Social Media and Sustainable Communication. Rethinking the Role of Research and Innovation Networks.

Thomas Köhler [1], Thomas Weith [2], Lisette Härtel [3], Nadin Gaasch [4]
[1]Technische Universität Dresden, Media Center
[2]Leibniz-Zentrum für Agrarlandschaftsforschung Müncheberg e.V.,
Institut für Sozioökonomie
[3]Technische Universität Dresden, Department of Education
[4]Leibniz-Zentrum für Agrarlandschaftsforschung Müncheberg e.V.
Institut für Sozioökonomie

Structured Abstract

Purpose – Recent studies demonstrate the serious influence of social media on scholarly communication. However, scientists from academia seem to be rather carful in trying new technologies (Kaiser, Köhler, Weith 2016), with most preferring private channels first (Pscheida et al., 2013). Nevertheless, science and innovation are a public issue of wide interest. Communication is a fundamental prerequisite for transfer of information and creation of knowledge, but not sufficient to sustainably implement knowledge in society (Johnson & Chang 2000). Any innovative development from R&D needs to be published and distributed by means of communication and learning. Only if processes of learning are added relevant knowledge can be converted into actions and become effective (Larsen-Freeman 2013).

Design/methodology/approach – New media technologies open up a variety of technological tools and innovative individual and organizational collaboration patterns. Does science consider such opportunities? What kind of data can be used to investigate the ICT / social media usage from a functional perspective? The authors decided to build their argumentation on two cases studies, describing the structural design of research networks, which are indeed quite similar. Therefore, the funding measure „Sustainable Land Management" as well as the research network „eScience Saxony" were considered. Both combine a series of smaller R&D projects within the context of a wider network. The data shows, however, differences in structure and scope (some projects follow a transdisciplinary approach while others do not) as well as further similarities in relation to the usage of social media.

Originality/value – As a research question it is examined how actors of network projects design processes of transfer and implementation of knowledge in their project networks. For the empirical investigation, qualitative data of the two cases is obtained and evaluated systematically. The findings emphasize (1) the equality of knowledge communication and organization of joint learning experiences and,

moreover, (2) similar conceptual understanding of transfer across projects. Moreover, they (3) consider similar media scenarios as appropriate. Marginally, also (4) processes of communication and learning receive attention – which are used as the operationalization of transfer and implementation in the studied networks.

Practical implications – The aim of the research presented is to investigate the various effects of the research networks as a specific form of organizational intervention (Härtel et al, 2015). The authors thereby give attention to the transfer and implementation strategies from the perspective of knowledge communication, in respect of knowledge management, and use theoretical approaches from different disciplines including developmental and social sciences (Stützer et al., 2013) as well as education and organizational studies to elaborate the meaning of research and innovation networks.

Keywords – Social media, sustainable communication, research and innovation networks, case study.

Paper type – Academic Research Paper

1 Introduction

Recent studies demonstrate the serious influence of social media on scholarly communication. However, scientist from academia seem to be rather careful in trying new technologies (Kaiser, Köhler, Weith 2016); moreover, they prefer usage in a private, nonprofessional context first (Pscheida et al., 2016). Nevertheless, science and innovation are a public issue of wide interest. Communication is a fundamental prerequisite for the transfer of information and creation of knowledge, but not sufficient to sustainably implement knowledge in society (Johnson & Chang 2000). Any innovative development from Research and Development (R&D) needs to be published and distributed by means of communication and learning. Only if processes of learning are added relevant knowledge can be converted into actions and become effective (Larsen-Freeman 2013).

2 Social Media in scholarly communication

Universities are genuine places for the creation, dissemination and transfer of knowledge. But E-Learning activities of universities often have a one-sided orientation where the focus is mostly on the technological support of courses by learning management systems, in particular the use of lecture recordings and authoring tools for creating E-Learning content compliance (Lattemann & Köhler 2005, 2006). Although learning always takes place in social communities, only recently a stronger focus of scientific discourses on the use of media according to this

social dimension has been observed (Köhler & Neumann 2011). These activities are undoubtedly necessary and important and aim generally to support higher education and university teachers. However, the students are more often indirectly a target group, as, approaches to directly support student learning are rare. The aim of Köhler & Neumann (2011) was to consider the learning experience and the different phases of the studies from the perspective of students and identify potential support options for these phases by the universities. From a technological point of view, a specific social software was in question. This included web-based applications which are characterized by the fact that they encourage interaction and sharing among users instead of providing services to single users in an individualized way only.

Kahnwald et al. (2016) state that higher education has the potential of using social software especially in supporting informal learning and in universities do exploit this potential in different ways. But so far, social media are hardly implemented in a systematic or even constant manner. Starting from the assumption that the students (in the sense of a community of practice) pursue a common goal (the completion of their studies), Kahnwald et al. (2016) explain that students of Saxon universities were interviewed in focus group interviews about the challenges they face in each study phase. To get an insight into how universities already support informal learning processes with social software, case studies were developed around good practices. Against the background of this empirically gathered evidence, different implementation scenarios for social software have been developed in the field of higher education and a number of strategic recommendations for the use of social software derived to promote informal learning of students at university (Kahnwald et al., 2016).

The social science theories and models of communication and diffusion of research results show that communication and social diffusion are closely interlinked. Not the media alone, but the social relations of actors have an influence on whether and how information and knowledge flow function in a media society. Opinion and information distribution is based on social synergies, in particular resulting from interaction processes of actors. These are often pursued as social capital in the context of social research (Henning 2006, Breiger 1990). In particular, the web-based access to information can diffuse the process of the social component of interpersonal communication. Therefore, in this age of media coverage of social networks, a unidirectional theory, as Lasswell (1948) and Shannon and Weaver (1949) described, can be considered no longer (Rogers 2003).

Katz and Lazarsfeld (1955) transferred in their approach the phenomenon of the influence of social relationships to a model, whereby the idea of the omnipotence of the media was shifted toward an influence of the social dimension. Although this

simplified model of the two-step flow of communication seems obsolete in social science today, it is still regarded as a basis for the further development of many existing communication and diffusion theories (Stützer et al. 2013). Today the priority starts from a multi-stage flow that considers particularly the reciprocity of interpersonal relationships at the centre of investigations. Interpersonal communication therefore forms the basis for all forms of social diffusion processes. The study of social media as a media meeting point therefore plays a significant role in modern social science. Socially oriented online platforms thus provide participants with the instrument to become influential actors in web-based information and knowledge transfer and ensure the networking potential in knowledge networks.

3   Communication and transfer in research and innovation networks

3.1   Research and innovation networks
Not only in scholarly collaboration professionals face new challenges in the age of eresearch- oriented „digital research". In particular, challenges such as dealing with digital material and resources, information management systems, personal working and learning environments, social networks, and further collaboration in research and innovation networks are typical patterns of organizational behaviour (Endruweit 2004, Scott & Davis 2007).

Nowadays professional networks are predominantly based upon social media tools – as the 15 million members in XING or the focused user groups in networks like the SIFAcommunity with its appr. 5,000 users demonstrate (Köhler et al. 2015). At the same moment, communication is an important prerequisite for the development and implementation of research and innovation networks. During the last decade various research activities have recognized and reflected these issues in practice, shown for example in the German funding measure 'Learning regions' or various funding measures about 'Innovation networks'.

The usage of social media can facilitate exchange of scientists from different organisations located worldwide and, thus, enhance information flows notably in complex networks reducing communication costs at once. It is to be kept in mind, that Walsh & Maloney (2007: 725) assumed in their study of collaboration problems in research networks that "asynchronous communication — which easily allows both one-to-one or one-to-many transmission, and which allows easy transmission of longer, text-based messages — may be critical for keeping collaborations on track. In contrast, synchronous communication, although richer in back-channel information, may be neither necessary nor effective, perhaps due to the coordination costs required to set up the conversation (…).".

However, how does recent literature define communication, and in particular social media? What do we understand by collaboration as well as by research and innovation networks? "Science communication, as one part of all general sender – receiver activities, aims to enhance public scientific awareness, understanding, literacy, and culture by building AEIOU [Awareness, Enjoyment, Interest, Opinion-forming, and Understanding of science] responses in its participants. (…) Science communication also provides skills, media, activities, and dialogue to enable the general public, mediators, and science practitioners to interact with each other more effectively." (Burns et al. 2003: 198f.).

Our understanding of collaboration refer the definition of Thomson (2006: 23): "Collaboration is a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions." Liyanage points out in her definition the strategic aspect of collaborations that are "forms of strategic alliance between firms and other organizations which are developed for strategic purposes" (1995: 554). Collaborative R&D and research collaboration are specific types of collaboration. They "provide unique opportunities for different parties to succeed in research and its commercialization" (Liyanage 1995: 554). Rampersad et al. (2010: 794) define innovation networks "as a relatively loosely tied group of organizations that may comprise of members from government, university and industry continuously collaborating to achieve common innovation goals.".

If one follows the largest funding institution in Europe, the European Union's research framework program, one may find the „Network of Excellence (NoE)", which typically is a medium-sized research project co-funded by the European Commission in the programs FP6 and FP7 between 1998 and 2006. These projects are „designed to strengthen scientific and technological excellence on a particular research topic through the durable integration of the research capacities of the participants" (EC, 2006). NoE usually combine several independent institutions who partner for the duration of appr. 3 years around a single thematic domain. More recently, the German Leibniz society started to launch research alliances (2014), whereas the Fraunhofer Society, another German research corporation, uses the idea of research composites. When addressing this macrosocial form one may link the research collaboration with organizational theory where networks occurred as a key concept in the 1990s (cf. Lattemann & Köhler 2005, who summarize previous research and discuss governance concepts for virtual organizations).

3.2 Research design, methodology, and sample

New media technologies open up a variety of technological tools and innovative individual and organizational collaboration patterns. Does science consider such opportunities? What kind of data can be used to investigate the Information and Communication Technology (ICT) / social media usage in a functional perspective? The authors decided to build their argumentation on two cases studies describing the structural design of research networks, which are indeed quite similar. More specifically, we focused on the funding measure „Sustainable Land Management" as well as the research network „eScience Saxony", both of which combine a series of smaller R&D projects within the context of a wider network. The data shows, however, differences in structure and scope (some projects follow a transdisciplinary approach while others do not) as well as further similarities in relation to the usage of social media.

The chosen methodology focused on surveys in order to detect the usage of social media in relation to the structural development of the respective networks. To do so, interviews were conducted with typical representatives of actor groups in the networks, chosen due to its central position in each network or subsequent project. The data was processed as a qualitative content analysis. The interview technique used was of a rather semi-structured character. Additional results from the study include documents describing the configuration and the findings of both networks.

4 Data from two sample cases

Case 1: Sustainable Land Management

The Germany Federal Ministry of Education and Research (BMBF 2013) financially supported funding measure „Sustainable Land Management" (NLM) with its currently 25 project networks is here a typical example (Kaiser et al. 2012). With the aim of pioneering the design of the research landscape between the applied research and system design, conscious network structures in the form of project networks from research and practice are addressed (inter- und transdisciplinary focus) by the BMBF.

A new feature of this approach is the sense that, in addition to the interest in the subject-specific knowledge gained in the area of land use research, the question of knowledge transfer is also analysed.
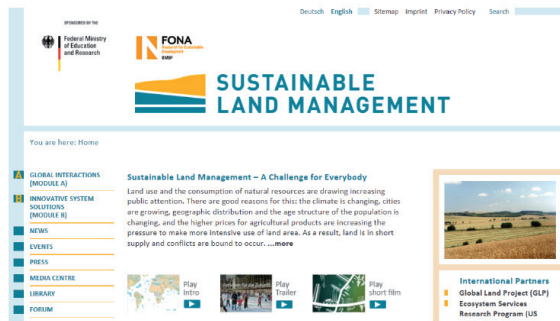
Figure 1: Website of the funding measure „Sustainable Land Management"
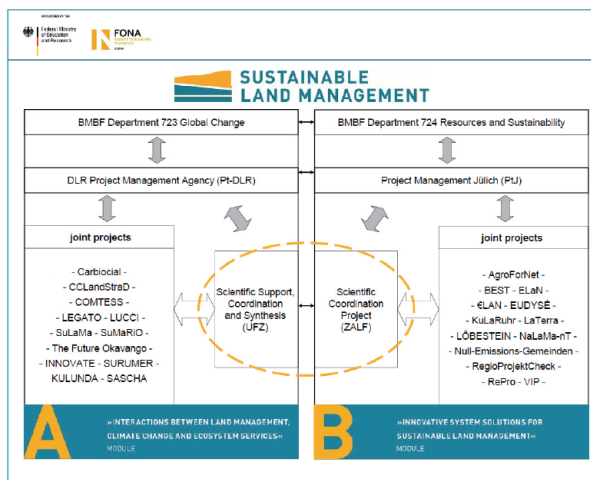**(cf.http://nachhaltiges-landmanagement.de/en/)**

Figure 2: Structure of the funding measure „Sustainable Land Management"
(figure by the authors, the acronyms stand for single collaborative projects)

This is done in particular by the professional competence regarding spatial development, environmental and planning sciences, and landscape research (cf. Zscheischler et al. 2014, Salet 2014), also taking into account expertise from neighbouring areas such as climate research (cf. Knieling & Müller 2015; Knieling & Roßnagel 2015) or forestry science (cf. Janse 2007).

Case 2: research network eScience Saxony

**Figure 3: Organizational structure of the eScience – Research Network
(cf. https://escience.htwk-leipzig.de/)**

The situation is similar in the case of the research network eScience Saxony. The project eScience – Forschungsnetzwerk Sachsen (http://www.esciencesachsen.de), which is a joint project, with funding by the European Social Fund, of all the 12 state universities in Saxony, coordinated by the TU Dresden, the TU Bergakademie Freiberg, and the HTWK Leipzig.

Through the coordinated actions of the Saxon State Ministry of Science and Art and the European Commission, but as well the national German Federal Ministry of Education and Research over the last years, the field of „computational sciences" has been advanced to an excellent level regionally, which includes the introduction of certain E-Learning support systems (Hener & Buch 2006). There was, however, still a strong need, especially in relation to research regarding cooperative, media-supported actions of scientists as well as the tools, technologies and methods employed, to overcome substantial deficits. This is where the network started in order to assist scientists in developing appropriate usage of digital online technologies as research tools.

With the specific organizational structure of the eScience – Research Network Saxony it became possible to address 3 thematic areas with a series of highly specified projects under the joint umbrella of the research network. The selection procedure and the quality assurance where granted with the Scientific Supervision by the E-Learning Task Force which belongs itself to the State Rectors' Conference and acts as interface to the ministry and all rectorates (Köhler et al. 2010). Overall this structure interlinks a network with a classis hierarchic organization and a project structure, i.e. combines three different types of organization.
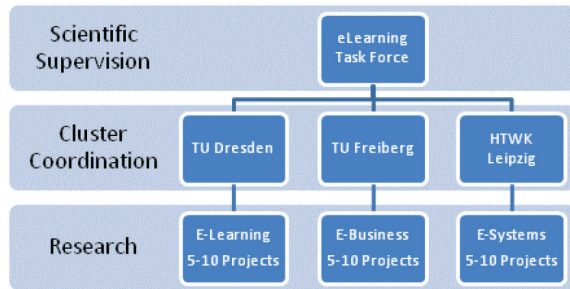
Figure 4: Organizational structure of the eScience – Research Network (own figure)

5 Conclusions

Concerning the idea of interlinking concepts of social media, efficient collaboration, and effective communication, both networks are completely different. Already this observation leads to the necessity of rethinking of the role of research and innovation networks on social media usage. In future, the social embedding and social interlinkages of network actors should attract more attention in research and practice while considering a mix of different organizational patterns.

Another aspect is the domain of the networks which may have some influence, whereas as e-science by nature deals with ICT and social media as a tool, sustainable land use is a large scale endeavour in the applied natural sciences with strong linkages to a variety of sectors outside academia, such as public administration, farming, and others. In addition, it needs to be taken into account that some of the subsequent projects have reached the end of their life cycles, i.e. the core focus of their communication strategies was directed towards transfer and implementation. These are by nature, activities of intense communication, additionally driven by institutional settings like funding regulations concerning the communication of results. All those findings call for different means and patterns of collaboration – from a simple website via an online database until social media communities – whereas undoubtedly communication is one of the core activities of the networks even though those are foremost perceived and thought as thematic task form in- and outside.

Instruments of communication of various means could be worked out which are used strategically for transfer and implementation. Indeed the projects used their grants toward communication rather wide, i.e. there was no single focus detected on (social/ online) media use. Especially digital media such as websites, newsletters, or locations explicitly for internal deployment such as Dropbox were used. In contrast to this use of so-called new media, there is a sceptical attitude of the respondents to these transfer

agents. They do, however, name the advantages of digital instruments such as time savings, location independence, and financial savings. Nevertheless, they do not see the need to introduce a technology-based exchange platform, also to reduce additional time consumption and costs (cf. Härtel et al. 2015).

As well authors observed a stronger awareness of the concepts and potentials of social media in the e-science core community. However when it comes to external transfer, respondents rely mainly on informal exchange processes with the project partners in both cases. In particular with respect to practice partners, this is a proven strategic approach. With informal approaches, preferably already existing working relationships are involved. In common discourse, existing stocks of knowledge of partners are exchanged, used, and supplemented, carrying the newly created knowledge.

This perspective recognises that the knowledge and skills needed for innovation cannot be simply transferred through networks by linking these multiple groups – there also needs to be what Kogut and Zander (1992, p. 389) termed a "common stock of knowledge", to facilitate such processes. That is, the communication of knowledge is only possible between people who, to some extent at least, share a system of meaning (Trompenaars 1995). Knowledge then is not transferred but must be continuously created and recreated through networking as individuals come to share a common understanding or a common frame of reference. From this perspective then networking is seen not as a case of linear information transfer but as a process of interrelating and sense making (Weick 1990; Swan et al. 1999: 263). For future research a more comprehensive reflection of results from transdisciplinary (td) research projects for this case will be helpful. In td research communication between different actor groups is one of the key issues. Additionally the analysis and conceptual framing of processes are important aspects (c.f. Zscheischler & Rogga 2015).

References

Breiger, R. L. Social mobility and social structure. Cambridge University Press, Cambridge England; New York, 1990.

Burns, T. W., O'Connor, D. J. & Stocklmayer, S. M. (2003): Science Communication: A Contemporary Definition, Public Understanding of Science, 12, 183–202. DOI: 10.1177/09636625030122004

Endruweit, G. (2004): Organisationssoziologie. Stuttgart, UTB.

European Commission (2006). What is FP6: Instruments: Network of Excellence. Brussels, European Commission. Online via http://cordis.europa.eu/fp6/ instr_noe.htm 01.01.2013.

Härtel, L., Hoffmann, M., Weith, T. & Köhler, T. (2015). Wissenskommunikation und Transfer für die Landschaftsentwicklung. Eine Analyse im Forschungsnetzwerk „Nachhaltiges Landmanagement".; Zeitschrift für Gruppendynamik und Organisationsberatung. DOI 10.1007/s11612-015-0296-0

Hener, Y. & Buch, F. (2006). Evaluation des Bildungsportals Sachsen; Arbeitspapier Nr. 80, Centrum für Hochschulentwicklung, Gütersloh. Aufgerufen am 01.02.2007 unter http://www.che.de/downloads/Eval_Bildungsportal_ Sachsen_AP80.pdf.

Hennig, M. (2006). Individuen und ihre sozialen Beziehungen. VS Verlag für Sozialwissenschaften, Reihe: Forschung, Gesellschaft., Wiesbaden.

Janse, G. (2007). Communication between forest scientists and forest policy makers in Europe – A survey on both sides of the science/policy interface. Forest Policy and Economics, 10(2008), 183–194.

Johnson, J.D. & Chang, H.-J. (2000). Internal and External Communication, Boundary Spanning, and Innovation Adoption: An Over-Time Comparison of Three Explanations of Internal and External Innovation Communication in a New Organizational Form; In: Journal of Business Communication, Vol. 37 Issue 3.

Kahnwald, N., Albrecht, S., Herbst, S., Köhler, T., unter Mitarbeit von Fraas, C.; Gerth, M., Hofmann, D., Kawalek, J., Pentzold, C., Schwendel, J., Stark, A., Weller, A. & Welz, T. (2016). Informelles Lernen Studierender mit Social Software unterstützen. Strategische Empfehlungen für Hochschulen; Reihe: Medien in der Wissenschaft, Band 69; Münster, Waxmann.

Kaiser, D.B., Köhler, T. & Weith, T. (2016): Knowledge management in sustainability research projects: Concepts, effective models, and examples in a multi-stakeholder environment, Applied Environmental Education & Communication, 15:1, 4-17, DOI: 10.1080/1533015X.2016.1141720

Kaiser, D.B. Köhler, T. & Weith, T. (2012): Informations- und Wissensmanagement im Nachhaltigen Landmanagement. In: Köhler, T. & Kahnwald, N. (2012):, GeNeMe 2012 – Gemeinschaften in Neuen Medien, Conference Proceeding, TUDpress, Dresden: 121–133.

Kaiser, D. B., Köhler, T. & Weith, T. (2016) Knowledge management in sustainability research projects: Concepts, effective models, and examples in a multi-stakeholder environment. Applied Environmental Education & Communication 15, 1, 4–17.

Katz, E. & Lazarsfeld, P. F. (1955). Personal influence; the part played by people in the flow of mass communications. Free Press, Glencoe, Ill.

Knieling, J., & Müller, B. (Hrsg.). (2015). Klimaanpassung in der Stadt- und Regionalentwicklung, Ansätze, Instrumente, Maßnahmen und Beispiele, Reihe Klimawandel in Regionen zukunftsfähig gestalten (Bd. 7). München: oekom-Verlag.

Knieling, J., & Roßnagel, A. (Hrsg.). (2015). Governance der Klimaanpassung. Akteure, Organisation und Instrumente für Stadt und Region, Reihe Klimawandel in Regionen zukunftsfähig gestalten (Bd. 6). München: oekom-Verlag.

Köhler, T., Höhn, K., Schmauder, M., Kahnwald, N. & Schilling, T. (2015). The SIFA community as a virtual learning space in OSH; In: Köhler, T., Kahnwald, N. & Schoop, E. (Eds.). Knowledge Communities in Business and Science. Proceedings of the GeNeMe 2015; Dresden, TUDPress.

Köhler, T., Neumann, J. & Saupe, V. (2010). Organisation des Online-Lernens; In: Issing, L. J. & Klimsa, P.: Online-Lernen. Ein Handbuch für das Lernen mit Internet; München, Oldenbourg Wissenschaftsverlag (2. Korrigierte Auflage).

Larsen-Freeman, D. (2013). Language Learning. Supplement, Vol. 63.

Lattemann, C. & Köhler, T. (2005). Trust or Control - Governance concepts for virtual organizations; In: Frontiers of e-Business Research, vol. 3.

Liyanage, Shantha (1995): Breeding innovation clusters through collaborative research networks. Technovation, 15(9), 553-567.

Pscheida, D., Köhler, T. & Mohamed, B. (2013). What's your favorite online research tool? Use of and attitude towards Web 2.0 applications among scientists in different academic disciplines; In: Marsden, C. & Tassiulas, L.: Proceedings of the 1st International Conference on Internet Science; Brussels, Sigma Orionis.

Rampersad, G., Quester, P. & Troshani, I. (2010): Managing innovation networks: Exploratory evidence from ICT, biotechnology and nanotechnology networks. Industrial Marketing Management 39, 793–805. doi:10.1016/j.indmarman.2009.07.002Rogers, E. M. (2003). Diffusion of Innovations. Free Press, New York, London, Toronto, Sydney, [1962].

Salet, W. (2014). The authenticity of spatial planning knowledge. European Planning Studies, 22(2), 293–305.

Scott, W.R & Davis, G.F. ((2007): Organisations and Organizing. Pearson International Edition. New York.

Stützer, C. M., Köhler, T., Carley, K. M. & Thiem, G. (2013) „Brokering" Behavior in Collaborative Learning Systems Original; In: Procedia - Social and Behavioral Sciences 100 [OAP via http://www.sciencedirect.com/science/article/pii/S0277953613005029].

Swan, J., Newell, S., Scarbrough, H. & Hislop, D. (1999): Knowledge management and innovation: networks and networking. Journal of Knowledge Management, 3 (4): 262 - 275. http://dx.doi.org/10.1108/13673279910304014

Walsh, J. P., Maloney, N. G. (2007): Collaboration Structure, Communication Media, and Problems in Scientific Work Teams. Journal of Computer-Mediated Communication, 12, 712–732. doi:10.1111/j.1083-6101.2007.00346.xZscheischler,

J., Rogga, S., & Weith, T. (2014). Experiences with Transdisciplinary Research. In: Systems research and behavioral Science. Wileyonlinelibrary. doi:101002/sres.2274.

Zscheischler, J., & Rogga, S. (2015): Transdisciplinarity in land use science – A review of concepts, empirical findings and current practices. In: Futures, dx.doi.org/10.1016/j.futures.2014.11.005.