AGRICULTURAL KNOWLEDGE: LINKING FARMERS, ADVISORS AND RESEARCHERS TO BOOST INNOVATION

AGRILINK'S MULTI-LEVEL CONCEPTUAL FRAMEWORK

THEORY PRIMER: 19) MLP – ANCHORING AND SCALING

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AgriLink

Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation.

AgriLink's multi-level conceptual framework

Theory primer: 19) MLP – Anchoring and scaling

The elaboration of this Conceptual Framework has been coordinated by **The James Hutton Institute**, leader of AgriLink's WP2.

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This document presents the multi-level conceptual framework of the research and innovation project AgriLink. It is a living document.

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It has gone through a transdisciplinary process, with implication of both practitioners and researchers in writing, editing or reviewing the manuscript. This participation has been organised within AgriLink's consortium and beyond, with the involvement of members of the International Advisory Board of the project, including members of the Working Group on Agricultural Knowledge and Innovation System of the Standing Committee on Agricultural Research of the European Commission.

Theory Primers

The purpose of the primers is to provide AgriLink consortium members with an introduction to each topic, which outlines the key points and identifies options for further reading. The primers have also served to demonstrate the wide range of expertise in the consortium, and to highlight the specific research interests of consortium members. Primers are intended to act as a **foundation for academic journal articles, and an early opportunity for collaboration between consortium members**.

19) MLP – Anchoring and scaling

Author: Boelie Elzen

1.0 General Overview of the Theory or Approach

1.1 Summary of the Theory, Approach or Topic

MLP distinguishes three levels: micro-level of (socio-technical) niches, meso-level of (socio-technical) regimes and macro-level of (socio-technical) landscape. Innovation processes are analysed as the interplay between these three levels. Niches are the breeding ground for novelties to learn on how novelties can be made to work in practice. Regimes describe an incumbent socio-technical system within which innovation tends to be of an incremental nature. Landscapes describe exogenous factors that put pressure on regimes for change and create 'windows of opportunity' for niches to link up to and transform regimes.

Scaling of innovations addresses the issue that has traditionally been conceptualised as transfer, dissemination, diffusion or adoption. Unlike these other concepts, scaling acknowledges that a novelty undergoes continuous change during this process and that it is not only a matter of adapting the novelty to an existing regime, but also of adapting an existing regime to a novelty. The latter has important implications for governance and policy, stressing it is important to create a 'conducive environment'.

The concept of anchoring has been developed to analyse the linking of niches with regimes. Three forms of anchoring are distinguished that derive from the three constituent components of a regime, notably technical, network and institutional components. These are technological anchoring, network anchoring and institutional anchoring. To realise scaling, all three forms of anchoring need to take place.

1.2 Major authors and their disciplines

The MLP was initially developed by Rip and Kemp and later elaborated extensively by Geels (2005). Whereas traditional innovation studies mainly addressed processes of incremental innovations, the MLP enabled the understanding of radical innovations, also called system innovations or transitions. The MLP was subsequently 'translated' into strategic approaches to stimulate transitions towards sustainability, such as 'strategic niche management' (Schot and Geels 2008) and 'transition management' (Loorbach 2007). The topic of 'scaling' has many fathers, who sometimes distinguish between scaling up and scaling out. Scaling up relates to the process of 'increase' (e.g. in terms of numbers, speed, size), whereas scaling out describes a process of 'expansion', e.g. geographical spread of a particular technology. Wigboldus et al. (2016) take these together, using the single term 'scaling'. The concept of anchoring was developed by Elzen at al. (2012) to address an understudied aspect of the MLP, notably the linking between niches and regimes. To assess potential future transition pathways, Elzen et al. have developed a scenario methodology that builds on the MLP.

1.3 Key references

Elzen, Boelie, Frank W. Geels, Peter S. Hofman and Ken Green, 'Sociotechnical scenarios as a tool for transition policy: an example from the traffic and transport domain', in Boelie Elzen, Frank W. Geels and Ken Green (eds.), *System Innovation and the Transition to Sustainability*, Cheltenham: Edward Elgar Publishing Ltd. (2004), pp.251-281.

Elzen, Boelie, Cees Leeuwis and Barbara van Mierlo, 2012. "Anchoring of Innovations: Assessing Dutch efforts to harvest energy from glasshouses". *Environmental Innovation and Societal Transitions*, 5, pp.1-18.

Geels, F.W., 2005. *Technological Transitions and System Innovations: A co-evolutionary and socio-technical analysis*. Edward Elgar Publishing Ltd., Cheltenham.

Loorbach, D. (2007) Transition Management: new mode of governance for sustainable development. PhD- dissertation. Rotterdam Erasmus University.

Schot, J., and F.W. Geels (2008) Strategic niche management and sustainable innovation journeys: theory, findings, research agenda and policy. Technology Analysis & Strategic Management. 20: 537-554.

Wigboldus, Seerp, Laurens Klerkx, Cees Leeuwis, Marc Schut, Sander Muilerman and Henk Jochemsen, 2016. Systemic perspectives on scaling agricultural innovations. A review. *Agron. Sustain. Dev*., 36:46, 1-20.

1.4 Brief history of how the theory has developed and been applied

MLP was initially applied in a wide number of cases as an analytical perspective to analyse transition processes. It has been used by a wide variety of scholars. Subsequently it was developed into strategic tools to stimulate sustainability transitions and these are widely used by a variety of stakeholder networks in the Netherlands. The concepts of scaling and anchoring are used by an increasing range of scholars to study how niches can link up to regimes and actually start a transition process.

1.5 Basic concepts

In the MLP dynamic, system innovations develop as follows (cf. figure ##). A novelty emerges in a local practice and becomes part of a niche when a network of actors is formed that share certain expectations about the future success of the novelty, and are willing to fund and work on further development. Niches may emerge and develop partly in response to pressure and serious problems in an existing regime which can be either internal to the regime itself (such as animal welfare in industrial animal production) or come from the socio-technical landscape (e.g. the pressure to curb CO2 emissions which affects more than just the animal production sector). The further success of niche formation is on the one hand linked to processes within the niche (micro-level) and on the other hand to developments at the level of the existing regime (meso-level) and the socio-technical landscape (macro-level). Supported by actors willing to invest in the new concept (industries, R&D organisations, government) and initially protected from competition at the market place (e.g. through subsidies), the novelty is improved within the niche, broader networks are formed around it, and more is learned about directions for improvement and functions it may fulfil.

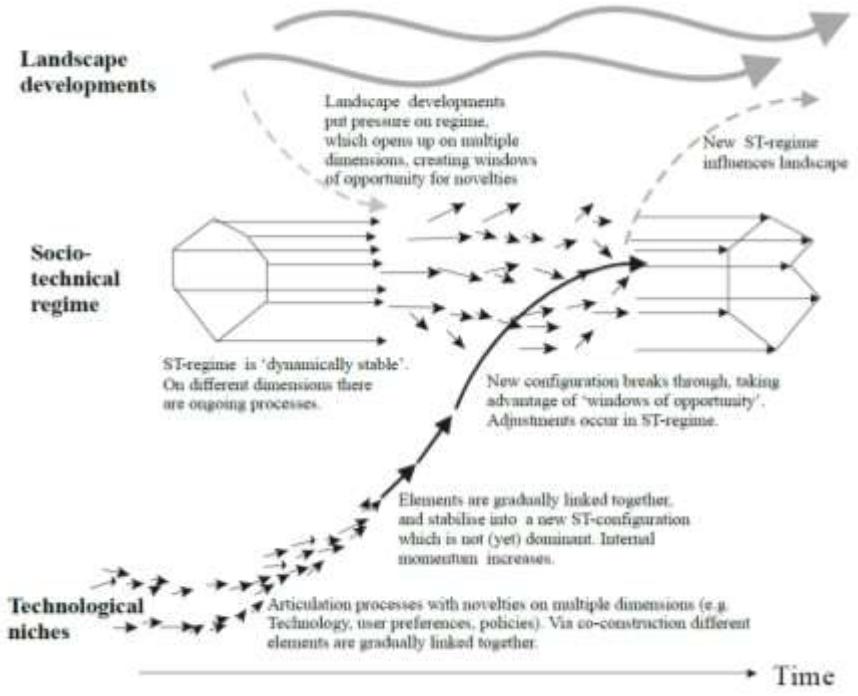

Figure 1. A dynamic multi-level perspective on system innovation (Geels 2005).

Scaling of innovations addresses the issue that has traditionally been conceptualised as transfer, dissemination, diffusion or adoption. The typical idea behind these concepts is that what has been demonstrated in one place can be copied elsewhere and work there as well. Recent work in innovation studies, however, is that this rarely works as simple as that. Especially in agriculture, with a broad variety of farming practices, a novelty needs further adaptation to be made to work in another location. Technologies and practices that work in a specific ecological, sociocultural or geographical area, do not automatically work, and may even have negative effects, in other areas. This may produce undesirable effects such as emission of pollutants and greenhouse gases, poorer animal welfare, deteriorating labour conditions, degradation of soil quality, etc. Finally, and not least important, in terms of policy adoption thinking focusses attention on the farm level while it neglects the importance of creating a conducive environment (e.g. by changing consumption behaviour, changing values of various stakeholders, changing markets and value chains, etc.).

To acknowledge this, scaling processes are conceptualised as an "integral part of a systemic approach to innovation, to anticipate on the possible consequences of scaling efforts" (Wigboldus et al. 2016, 1). Various authors make a distinction between scaling up and scaling out (e.g. Anderson 2012; Millar and Connell 2010). Scaling up relates to the process of 'increase' (e.g. in terms of numbers, speed, size), whereas scaling out describes a process of 'expansion', e.g. geographical spread of a particular technology. Wigboldus et al. (2016) take these together, using the single term 'scaling'.

Various innovation and scaling approaches and related policies and interventions can be distinguished, depending on situation specificities (Fig. 1). In the first approach (push), the value of the technology or practice (e.g. higher yielding crop variety) to be scaled up is taken for granted and the focus is on uptake and adoption. The second approach (pull) begins by defining a vision that innovation and associated scaling processes need to make a contribution

to. The focus of activity is to reorient system values towards this vision, i.e. some players such as policymakers within the regime may assist niches to make changes and disrupt the regime (Kivimaa and Kern 2016; Mitchell et al. 2015)."

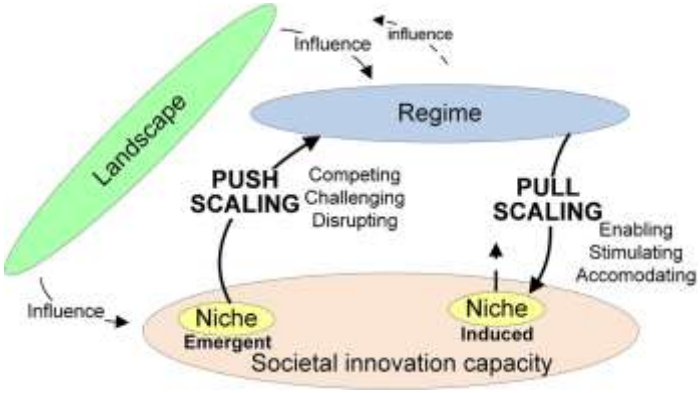

Fig. 2. Distinguishing different types of scaling initiatives in a simplified MLP view (Wigboldus et al. 2016, 10).

Historical studies largely provide examples of 'pushed scaling' whereas this also seems to be the main emphasis in current innovation attempts. However, 'pulled scaling' (support scaling by changing regime and niche conditions) may in many cases a more appropriate and effective approach.

To study the uptake of innovations, the concept of anchoring, which was developed in the context of system innovation programmes in the Netherlands (Loeber 2003, Grin & Van Staveren 2007). In a study of the uptake of radical energy novelties in glasshouse horticulture, the concept was defined more specifically as follows:

> "Anchoring is the process in which a novelty becomes newly connected, connected in a new way, or connected more firmly to a niche or a regime. The further the process of anchoring progresses, meaning that more new connections supporting the novelty develop, the larger the chances are that anchoring will eventually develop into durable links." (Elzen et al., 2012, p.3)

Building on a distinction between three constituent components of a regime, notably technical, network and institutional components (Geels, 2004), the authors distinguish three forms of anchoring. These are technological anchoring, network anchoring and institutional anchoring (Elzen et al., 2012, p.4-6). *Technological anchoring* takes place when the technical characteristics of a novelty (e.g. new technical concepts) become defined by the actors involved and, hence, become more specific to them. *Network anchoring* means that the network of actors that support the novelty changes, e.g. by enrolling new producers, users or developers. *Institutional anchoring* relates to the institutional characteristics of the novelty, i.e. the new rules that govern its further development and uptake. Institutional anchoring implies that developments within a niche or regime become translated into adapted or new rules that govern, at least temporarily, the activities of both niche and regime actors. Various other authors have also addressed the study of niche-regime interaction, e.g. Ingram (2017) who focuses on knowledge rather than innovation and who explores the extent to which niche knowledge systems confront and, or enhance the regime's AKS.
To assess potential future transition pathways, Elzen et al. () have developed a scenario methodology that builds on the MLP. Such 'socio-technical scenarios' feature the interplay between the three MLP levels. Doing so, they not only describe *what* may happen in the future

but also *why* this happens. Because of this focus on the why questions such scenarios provide a much richer source of input for governance and policy than traditional scenario methods.

2.0 Application to the analysing the role of farm advisory services in innovation

2.1 Relevance to AgriLink Objectives

[tick relevant]	AgriLink Objectives
✓	Develop a theoretical framework utilising a multi-level perspective to integrate sociological and economic theories with inputs from psychology and learning studies; and assess the functions played by advisory organisations in innovation dynamics at multiple levels (micro-, meso-, macro-levels) **[WP1]**;
	Assess the diversity of farmers' use of knowledge and services from both formal and informal sources (micro-AKIS), and how they translate this into changes on their own farms **[WP2]**;
✓	Develop and utilise cutting edge research methods to assess new advisory service models and their innovation potential **[WP2]**;
✓	Identify thoroughly the roles of the R-FAS (regional FAS) in innovation development, evaluation, adoption and dissemination in various EU rural and agricultural contexts **[WP2]**;
	Test how various forms of (national and regional) governance and funding schemes of farm advice i) support (or not) farmers' micro-AKIS, ii) sustain the relation between research, advice, farmers and facilitate knowledge assemblage iii) enable evaluation of the (positive and negative) effects of innovation for sustainable development of agriculture **[WP4]**;
	Assess the effectiveness of formal support to agricultural advisory organisations forming the R-FAS by combining quantitative and qualitative methods, with a focus on the EU-FAS policy instrument (the first and second version of the regulation) and by relating them to other findings of AgriLink. **[WP4]**.
	At the applied level, the objectives of AgriLink are to:
✓	Develop recommendations to enhance farm advisory systems from a multi-level perspective, from the viewpoint of farmers' access to knowledge and services (micro-AKIS) up to the question of governance, also recommending supports to encourage advisors to utilise specific tools, methods to better link science and practice, encourage life-long learning and interactivity between advisors **[WP5]**;
✓	Build socio-technical transition scenarios for improving the performance of advisory systems and achieving more sustainable systems - through interactive sessions with policy makers and advisory organisations; explore the practical relevance of AgriLink's recommendations in this process **[WP5]**;
	Test and validate innovative advisory tools and services to better connect research and practice **[WP3]**;

	Develop new learning and interaction methods for fruitful exchanges between farmers, researchers and advisors, with a focus on advisors' needs for new skills and new roles **[WP3]**;
	Guarantee the quality of practitioners' involvement throughout the project to support the identification of best fit practices for various types of farm advisory services (use of new technologies, methods, tools) in different European contexts, and for the governance of their public supports **[WP6]**.

2.2 How this can be applied/developed in AgriLink

The multi-level perspective analyses on-farm development as being embedded within a wider agro-food system. It focuses attention on the fact that making agriculture more sustainable is not only a matter of making on-farm practices more sustainable but also a matter of making the wider system more sustainable and conducive to the necessary changes at the farm level. The implication for farming advise is that this also needs to be embedded in knowledge on the wider system and that the content of the advice should address both the farm and this wider system.

The concept of anchoring makes an important distinction between three different dimensions in the multi-level dynamic, notably networks, institutions and technology. This distinction needs to be reflected in the analysis of AgriLink cases and also in recommendations for improving the farming advisory system.

The socio-technical scenario methodology is of direct relevance for the envisaged scenario building task in WP5.

2.3 Research questions relevant to AgriLink [see the draft conceptual framework for further options]

- To what extent are advisors aware of the various distinctions suggested by the MLP, including: niche vs. regime developments; technical, network and institutional issues; pull vs. push strategies?
- What is the relative role of 'push' scaling and 'pull' scaling in various advisory practices.
- What are the main barriers for farmers to follow advise given by advisors. What is the respective role of technical, network and/or institutional factors in these.

2.4 Methodological implications

- In both analysis and advice, make a clear distinction between niche-situations (where the emphasis should be on learning and articulation) and regime situations (where the emphasis should be on scaling).
- In both analysis and advice, acknowledge the importance of the distinction between technical, network and institutional factors.
- In advice, make a distinction between push and pull strategies and potential synergies between them.

2.5 Strengths and weaknesses/Sensitivities regarding use

The MLP has been widely used and has proven to be a very robust framework to analyse retrospective innovation processes.

MLP has been less proven in 'ongoing' innovation processes and various conceptual tools to do so have only been recently developed and used. MLP claims to be able to zoom in (to the micro-level of individual actors) and zoom out (to the system level of agriculture at large) but the analytical toolbox to do so still needs to be largely developed.

2.6 Potential operational problems

MLP provides a number of 'guiding heuristics' but few clear analytical concepts and guidance on how to operationalise them. Still a lot of 'learning by doing' is needed.

Optional Section 3: Practical example

The anchoring 'approach' has been used in a Dutch programme for sustainable animal production. In this programme, various 'integrally sustainable' new animal production systems were developed in an interactive process with stakeholders for a dozen species of animals. Using the anchoring approach from the very beginning has led to considerable successes for the practice uptake of some of these newly developed systems, although some other were also failures (Bos and Elzen 2016).

Optional Section 4: Recommended further reading

Elzen, Boelie, Marc Barbier, Marianne Cerf and John Grin, 2012. Stimulating transitions towards sustainable farming systems. In I. Darnhofer, D. Gibbon and B. Dedieu (Eds.). *Farming Systems Research into the 21st century: The new dynamic*. Dordrecht: Springer.

Elzen, Boelie, and Sierk F. Spoelstra, 2012. "Developing Sustainable Livestock Production Systems: Outline of a Learning and Experimentation Strategy (LES)". In Marc Barbier and Boelie Elzen (Eds.). *Proceedings of the first international workshop on System Innovations, Knowledge Regimes, and Design Practices towards Sustainable Agriculture*. Paris: INRA, pp.208-225. Downloadable from: http://www4.inra.fr/sad_eng/Publications2/Free-e-books/System-Innovations-for-Sustainable-Agriculture

Grin, John, Jan Rotmans and Johan Schot, 2010. *Transitions to Sustainable Development. New Directions in the Study of Long Term Transformative Change.* New York: Routledge.

Spaargaren, Gert, Anne Loeber, and Peter Oosterveer (eds.), 2011. *Food Practices in Transition*. New York: Routledge.

Sutherland, L-A., Darnhofer, I., Wilson, G.A. and Zagata, L. (eds) 2014. *Transition Pathways towards Sustainability in Agriculture: Case Studies from Europe*. Wallingford: CABI.

Voss, J-P., Bauknecht, D. and Kemp, R., 2006. *Reflexive governance for sustainable development*. Cheltenham: Edward Elgar.

References (to documents referenced in this template only)

Anderson, I. 2012. Scaling development results. A literature review and implications for Australia's aid program. AusAid, Canberra

Elzen, Boelie, Frank W. Geels, Peter S. Hofman and Ken Green, 2004. 'Sociotechnical scenarios as a tool for transition policy: an example from the traffic and transport domain', in Boelie Elzen, Frank W. Geels and Ken Green (eds.), System Innovation and the Transition to Sustainability, Cheltenham: Edward Elgar Publishing Ltd., pp.251-281.

Elzen, Boelie, Frank W. Geels and Ken Green (eds.). System Innovation and the Transition to Sustainability, Cheltenham: Edward Elgar Publishing Ltd. (2004).

Elzen, Boelie and Bram Bos, 2016. The RIO approach: Design and anchoring of sustainable animal husbandry systems, Technological Forecasting and Social Change. http://dx.doi.org/10.1016/j.techfore.2016.05.023

Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Research Policy 31 (8/9), 1257–1274.

Geels, F. W. 2004. From sectoral systems of innovation to socio-technical systems; Insight about dynamics and change form sociology and institutional theory. Research Policy, 33, 897-920.

Elzen, Boelie, Cees Leeuwis and Barbara van Mierlo, 2012. "Anchoring of Innovations: Assessing Dutch efforts to harvest energy from glasshouses". Environmental Innovation and Societal Transitions, 5, pp.1-18.

Geels, F.W., 2005. Technological Transitions and System Innovations: A co-evolutionary and socio-technical analysis. Edward Elgar Publishing Ltd., Cheltenham.

Ingram, Julie 2017. Agricultural transition: Niche and regime knowledge systems' boundary dynamics. *Environmental Innovation and Societal Transitions* (In Press 17 July 2017).

Loorbach, D. (2007) Transition Management: new mode of governance for sustainable development. PhD- dissertation. Rotterdam Erasmus University.

Rip, A., and R. Kemp, 1998. Technological Change. In S. Rayner and E.L. Malone (eds), Human Choice and Climate Change. Columbus, Ohio: Battelle Press. Volume 2: 327-399.

Schot, J., and F.W. Geels (2008) Strategic niche management and sustainable innovation journeys: theory, findings, research agenda and policy. Technology Analysis & Strategic Management. 20: 537-554.

Wigboldus, Seerp, Laurens Klerkx, Cees Leeuwis, Marc Schut, Sander Muilerman and Henk Jochemsen, 2016. Systemic perspectives on scaling agricultural innovations. A review. Agron. Sustain. Dev., 36:46, 1-20.

Kivimaa P, Kern F (2016) Creative destruction or mere niche support? Innovation policymixes for sustainability transitions. Res Policy 45: 205–217. 10.1016/j.respol.2015.09.008

Grin, J., van Staveren, A., 2007. Werken aan Systeeminnovaties (Working on System Innovations). Van Gorcum, Assen.

Loeber, A., 2003. Inbreken in het gangbare: Transitiemanagement in de praktijk – De NIDO benadering (Breaking in into the Usual: Transition Management in Practice – The NIDO Approach). NIDO, Leeuwarden.

Millar J, Connell J (2010) Strategies for scaling out impacts from agricultural systems change: the case of forages and livestock production in Laos. Agric Hum Values 27:213–225. 10.1007/s10460-009-9194-9

Mitchell C, Cordell D, Fam D (2015) Beginning at the end: the outcome spaces framework to guide purposive transdisciplinary research. Futures 65:86–96. 10.1016/j.futures.2014.10.007