the biodiversity in agroecological systems as a priority for research funding. However this did not imply that applied research should not be undertaken (Interviewee # 10).

The interviews highlighted that one way to respond to these standpoints was through “trying to find the right balance in the IAR4D approach” as an “evolving methodology” (Interview #16). Put simply, “interdisciplinary scientific collaboration is a core part of R4D because pure science cannot address all issues and social sciences can find out things that are relevant” to research having impact (Interview #10).

While concepts such as ‘innovation platforms’ and ‘pathways to impact’ might join the “high turnover of [other] concepts in development” (Interview #12) and add to
“confusion in terminology” (Interview #16), interviewees nonetheless understood them as terms that brought their research closer to problem-solving. As one person said, “I like the concept and approach of innovations – allowing the people solving the problems to add in. Not just waiting for everything from the outside to come in and solve it” (Interview #12). Another considered that “you don’t need rocket science. It just has to be people-centred science” (Interview #5).

There were a number of different ways in which innovation platforms were described. At one level it was the outcomes achieved: “an innovation platform system changes the mind and way of thinking because the solution is not in one basket. You have to just put everything on the table” (Interview #10). At another, ‘innovation platform’ was a term that encapsulated people, processes and their interactions:

“A platform itself must constitute a mix of people with some combination of skills working on a plan that is twitching some activity from the way that it was done before to a way that can be more efficient and can bring about change. So to me it can be an incubator that can be composed of those components – the people, whatever technologies that you want to twitch and systems that can make this happen. So when someone shares with you what they do on an IP [innovation platform], it should be something that lights the lamp in your head, and you go ‘wow!’...[I]f you can take a map to identify a disease, that has changed things. So the processes that have led to that change are basically the platform that you call an IP. It is not one component, it involves a lot of set ups and partnerships, people and resources to do that” (Interview #14).

At another level, the concept of innovation platforms was an agitation for research to pay attention to the real world. Said one person who saw the process of change as being about “how do we organise ourselves to be more responsible, real time, in your face? The lessons we are learning need to be turned around quickly and be relevant. How do we make things relevant for development? … A flashy front end helps better prioritise work impact pathways. Yes, it’s a different way of working. It improves the relevance of back office research and accelerates time between discovery and impact” (Interview #16). Innovation platforms thus can be viewed as a
mixed metaphor for driving change and not as a static entity or as a specific end point.

The notion of ‘impact’ also emerged as multi-dimensional. It looked towards the research community in terms of the production of knowledge; to what was beneficial for countries, regions and communities; and to capacity building. On this latter point there were ideas about improved curricula, the organisation of tailored skill and knowledge-enhancing workshops and courses, the nurturing of networks and institutional strengthening of inter-disciplinary alumni and practitioners.

The researchers interviewed clearly wish to make positive contributions to the developing world, “to know exactly whether your objectives are in line with the problems that are in society” (Interview #17). They know that they have to “take into account different resources, [and] skills” (Interview #10) in communities as well as within complex organisational constellations. Importantly, many saw the need to do better by the communities in which research was conducted. One person reflected that “communities say ‘there w[ere] some people who were here before but we haven’t heard anything’. They say ‘You just come when you want to collect data and then you go away’. Sometimes you need to walk with the people to make the change and to make it stick more” (Interview #4). It was recognised also that researchers as well as their “countries need to use these opportunities to turn the problems into solutions” (Interview #11).

7.2. Suggested actions for future R4D

Various actions were suggested by interviewees as important for future effort in their own research and as lessons for others. These suggestions are summarised in Table 2. Suggestions drawn from various interviewees’ reflections are presented, together with our comments about their application or broader meaning, in three groups related to their predominant relevance in (1) project design and impact; (2) research teams and capacity; (3) specific research methods.
<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>1 PROJECT DESIGN AND IMPACT</td>
<td></td>
</tr>
<tr>
<td>1.1 Putting social aspects into bioscience is ‘a new field’… Internalising this has started, but not sure how or to what extent</td>
<td>How might social – bio science integration be institutionalised by bioscience research organisations?</td>
</tr>
<tr>
<td>1.2 Have a design phase that should be started sooner. We need more structured thinking and more effort to explore the interface and how it could work in better ways.</td>
<td>Pre-project specification needs investment in time and conceptual input.</td>
</tr>
<tr>
<td>1.3 Work closer with the community. Not just in data collection but also implementation and follow-up of findings</td>
<td>Community engagement and partnerships need attention at design phase and throughout a research process</td>
</tr>
<tr>
<td>1.4 Get the farmer to be the one to set the research agenda – the opportunities and challenges.</td>
<td>Community engagement and partnerships need attention at design phase and throughout a research process</td>
</tr>
<tr>
<td>1.5 Communities need time to change and to understand that they are the ones who can make things happen. They need skills, courage, knowledge.</td>
<td>Achieving local impact needs ongoing engagement.</td>
</tr>
<tr>
<td>1.6 Not enough knowledge of the farm level exists. What factors promote the maintenance of the disease at farm level? Hence our work on social networks.</td>
<td>The systemic complexity of production situations needs to be understood.</td>
</tr>
<tr>
<td>1.7 If you want to have impact you need to be as holistic as possible</td>
<td>Broaden the boundaries of the system that research is seeking to understand and change</td>
</tr>
<tr>
<td>1.8 Look at production systems holistically not only in terms of a specific production problem or constraint, then the package to deliver to farmers can be more holistic and address all the problems.</td>
<td>Broaden the boundaries of the system that research is seeking to understand and change.</td>
</tr>
<tr>
<td>1.9 Be aware that it is common that when subsistence food develops market value that men become interested and push out women.</td>
<td>Gender and development issues need to be considered in project framing and design to guard against perverse outcomes</td>
</tr>
<tr>
<td>1.10 There is recognition of the importance of social science but often this is not explicitly recognised and budgeted. It is the same for communications. It is not about just scrambling around at the end.</td>
<td>Multi-disciplinary involvement and integrated approaches are needed across the overall project cycle</td>
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<tr>
<td>Section</td>
<td>Summary</td>
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<tr>
<td>1.11</td>
<td>There has been too much informing and telling rather than looking at the incentives (not simply financial incentives) and reasons for people to take up innovations. We also don’t know enough about the political economy around people taking up, or not, particular technologies.</td>
</tr>
<tr>
<td>1.12</td>
<td>There is a lot of history to doing research in Africa. There’s 50 years or so of research that could be looked at.</td>
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<tr>
<td>1.13</td>
<td>Research findings can get lost in a Government Department where priorities may change.</td>
</tr>
<tr>
<td>1.14</td>
<td>Inception workshop involving people from the field (farmers), researchers and NGOs influenced the direction; told us what they want and most stayed involved.</td>
</tr>
<tr>
<td>1.15</td>
<td>Maybe the IP is the thing through which to have impact. So as researchers our background information was a bit late. The main thing is to be flexible.</td>
</tr>
<tr>
<td>1.16</td>
<td>Realise that the needs of the private sector are quite a bit different to the needs of the public sector. The social dynamics are different.</td>
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## 2 RESEARCH TEAMS AND CAPACITY

<table>
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<tr>
<th>Section</th>
<th>Summary</th>
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<tbody>
<tr>
<td>2.1</td>
<td>Partnering is key: communications and awareness is needed to work with the right people and organisations. If you have students things work very well – this leads to quality work – partnering with Universities adds value.</td>
</tr>
<tr>
<td>2.2</td>
<td>CRPs (the major research arenas in CGIAR work programme) have the capacity for transformation.</td>
</tr>
<tr>
<td>2.3</td>
<td>Have more involvement in the lab from the Australian side as it seems that the Australian partners are operating from a distance. We don’t have the right input from Australia on this. It could be made stronger with input across the board.</td>
</tr>
<tr>
<td>2.4</td>
<td>Purposefully select team members based on a clear definition of ‘expertise’ where experience is aligned to specific tasks. This is to provide a more strategic approach to recruitment through a well-defined recruitment profile and also through robust assessment of skills: e.g. “we really knew that”</td>
</tr>
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</table>

Integrating social sciences is important to understand development context and identify pathways for change.

History matters – but is often overlooked.

What are the best ways for research findings to be institutionalised?

Inception workshops as a key ‘social technology’ that affect project trajectories, so questions of who is invited to participate are critical.

Research needs to inform the IP (innovation platform) and learn from the IP. The IP becomes the locus of learning and driving change.

Researchers need awareness of different needs, understandings and practices.

Partnerships are important in the research domain, not only for development impact.

What links, alignments and partnerships are important, to build impact from other research?

Balance is important in investment, across skills and disciplines.

Prior experience of individuals, social connectivity, proactivity and some preliminary joint working experience is important given restricted project time scales and obligations to
2.5 **Keep health considerations in mind and perhaps develop some in-service training in PLA and gender.**

Building capability for projects to deliver development impact is important.

2.6 **Develop opportunities to have different groups to share expertise, seminars and workshops so everyone gets exposure to what the others are on about.**

Mechanisms to build wider capability are important.

2.7 **Exploit more the potential for cross-talk between the projects (and programs) – there could be synergies**

There are unrealised opportunities for cross project and partnership learning. Arenas for this have been lacking and missed.

2.8 **We have Wikispace but I am not sure if people are using it a lot. They are not familiar with it and in remote areas accessibility is difficult. The main channel for communicating is the internet. We have a common agreement with a joint plan.**

Keeping good communication within scattered teams is a challenge.

2.9 **There's still a bit of a disconnect – it may fall apart at the analysis stage. There will be stuff the sociologists are happy with, stuff the biologists are happy with and maybe some joint articles.**

Challenges of integration continue through to publication and impact.

2.10 **Design and run feedback workshops from the project**

Stakeholder engagement needs to be obtained throughout a research project.

### 3 SPECIFIC RESEARCH METHODS

3.1 **Avoid questionnaire pre-testing that is small and narrow, which is a risk because of time and logistical issues.**

Questionnaire development and testing should be a ‘joint enterprise’ by a whole team.

3.2 **Palms (hand held data loggers) cannot be recalibrated in the field – therefore more time with pilot testing and enabling variation to be dealt with is important in surveys.**

Risk of unfamiliar or inflexible technologies impacting on data quality. Preparation needs conceptual and time investment.

3.3 **Put funds in another location; now looking at small-holder farmers – perhaps look at larger farmers.**

Sequence of priorities and foci

3.4 **Best interviews are with men and women. Men can’t answer about some aspects of production.**

Gender engagement affects data quality.
8. Further directions for inquiry about social and biophysical science integration

This research highlights diverse understandings and experiences of collaborative relationships between the social and bio sciences in the R4D domain. Features that might be explored further include:

- Why and how interdisciplinarity might be developed with regard to specific problems or research questions.
- How capacity and support for those engaged in interdisciplinary practice might be developed
- How interdisciplinarity might be developed in intellectual, methodological and outcome arenas outside specific research projects and programs, as part of a broader arena of capacity building and practice, and what structural arrangements and incentives would be required to achieve this
- How the social networks of researcher influence the scope of research questions and research design, conceptions of innovation platforms, and pathways to impact
- The value to R4D practice of curiosity, openness, and enthusiasm for the work of others and the concerns of others, and how associated positive outcomes for development might be further developed.
- More awareness of the facilitative and/or constraining role of particular institutions on the efficacy of R4D practice.

Many of these features have significance beyond disciplinary integration in research, and highlight the value of further elaboration of the interface between research and development, including differences between research for development and research in development.
9. Bibliography


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