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Early Stage Researchers in  
Transdisciplinary Research

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## Growing Into What?

### The (Un-)disciplined Socialisation of Early Stage Researchers in Transdisciplinary Research<sup>1</sup>

**Ulrike Felt, Judith Igelsböck, Andrea Schikowitz, Thomas Völker**

*Over past decades we have witnessed considerable debate questioning the capacity of contemporary research to address the challenges posed by complex societal developments. As a consequence the need for rethinking cultures and practices of knowledge production has moved high on the policy agenda, in particular in areas like natural resource management or more broadly speaking sustainability issues. In this context transdisciplinarity has become one of the key-notions standing for more openness towards and engagement with non-scientific actors all along the process of knowledge production. While there is much debate on the broader issue and programmes are put in place little is known about the research realities in contexts where different kinds of actors - scientists and societal actors - are to be engaged in knowledge production. This paper will focus on early stage researchers and how they manage to reconcile the demands of transdisciplinarity with other normative demands in contemporary research such as accountability, mobility and the rigid "career-scripts" defining access to more stable positions. Using the concept of "epistemic living spaces", which addresses how researchers see their room for epistemic and social manoeuvre within research, the paper thus explores the possibilities and limits of contemporary research structures to accommodate this alternative way of producing knowledge and addresses issues of responsibility towards younger researchers.*

#### Introduction

Over past decades we have witnessed considerable debate questioning the capacity of contemporary research to address the challenges posed by complex societal developments. As a consequence the need for rethinking cultures and practices of knowledge production has moved high on the policy agenda. In particular in areas like climate change, natural resource management or more broadly speaking sustainability the limits of classical disciplinary organized knowledge production structures, the accompanying value systems and institutional logics have been highlighted. Along with it came the call for including new societal actors in diverse stages of the knowledge production. These debates are tied to key-notions such as 'post-normal science' which stresses the need for extended forms of knowledge production at moments when "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowics

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and Ravetz, 1993: 744); or 'mode 2 knowledge production' (Gibbons et al., 1994) that stresses that knowledge is increasingly produced and validated in contexts also framed by extra-scientific rationales. The notion of transdisciplinarity is positioned as central in the context of this new mode of knowledge production and is meant to stress the extended and more inclusive character of knowledge production. Non-academic partners should thus – as for example the funding programme which is the background to this paper, states – be integrated along the course of knowledge generation<sup>2</sup>. Hence, science should not simply open-up for thinking towards application, like other emerging concepts such as 'translational research' underline, but collaborated with non-scientific partners towards finding solutions for concrete societal problems.

Yet what remained rather unclear and under-researched so far is how far these quite normative assumptions also transform the every-day practices of academic knowledge production. While there has been a body of literature discussing these issues from a macro perspective (e.g. Nowotny, 2007), looking at them from the vantage point of competing institutional logics (e.g. Swan et al., 2010), reflecting some of the authors' own experiences in transdisciplinary research (e.g. Darnhofer and Loibl, 2007), investigating how indicator driven assessment policies foster disciplined mainstream research (Rafols et al., 2011) or taking a more evaluative approach (e.g. Pohl and Hirsch Hadorn, 2008; Bergmann et al., 2005), rather few studies have investigated empirically how these new forms of knowledge generation as well as the diagnosed macro changes frame the life- and work-realities of contemporary researchers.

This paper wants to specifically address this gap. It will do so by focusing on early stage researchers as they find themselves most directly confronted with such changes in a crucial phase of their academic life: they are growing into research, getting to know its modes of ordering, encountering its values, learning its practices, and many more. At the core of our analysis will be the ways in which participants in a PhD programme and other PhDs in the same funding scheme manage to reconcile the demands of openness and engagement formulated by the very notion of transdisciplinarity with other normative demands in contemporary research such as accountability or mobility and the rather rigid "career-scripts" (Duberley et al., 2006) defining access to more stable positions.

We will start by discussing our central conceptual framing and then describe the empirical basis for our analysis. In what follows we will look at the socialization process of early stage researchers into transdisciplinary research environments through analysing (1) their efforts to orient themselves, (2) the attachments they create, (3) the strategies of positioning they develop and, (4) how they aim at stabilizing their situation in order to assure their epistemic lives beyond the PhD phase. The discussion and conclusions will then reflect the imaginations and practices of transdisciplinarity through the lens of the PhDs' accounts and discuss what this means for the implementation of this kind of research into contemporary academic knowledge production environments.

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<sup>2</sup> This is the understanding developed by the programme investigated in this article. [www.provision-research.at](http://www.provision-research.at) (31.01.2011).

## Living in research

In order to address the questions at the core of this paper we will build on the concept of 'epistemic living spaces' (Felt, 2009) developed in the framework of a comparative European research project on academic work. This concept is rooted in a co-productionist approach, stressing the intertwinedness of science and society, and thus that "the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it" (Jasanoff, 2004: 3). Taking a person-centred approach we want to draw our attention to their individual or collective perceptions and narrative re-constructions of "the multi-dimensional structures – symbolic, social, intellectual, temporal and material – which mould, guide and delimit in more or less subtle ways researchers' (inter)actions, what they aim to know, the degrees of agency they have and how they can produce knowledge." (Felt, 2009: 19) The concept thus directs our attention to the work researchers have to do to stabilize, extend or protect their room for manoeuvre.

Stressing the aspect of *living* in research captures not only the formal rules and norms in research or institutional structures and their change, but also dimensions such as "feeling intellectually and socially 'at home', holding an understanding of the often non-codified sets of values which matter, feeling subjected to, being part of and performing certain temporal regimes, tacitly sharing a repertoire of practices to address knowledge questions, adapting to specific often complex funding arrangements and many more." (Felt, 2009: 19) In a nutshell the concept of epistemic living spaces focuses on the "intertwinedness of the personal, the institutional, the epistemic, the symbolic and the political" (Felt, 2009: 19). It speaks to the "multiplicity, patchiness and heterogeneity of the space in which science works" (Pickering, 1992: 8) in today's research landscape, allows us to address the diverse structuring forces and thus would in the end lead a more fine-grained understanding what the "disunity of science" (Stump and Galison, 1996) could mean in every-day research contexts.

Hence, elements which are less important for studying tightly-bound "epistemic cultures" (Knorr-Cetina, 1999) are key for understanding the more fluid epistemic living spaces: the (trans)formation of academic work environments through the framing of research in policy discourses; through the broader societal imaginaries which guide research; through 'institutional logics' (Swan et al., 2010) and practices; and through the manifold normative and highly symbolic regimes which govern contemporary research practices. The concept thus addresses the inextricable interdependence of epistemic practices, institutional rationales, individual biographical decisions, as well as political and broader societal frameworks, which characterize the lived experiential realities of researchers today. It thus focuses on how researchers perceive the changes of the conditions and contexts in which research is carried out and how they understand the impact on their lives.

For the early stage researchers in our case this means having to imagine for the first time how such a living space in which they work would/should/could look like. This happens at a moment when research cultures get rearranged, tempo and temporal limitation of scientific research are imposed (Garforth and Cervinková, 2009) and values, virtues and rituals get redefined. But also the 'tacit geographies' (Felt and Stöckelová, 2009) that order research, how PhDs understand their own place and how

they (have to) cohabitate within their perceived epistemic living space is essential for our understanding of change in academia.

The room for manoeuvre is never pre-established nor stable over time but needs constant work. At every major step in a researchers life these different dimensions and their extension get renegotiated, creating new degrees of freedom while at the same time imposing new constraints. (Felt et al., 2011) Looking at PhDs thus will show us how they work on their first kind of epistemic living space and how it enables them to move across the boundary that separates the pre-doc from a post-doc life.

## Data and method

As introduced above, we opt for taking a closer look at early stage researchers' socialization, because they are notably exposed to changing research environments and the related normative assumptions. They have to develop their own strategies to establish, stabilize and develop their 'epistemic living spaces'. In contrast, more established researchers are already settled in specific research areas, epistemic communities and institutional frameworks and thus are better equipped to deal with diverging demands.

We draw upon data collected in the course of a three-year research project 'Transdisciplinarity as Culture and Practice'. Moving beyond broader claims of changing modes of knowledge production, the project aims at offering an in-depth understanding how changing boundary conditions in research and funding environments, such as programmes funding transdisciplinary research, in our case on sustainability, shape the culture and practice of knowledge production. To do so the project investigates a broad range of finished and still progressing projects in the context of a major Austrian funding program on sustainability research applying a multi-method approach.

For this article we specifically look at what these changes mean for young researchers' lives in science and their ways of knowing. We focus on a doctoral school, which explicitly aims at establishing a transdisciplinary doctoral education. We conducted a focus group discussion, six semi-structured interviews with PhDs engaged in this doctoral school<sup>3</sup>, interviewed the director of the school and participated in the closing event, which was framed as a reflexive assessment exercise. What is specific in the framing of this group of PhDs is that they were supposed to be neither attached to one lab nor to a discipline but should be located transversal to such orders. Thus, PhDs in the programme were expected to assemble their community and partners according to the (societal) problem they are addressing in their dissertation project.

To carve out the specificity of this situation, we also conducted four interviews with PhD students engaged in transdisciplinary projects who are however clearly affiliated to certain institutions as well as disciplines and related communities, and whose thesis is not expected to be necessarily a transdisciplinary one. The interviews with the doctoral students took place in the finishing phase of their three years doctoral educa-

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<sup>3</sup> Quotes taken from the focus group material conducted with PhDs of the transdisciplinary doctoral program are labeled as „FG\_DS\_Line“, quotes from interviews with PhDs engaged in the doctoral school as “I\_DS\_PhDNumber\_Line” as well as interviews with PhDs engaged in transdisciplinary projects (see below) as “I\_P\_PhDNumber\_Line”.

tion, in which we found them simultaneously reflecting ex post on their transdisciplinary socialization process as well as already intensively planning and working on their next career steps. To speak to them in such a phase of transition allowed us to gain quite profound insights into what being a transdisciplinary researcher might mean for young researchers. Beyond that the interviews carried out with more senior researchers in the same research environment allows us to contextualize our findings.

To analyse these individual sense-making processes in relation to broader developments we decided to go beyond classical grounded theory (Strauss and Corbin, 1998), inscribing ourselves into constructivist approaches as introduced by Clarke (2005) in her situational analysis. Including discursive as well as wider institutional and political contexts into analysis this approach allows for embracing both micro- and macro-processes.

## Growing Into Transdisciplinary Research

To understand the processes and practices related to becoming a researcher in a transdisciplinary research context, we suggest to analyse how early stage researchers narrate, and thus reflect upon, order and assess their moving into and settling in transdisciplinary research. In doing so we will elaborate in some detail on four kinds of work early stage researchers engage in when shaping their epistemic living space in a way that seems satisfactory to them: (1) orienting, i.e. coming to grips with the epistemic, social and institutional space they are in and to identify the specificities of transdisciplinarity as compared to other modes of research; (2) creating attachments, i.e. to build a sufficiently coherent identity as a researcher and to develop a feeling of 'being at home' socially as well as intellectually; (3) positioning, i.e. finding a subtle balance between their own expectations and aspirations and the 'external' requirements they encounter; and (4) stabilizing and expanding, i.e. fostering a future career, thus to master the transition to the Post-Doc phase, either within or outside academia.

### Orienting

When entering a new research-environment, one crucial process is that of orientation (see, for example Weidman et al., 2001; Gieryn, 1999). Early stage researchers look for what could be coined 'guiding maps' that enable them to identify central epistemic, social and institutional orders relevant in their specific environment and that support the creation of a tacit understanding of what is expected and needed to foster their own career.

On the epistemic level our interviewees sought for orientation concerning what would be regarded as a 'good research question', the methods which would be seen as core or at least as commonly accepted basis for producing 'sound evidence' as well as the repertoire of theories which were considered as appropriate to deliver satisfactory explanations. Yet they quickly realized that in transdisciplinary research actors from different disciplines and also extra-scientific partners should collaborate in knowledge production, which also means that they were confronted with a blend of different disciplinary maps and ordering modalities. Moreover, for every project and

topic a different combination of guiding maps seemed suitable and engagement with other actors is sought for.

Especially when talking about their first phase of defining their research question and approach, the early stage researchers expressed difficulties of orienting themselves within the multiplicity of relevance systems. The PhDs described this situation as “meandering” (I\_DS\_PhD4\_57) through a landscape not easily comprehensible to them, and finally reacting by turning to more familiar maps – often classical disciplinary ones – in order to find a stable starting point for their research. One PhD brought this nicely to the point:

*“For me it was easier as I was a x-scientist and I said, ok I look at it from the x-perspective [...] This was an advantage for me [...] For my colleague it was slightly more difficult, as he was [...] interdisciplinary from education and he did not have this point of departure which he could refer to.” (I\_DS\_PhD1\_79)*

Closely related to this lack of coherent guidance concerning the epistemic dimensions of transdisciplinary sustainability research, our interviewees also expressed a considerable disorientation in regard to the (academic) credits that count and how to gain them. This means for example to know where – conferences, journals, ... – to publish results in order to become visible to a relevant community or which institutions seem promising for future jobs. However, as within transdisciplinary research the relevant community was fluid and also relevant institutions might change according to the respective issue at stake, also the produced credits and their value are rather vaguely defined. One PhD for example shared with us that

*“at summer schools, I was often asked how my career would go, if that actually works, where I would publish and so on.” (I\_DS\_PhD6\_860)*

More generally the early stage researchers in the doctoral school described “a pretty important gap” (I\_DS\_PhD1\_1138) between their respective disciplinary maps and what seemed to be valued in their current context, especially when it comes to publication venues. They saw their disciplinary orders of quality considered as “suddenly nothing worth anymore” (ibid.) while at the same time no clear (and easily acceptable) alternative was provided to them. Interestingly this situation seems slightly different when PhDs are integrated in larger research projects, as they seem to get their guidance – even if it would only be temporarily – from the project framing and the senior researchers involved in the same project.

This also points to a lack of social orientation and links to the question of finding a community in order to socialize into research through sharing values, questions, approaches and many more. Even though doctoral students in more disciplinary orientated doctoral schools also experience disorientation at some points in their socialization, they can at least rely on what is called “the graduate student grapevine” (Gardner, 2007) as they are embedded in a clearer institutional and disciplinary framework. This enables them to tacitly understand what is expected of them and what they need to do to foster their own careers. In contrast, within the transdisciplinary doctoral school each doctoral candidate was assigned to a group of supervisors with different disciplinary backgrounds and expected to collaborate with researchers from different disciplines and extra-scientific partners. Our interviewees narrate this as the absence of a coherent peer community that would provide collective imaginations of order and



therefore provide orientation. This uneasiness concerning the identification of relevant peers is expressed in a variety of ways, one being through the issue of supervision, where they ponder over questions such as the kind of know-how that is institutionally available or not, and how the choices of supervision create tensions and frame – limit or foster – future possibilities.

## Attaching

While doing orientation work, the doctoral students in transdisciplinary education also struggle to develop attachments in the sense described above. Such attachment work happens on four different levels: ideological, epistemological, social and institutional.

Starting with the broader ideological level, our interlocutors seemed from the very beginning of the doctoral college to have been able to strongly attach to the normative imagination of transdisciplinary knowledge production: it was seen as necessary to adequately address complex contemporary problems related to sustainability and as having the potential to contribute to a sort of ‘common good’.

However, to live up to this normative ideal they felt lacking the adequate repertoire of ‘tools’ – be they methodological or theoretical.

*“When interdisciplinarity and also transdisciplinarity should happen, then there also needs to be a methodological education, which we did not have in that form” (FG\_DS\_474),*

is the way one PhD made it explicit. This in turn led to the conclusion that developing attachments to transdisciplinarity on an epistemic level was much harder to achieve for them. While wanting to keep up these normative ideals as they saw them as valuable and important, they expressed quite frequently the feeling to (have) fail(ed) implementing these ideals in the research practice.

PhD’s narratives in fact could be grouped in two main positions: either they could hardly identify distinctions between how they were working before and how they are working now, and thus asked themselves what all this transdisciplinarity talk was about; or they dismiss the provided procedures as inadequate or unattractive. One PhD brought this nicely to the point:

*“...when it became concrete, then I often thought, okay, but this is neither great nor actually new” (I\_DS\_PhD6\_999).*

This difficulty to create clear attachments to transdisciplinarity on the epistemological level, then gets translated in their accounts into the decision to re-attach to more familiar spaces, such as their ‘home-disciplines’ or communities they judge as close to them, while transdisciplinarity remains epistemologically underdetermined.

Attachment on a social level, which of course plays a crucial role in professional socialization, could not fully compensate this missing epistemic attachment, as the following quote shows:

*“It is indeed a nice atmosphere [in the doctoral school]. But it was not, that there were real collaborations” (I\_DS\_PhD3\_280).*

The early stage researchers described that social togetherness with their colleagues was created through their co-presence in the doctoral school, the synchronicity of their dissertation projects and their facing the same structural and practical troubles. However, thematically they remain at best neighbours, as everyone works on his or her own project, with different combination of disciplines, with other extra-scientific partners and with different theoretical frames and methods.

Even if our interviewees emphasize their good personal relations to doctoral colleagues, they did not manage to build a sound community feeling. Rather they experienced something like a fragmented community life meaning for example to be attached to the colleagues at the social level, to the 'home discipline' at the epistemic level, and to ideals and ideas of transdisciplinarity on an ideological level. Thus, for them transdisciplinarity did not really manage to sufficiently federate people to give birth to something they would label an epistemic community. Overall, the early stage researchers experience transdisciplinarity rather as an 'in-between space', than a 'cross-cutting-space', which is the metaphor of the related funding program and suggests a self-conscious movement across different research areas.

Against this background they pragmatically strive for attachment on an institutional level, looking for a department of the university the doctoral school is located in that proves epistemically as well as socially adequate. This seems interesting as from the broader ideological background of transdisciplinarity the flexibility, fluidity and temporality of knowledge constellations get highlighted (e.g. Gibbons et al., 1994) and disciplinary or institutional boundaries and fixed attachments are pushed to the background.

## Positioning

Positioning work can be characterized as the early stage researchers' attempts to find a place in research, to develop an adequate epistemic living space, to realize who they are and what they stand for. They try to carve out a position from which they can set up their lives in research and beyond. Thereby the PhDs have to negotiate and find a balance between their own expectations and the often contradictory and shifting requirements they encounter (e.g. Barry et al., 2006). In doing so, they deploy different positioning strategies to develop a distinguishable profile as a researcher and to increase their visibility in the field. They thus try to arrange both their own position and the respective environment in a way that seems beneficial, they look for adequate allies and build coalitions that promise to support the own work and a further career (Latour and Woolgar, 1986: 211).

Positioning work takes place on at least three levels: on the ideological, the institutional and the epistemic. Trying to clarify whether or not, or to what degree they are transdisciplinary is a struggle omnipresent in our interlocutors' accounts. Thus, even though all our interviewees were part of the transdisciplinary doctoral programme, subscribing to this particular ideology of producing knowledge seems far from evident.

Especially the ones who do not perceive a profile as a transdisciplinary researcher as beneficial for a future career insist on their disciplinary identity. In this vain they denounce those who say they are transdisciplinary as merely 're-branding' their work, while continuing to do 'conventional' research. This accusation would be captured

using terms like “trans-bow” (FG\_DS\_541) or “trans-tag” (FG\_DS\_626). They also try to connect to more disciplinary established actors, both within the doctoral college and beyond, insisting for example that they “need a supervisor from x-sciences unconditionally” (FG\_DS\_263). Others, who feel more comfortable with an identity as transdisciplinary researcher use quite different positioning strategies: they would, for example, argue that already their original scientific background was inherently transdisciplinary or stress that their personal predisposition such as being communicative and networked individuals makes them suitable as transdisciplinary researchers.

On the institutional level PhDs describe their effort to actively relate to the department that seems ‘epistemically closer’ in order to reach “a real integration or connection to the institute” (e.g. I\_DS\_PhD5\_504). They take part in institutional activities and tasks as teaching or developing research proposals and also try to integrate their colleagues from the departments in activities of the doctoral school, for example by inviting them to the dissertation seminar. This also explained why our interviewees quite explicitly opposed the plan of the leaders of the doctoral programme to rotate the workplaces of doctoral students during the three years in order to assure a better integration of the projects into the different research contexts.

Positioning on the epistemic level meant for these early stage researchers to appropriate a clearly recognizable research topic and a specific research approach, which proved complex in an environment without clear theoretical and methodological core repertoire. Seeing this step as crucial for the development of an identity, all of them spent considerable time to explain the need to clearly delimit ‘their dissertation projects’ and their strategies in doing so. For example, they change members of their original supervisor-teams in order to ensure support for their specific research interests, even if that caused “a lot of trouble” (I\_DS\_PhD2\_228) in some cases. Others re-define their supervisors’ roles, for example by differentiating “who is a supervisor and who is an advisor” (I\_DS\_PhD1\_206) or by attributing roles such as “emotional supervisor” (I\_DS\_PhD3\_242) or supervisor responsible for the content.

While the challenge to carve out an individual research profile is always a complex undertaking for PhDs, it seems particularly tricky in the context of transdisciplinarity. Here the very idea of transdisciplinarity suggests the production of solutions for external problems that should be defined and elaborated together with heterogeneous partners. In reaction to this demand for shared ownership of the problems to be solved amongst heterogeneous actors, early stage researchers express the fear that the partners’ interests could endanger their actual research. This fear of conflicting interests was made explicit in many different ways:

*“And I realized, if I talked with these people from my case studies, my whole work would change completely and go into another direction” (I\_DS\_PhD1\_788).*

Or they would describe the relation to practice partners in worst cases in terms of “instrumentalisation” (FG\_DS\_605) or label it as “contract research” (FG\_DS\_1885). In such situations traditional research myths are referred to, such as the ‘freedom of science’ understood as the analyses of a research problem without needing to consider the usability of the outcomes. In this vein the ability to produce ‘facts’ is clearly attributed to scientists and not to actors from practice fields. Consequently, early stage

researchers made considerable repositioning work to claim sole ownership over their projects:

*“As far as I have witnessed in the doctoral school, there actually always used to be the tendency to edge [the praxispartners] out, so science can be by itself” (I\_DS\_PhD3\_616).*

Claiming ownership in a transdisciplinary context thus meant in many cases bringing extra scientific partners close enough to meet the ideological and programmatic requirements, while keeping them largely out of epistemic decisions.

Regarding positioning work we could thus witness the need to do so on several levels simultaneously: arranging their position in the doctoral college, creating additionally links to external and more disciplinary established authorities and trying to fit the transdisciplinary demands while simultaneously trying to preserve their epistemic autonomy. At the same time the fear or the feeling of “belonging actually nowhere” (I\_DS\_PhD6\_868) runs like a red thread throughout their accounts.

### **Stabilizing and expanding**

The ‘riskiness’ of being engaged in transdisciplinary research is expressed as most obvious towards the end of the PhD phase, as early stage researchers need to ‘clear the next career hurdle’. In the last few months of the three years college, in which we conducted the interviews, early stage researchers seem to realize that they head for a major turning point: the end of their attachment to the doctoral college, a change of workplace as well as losing the status of being a student. These changes make them engage in diverse stabilizing activities, thus to prepare a “safe ground from which unknown territories may be explored” (Felt, 2009: 19).

Accordingly, our interlocutors aim at accumulating credits, i.e. positive feedback of diverse kind from peers which can be re-invested (Latour and Woolgar, 1986), through which they expect to be valued in their respective future working-field and thus raise the chances of a successful career within or outside academia. Thereby a difference can be observed between early-stage researchers who are striving for an academic career and those who prefer a more practice related career.

Those who see their future within academia raise doubts if their transdisciplinary PhD is conducive to this:

*“And eventually I didn’t have the security that it will suffice within the scientific community I will once be in. Because I lacked feedback.” (I\_DS\_PhD4\_629)*

In this “quasi-economic calculation through which a young investigator evaluated the opportunities of a field and his chances in it” (Latour and Woolgar, 1986: 195) transdisciplinarity is not necessarily perceived as particularly supportive when aiming for an academic career. Our interviewees set a clear hierarchy when assessing what counts: credits that count in the academic world such as classical publications are at the core, while outputs for the praxis are marginalized to a certain extent. The latter are either seen as gaining relevance only in the future or by treating them as mere add-ons to the ‘real’ work, stating that they “simply [aren’t] an output that counts” (I\_DS\_PhD2\_927). Thus, a lot of the early stage researchers show strong attempts to remain in one function or another within the current institution, as in this way they

hope to keep at least their attachment on one level, and to accumulate more academic credits before having to move on.

Those who do not necessarily see their future within academia describe their gain from the participation in the doctoral program foremost on the personal level – having developed ‘soft skills’ such as self-management or communicative capacities and being much more aware of the own strength and weaknesses. These skills are considered as beneficial for working in practice-related fields. None of them regards transdisciplinary research as a possible career in particular not under current circumstances. However, some of them ponder over potentially returning to academia at some point of their career, defining themselves as “commuting between the two worlds” (I\_DS\_PhD5\_1147) of science and praxis.

These reflections show that the worlds of academia and practice related areas are clearly perceived as separated in terms of job possibilities. Thus they stress the lack of an established ‘cross-cutting space’ for transdisciplinarity. The possibility to work in a truly transdisciplinary manner beyond single projects or educational programmes like the doctoral programme was then projected in a future yet to come. They speculated that in case of such a future establishment of transdisciplinarity they would be the ones who are in an advantageous position. Thus, the credits they accumulated within their transdisciplinary education are described as kind of an investment in an ‘extended science’ still to come.

## Discussion and Conclusions

The analysis of these four kinds of work PhD students had to do in order to create and maintain epistemic living spaces which seemed promising and worth while inhabiting them, made visible a number of tensions which occur when transdisciplinary research needs to be integrated into classical academic institutions with predominantly disciplinary modes of ordering. In conclusion we particularly want to address three of them.

First, the autobiographic accounts and reflections PhDs shared with us have pointed at the obvious tensions between New Public Management ideologies which hold academic institutions in firm grip on the one hand and the aspiration to do more integrative transdisciplinary work on the other. As we have seen early stage researchers very quickly realize how difficult it is to do this kind of research in an environment where dense accountability structures govern actions and career possibilities. Much of research needs to be measured, planned, counted and managed according to quantitative criteria, which caused anxieties on the side of young transdisciplinary researchers about what this working outside classical disciplines might mean for them. They felt caught between two opposing demands: (1) having to perform openness and readiness for exploring unstructured territories, engaging with non-scientists and doing substantive translation and articulation work; (2) having to acquire the necessary often highly standardized capital, measured through a quite rigid set of indicators (e.g. international peer reviewed publications), in order to assure at least potentially an academic career. Actually the judgment most of our interlocutors shared is that transdisciplinary outputs have relatively little value within the academic environment. (see

also Rafals et al., 2011) This goes very much in line with Mary Henkels' observation that within an obviously changing policy imagination of science in society the

*"academic identity is still strongly defended [...] and remains a powerful influence in reward systems and in the maintenance of academic agendas. It remains a strong source of academic identity, in terms of what is important and what gives meaning and self-esteem." (Henkel, 2005: 173)*

In that sense it is understandable that the PhDs felt concern about accountability structures and underlying academic values systems once getting close to finishing their research. It is often that they

*"realize how classifications matter at moments when, for example, individual biographies get twisted into predefined normative shapes because powerful classification schemes do not line up with the logic of everyday life." (Felt, 2009: 44)*

In that sense we could say that what is expected from these young transdisciplinary researchers is to perform a kind of 'different sameness'. They have to comply with both of the conflicting value systems: the requested openness and the high normativity, both implemented through recent research policy measures. It is largely left to them to develop their individual risk strategy to deal with the situation.

Second, from the ways in which our interviewees perceived the realities of transdisciplinary knowledge production, it seems essential to understand transdisciplinary research not simply as a different kind of more context-driven knowledge production (Gibbons et al., 1994), but as a *new kind of knowledge regime* (see also Bleiklie and Byrkjeflot, 2002). By using the notion of 'regime' we want to go beyond the epistemic level and focus our attention to the deep entanglements and partly essential tensions we could observe between: people – be they researchers or actors governing research; institutions and their 'institutional logics', i.e. the shared beliefs and practices (Friedland and Alford, 1991; Swan et al., 2010); ideologies – in our case of transdisciplinarity – and their accompanying prescriptions; and different forms of contestation (and workarounds) when it comes to performing this kind of research. Aiming at understanding what producing knowledge in a transdisciplinary manner actually means for early stage researchers, our research has shown that it is central to also engage with the socio-political imaginaries of a different relation between science and society inscribed into this way of doing research and to acknowledge how this mode of knowledge production chafes at established institutionalized practices of policy and scientific communities. This in turn would then demand for a different way of conceptualising the processes of socialisation of early stage researcher and the issues of responsibility attached to it.

Third, it seems rewarding to look at the multiple tacit geographies of transdisciplinary research and how they were perceived, constructed and performed by early stage researchers. We encountered numerous stories about struggling for or losing orientation, of not knowing which map to chose for purposes of orientation – disciplinary or transdisciplinary ones yet to be drawn –, of getting maps imposed, etc. Thus we are aware how deeply these maps shape and order the epistemic living spaces which early stage researchers inhabit. But it also seems essential not to loose sight of the fact that symbolic maps researchers and policy makers refer to never simply represent an existing situation, but much rather produce what will be regarded as a re-

search 'reality'. Maps are in that sense models for what they pretend to represent. (Felt, 2009) This again opens an issue of responsibility regarding early stage researchers particularly in transdisciplinary contexts as those producing, distributing or imposing these maps hold considerable power over social, economic and epistemic orders in research but also of the moral economies (Daston, 1995) which guide research.

Those maps 'show' territories, regions, borders and main directions and should allow to locate oneself. From our material we could reach the conclusion that transdisciplinarity seems to definitely be a research borderland and that on several levels: in the funding, in careers, in publications and in the lives of most of those established researchers that would accompany the younger ones. Most of the supervisors would have a disciplinary core from which they could make 'excursions' into transdisciplinarity and could get back if the territory proved unfriendly. The PhDs were not in this position. For them inhabiting borderland did not seem all too comfortable as it appeared as a place full of contradictions and multiple seemingly incompatible expectations; and there was the constant fear that moving to the core academic disciplines could become rather difficult once one had settled down in transdisciplinary. This allows us to interpret some of our interviewees' narratives as accounts of being a specific sort of "outsiders within" (Harding, 1991). Here an interesting difference between PhDs in the doctoral college and those participating in larger research projects in collaboration with established researchers becomes visible. While the former are expected to inhabit the borderland and 'become transdisciplinary' as result of their identity work, the latter are allocated some space within the epistemic core disciplines, transdisciplinarity being more of an add-on.

Coming back to the initial question – Growing into what? – we hope to have made visible some of the struggles young researchers encounter when engaging in transdisciplinary research. We have shown that while there have been high normative claims gravitating around this kind of knowledge production and special programmes have tried to counterbalance the tight disciplinary structures and institutional logics at work in classical knowledge production, at the same time these arrangements have proven notoriously difficult. Thus, efforts to establish transdisciplinary work practices would not only need time-limited funding programmes, but in particular institutional structures which make this kind of research compatible with the normative structures and the underlying values which are at work in science. Only such a step would allow young researchers to perceive the possible epistemic living spaces as sufficiently attractive to seriously engage with this kind of border crossing work, develop different kinds of innovation processes without having to individually carry the risk of the endeavour.

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