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# Reconceptualising translation in agricultural innovation: A co-translation approach to bring research knowledge and practice closer together

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ABSTRACT

Scientific research continues to play a significant role in meeting the multiple innovation challenges in agriculture. If this role is to be fulfilled, provision needs to be made for effective translation of research outputs, where translation is understood to be the process whereby science becomes part of useful knowledge for decision making. There is increasing interest in enhancing translation in the European agricultural innovation, research and policy context, and specifically in making it a more collaborative process. This new attention calls for a reorientation of how the concept is understood, theorised and operationalised. This paper considers these needs and specifically asks how can interactive innovation approaches be integrated with science-driven approaches to enhance translation; and how can this help to reveal the constituent translation processes? An interactive stakeholder methodology is described drawing on three agricultural case studies examined in the xx project which aims to make translation of existing bodies of scientific knowledge more effective. Analysis to date shows how this interactive methodology enables a communicative and reciprocal set of translation processes to evolve which comprise: identification, prioritisation, articulation, searching, retrieval, extraction and synthesis, and evaluation of innovation issues and solutions. These insights allow us to move beyond an understanding of translation as science- or innovation-driven to envisaging co-translation, where multiple processes interact in a fluid middle-ground, and where the actors involved develop the capacity to jointly analyse innovation issues and solutions. From the perspective of the EU's policy ambitions to stimulate collaborative translation, operationalising translation needs re-thinking with respect to requirements for new mind-sets and skills, and in particular for committed and well-resourced intermediaries who can foster these multi-actors approaches.

## 1. Introduction

Although agricultural innovation is understood to encompass much more than Research and Development (R & D), science continues to be an essential ingredient, as international, European Union (EU), and national level policies reiterate (Beachy, 2014; OECD, 2010; Alston, 2010). These argue that there is a compelling need for scientific research to play a significant role in meeting the innovation challenges of increased demand for food balanced against the need to deliver other ecosystem services. If this role is to be fulfilled, provision needs to be made for outreach and translation of research[1] outputs to enable effective deployment of innovative research. Translation, the process whereby science becomes part of useful knowledge for decision making (Valdivia et al., 2014), in effect, needs to be seen as an essential part of the research process. These concerns are as relevant to research already produced, as they are to ongoing and future research. In particular a key challenge in knowledge translation in agriculture, as in other disciplines, is taking a large body of research-based knowledge and making it meaningful to the user audience (Baumbusch et al., 2008). This is in the context of a recognised disconnect between research and innovation processes, which presents significant barriers to effective outreach (Leeuwis et al., 2004; Hessels and Van Lente, 2008).

In line with this there is emerging interest in research translation in a European agricultural innovation and research, and policy context. Here issues of responsiveness of research to users' needs, improved access to results and the valorisation[2] of research results are highlighted

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[1] 'Research' is used in this paper to denote scientific research, the systematic investigation using formal scientific methodologies in order to establish facts and reach new conclusions. Specifically here it refers to the outputs of this process, scientific information in the form of papers, reports, technical notes etc. It is acknowledged however, that agricultural research describes a very broad set of disciplines, actors and institutions, is multi-dimensional, operates at different scales and levels of complexity, and constitutes more than scientific outputs in that research interventions can take many forms; it is therefore simplistic to refer to research as a uniform entity.

[2] 'Valorisation' is used here in the sense of giving meaning and (non-monetary) value to research.

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as needing to be addressed (EU, 2012; OECD, 2015). Critically, it is envisaged that involving end-users[3] in the research process is essential to achieving translation and boosting innovation by facilitating the uptake of formal knowledge, and its integration into farming practices (EU, 2012; Brunori et al., 2013; Knickel et al., 2009). This is in accordance with new ways of supporting innovation processes which have emerged as more suited to the complex challenges that research and development have to address; and new understandings of such processes, which are oriented to mobilising actors[4] with multiple perspectives and hybridising scientific and stakeholder knowledge (Berthet et al., 2016).

Despite the increasing interest in enhancing translation, and specifically in making it a more collaborative process, the mechanisms for achieving this, and their theoretical underpinnings have not been sufficiently analysed in the agricultural context. Typically translation concepts have been framed by linear *science-driven* perspectives where scientific knowledge is produced by research organisations, transformed and communicated to end-users. Associated studies have been oriented towards understanding knowledge utilisation and information seeking behaviours (Young et al., 2014), achieving effective communication and knowledge application (Roelofsen et al., 2011); and understanding how information can be used to enhance adoption of innovations (Feder and Umali, 1993). These approaches have neglected the multiple processes entailed in the interrogation, interpretation, utilisation and transformation of scientific outputs that often lay behind higher level translations. *Interactive* perspectives of research and innovation, and of translational research offer some insights into how collaborative approaches can be applied to enhance translation of formal research outputs by involving those operating outside the research subsystem (Douthwaite et al., 2001). Incorporating these approaches potentially provides the means by which translation can be a more dynamic, communicative or two-way relationship (Jacobson, 2007; McNie, 2007); and in doing so reveal the constituent translation processes which to date have not been widely elaborated.

The new attention given to translation, and the interest in using collaborative approaches to enhance translation in particular, call for a reorientation of how the concept is understood and operationalised. Indeed, in other disciplines, where similar debates are ongoing (Baumbusch et al., 2008), there is a call for "nothing short of a new unified science of translation, interdisciplinary at its core, and requiring an array of skills and new techniques" (Burgio, 2010 p57).

This paper explores these issues drawing on experiences in the VALERIE[5] project which aims to boost the outreach of *existing* research outputs in agriculture using an interactive stakeholder methodology. Specifically the paper asks how can *interactive* approaches be integrated with *science-driven* approaches to enhance translation; and how can they help to reveal the constituent translation processes of interrogation, interpretation, utilisation and transformation of scientific outputs? In doing this the paper aims to make theoretical and empirical contributions to the understanding of translation in three ways. Firstly by developing an interactive stakeholder methodology for translation, secondly by revealing the constituent translation processes, and thirdly by developing the concept of co-translation to describe the processes observed.

## 2. Re-thinking translation – integrating interactive approaches with science-driven approaches

This section first characterises models underpinning interactive approaches and science-driven approaches drawing on the translation and innovation literature. It goes on to explore opportunities for integrating these approaches and introduces the notion of co-translation. It next discusses how to operationalise this to enhance the translation of research generated within a science-driven paradigm using interactive processes, and concludes by considering constituent translation processes.

### 2.1. Translational research and innovation models

Broadly the term translation[6] in the context of research and innovation captures ideas about how science becomes part of useful knowledge for decision making, in agriculture it is equivalent to turning knowledge into action (Valdivia et al., 2014; Woolf, 2008). Here it is closely aligned with innovation, which is widely understood to be a process of generating, accessing, and putting knowledge into use (Botha et al., 2014; Hall et al., 2001). In scholarship in both translation and innovation fields, there is a broad distinction made between linear approaches, which privilege scientific knowledge production, and more interactive approaches that favour bridging knowledge systems.

Translation is usually associated with a simplified linear perspective and with transforming knowledge (from basic and strategic research) into technologies, products, and processes (through strategic, applied, and adaptive research). The concept of translational research has emerged in acknowledgement that research needs to be more responsive to users. However this approach is still largely characterised by a science-supply model, as this definition demonstrates: [translational research is seen as] "new scientific methods and technologies, interdisciplinary approaches, and collaborative institutional arrangements being developed to narrow the gap between basic science and its application to product and process innovation" (Wamae et al., 2011 p21). It covers a range of activities from basic science at one end of the spectrum where research plays a more significant role through to end-use or application. Some activities are mainly concerned with the creation of new ideas while others target the transformation of these ideas into novel products and processes (Bielak et al., 2008). End-users are usually consulted towards the end of the process in this transformation to assist utilisation of existing research outputs, often through user-panels or consultations (Roelofsen et al., 2011). Although translational research has also been described as a third category, beyond basic and applied research, in that it is characterised by multi-disciplinary approaches and by interaction between academic research and practice (Lords, 2011), it is nonetheless usually concerned with interaction within the research subsystem.

Moving away from this linear perspective some commentators argue the need for translational research to focus on the social and human dimensions of science developments "by enhancing a two-way communication and participatory process where farmers and researchers work together to bridge differences in knowledge systems, to build social and political capital, and to strengthen the capacity of farmers" (Valdivia et al., 2014 p4). This reinforces the notion that translation requires social interaction as Bennett and Jessani (2011 p3) state "Knowledge translation is the meeting ground between two fundamentally different processes: research and action. It knits them with communicative relationships". This broadens and shifts the

[3] The term 'end-user' or 'user' is used to denote a (potential) user of translated information, it is acknowledged that end-users can also be involved in other knowledge processes.

[4] The term 'actor' is used to describe the multiple participants in agricultural innovation processes, they can also be thought of as stakeholders

[5] VALorising European Research for Innovation in agriculturE and forestry (www.valerie.eu)

[6] The term 'translation' is used in other contexts, for example in the sociology of translation (Callon, 1984); in the translation of socio-technical practices between niches and regime (Smith, 2007); the diffusion or replication of ideas and practices (Klerkx et al., 2017); and concerning shared semantic meaning (e.g. Carlile, 2004). This paper deals with translation of scientific information with respect to knowledge and innovation processes.

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