

Internal boundary spanning in translational research network. A case of mentoring in cancer research

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Abstract

In response to the complexities of environmental demands and competition, organizations must develop strategies to integrate the efforts of various agents by developing ways to cross existing boundaries. This qualitative study explores boundary-spanning processes to enhance collaboration within translational research network. Translational research is multidisciplinary activity aiming at bringing forward findings of basic research in order to develop new treatments to patients more quickly and effectively. Our results highlight the potential of a formal cross-disciplinary peer mentoring program. Organizations can facilitate this by developing operational models that foster cross-boundary interactions, enabling researchers to bridge gaps and integrate diverse expertise in everyday work.

Introduction¹

Facing the need to adapt to the complexities of environmental demands, competition, and evolving forms of knowledge work, organisations must develop strategies to coordinate and integrate the efforts of various agents—not only beyond the organizational boundaries but also within them. Building on the concept of internal boundary spanning between teams (Marrone, Tesluk & Carson, 2007; Marrone, 2010), this paper focuses on studying how scientists within research network act as boundary spanners between different domains and units in order to transfer knowledge and foster collaboration, and suggest mentoring as a mechanism to enhance translational research network collaboration.

Mentoring in academic medicine has been one of the core components of education and professional development (Gagliardi et al. 2014; Sambunjak, Straus & Marušić, 2006). Earlier studies have recognized mentoring as a catalyst for career success, and mentoring relationships have been cited as important in facilitating career selection, advancement, and personal wellbeing (Wilson et al., 2017). In addition, mentoring has been suggested as a strategy to improve knowledge translation and thus has potential in enhancing collaboration in the translational research network context (Gagliardi et al., 2014).

Translational research refers to the entire research chain from the study of basic molecules in the laboratory to patient treatment (Choi et al., 2019). It is multidisciplinary and crosses the boundaries of disciplines, organizations and professions. The two-way nature of research is key: on the one hand, basic research information is utilized in clinical research, and on the other hand, basic research needs patient samples and disease models at the laboratory level when studying the cellular and molecular mechanisms of the disease (Molas-Gallart et al., 2016). Translational research is a necessary prerequisite for bringing new treatments to patients faster and more effectively.

However, the benefits of translational research are not easy to gain. As generally known from organizational research that structures, expert networks, hospitals or universities, do not automatically create collaboration. Collaboration requires organizational support, the will of different parties, and time and financial resources to function. In practice, translational research is hindered by different practices, traditions, schedules and goals in different research fields (Krueger et al., 2019; Pober et al., 2001). Collaboration is complicated by a built-in paradox, in which a researcher must, on the one hand, have special expertise in a specific narrow topic and, on the other hand, have a broad understanding of research related to their field in order to be able to understand specialists in other fields.

Thus, our study explores formal mentoring program as means to enhance boundary spanning activities in local research network. The specific context of study is a formal cross-mentoring programme introduced for

¹¹ This developmental paper will be revised further by updating selected references and harmonising the textual style across sections before the conference

the cancer research network located in Western Finland. In empirical terms, we examine how the participants of the programme engaged in boundary-spanning activities and their motivational drivers. In addition, we identify the challenges the network needs to overcome in order to enhance mutual collaboration within the translational network.

Theoretical background

Organisational boundaries

Organisational boundaries refer to the conceptual distinctions that delineate what is considered 'inside' and what lies 'outside' a particular social entity (Yan and Louis, 1999). Earlier research has often conceptualised boundaries in instrumental terms, highlighting their function in maintaining separation between social systems—for example, for purposes of differentiation—or in safeguarding the focal system from external disturbances or disruptive forces (Llewellyn, 1994). More recent scholarly work has expanded on these views by recognising the interconnections, interdependencies, and reciprocal exchanges between systems, thereby shifting analytical attention towards boundaries themselves as significant units of analysis (see e.g. Yan and Louis, 1999).

Organisational boundaries are not static but they are constantly constructed and enacted (Ashforth et al, 2000; Hernes, 2004), as members make sense of who they are as a group, or, for example, what counts as acceptable behaviour within a certain coalition. Boundaries are elements of organisational cultures and identities, encompassing some members or groups while at the same time separating them from others (e.g. Laurila and Paalumäki, 2022). Reasonable amount of agreement on boundaries helps organisations to navigate in their daily lives, by promoting consistency and facilitating coordinate action.

O'Byrne (2007) proposes a three-dimensional conceptualisation of boundaries, encompassing physical, behavioural, and cognitive distinctions between social systems. Physical boundaries entail the most visible and tangible elements of social life, such as offices, workspaces, buildings and technologies, whereas behavioural boundaries show differences in expectations and norms guiding ways how to act and behave. Cognitive boundaries define ways how we perceive the world, what kind of information is valued or discarded, or what kind of value systems are used for decision-making. Taken together, this three-dimensional understanding of organisational boundaries provides a useful framework for identifying and addressing the differences that must be navigated to advance cancer treatment within the high-stakes context of scientific medical research.

Organisational boundary spanning

Team boundary spanning is defined as the team's actions to establish linkages and manage interactions with parties outside the team boundaries, or with the external environment (Marrone et al. 2007, Marrone,

2010). The ultimate goal of this activity is to ensure the team's performance and even its survival (Tushman & Scanlan, 1981; Ancona, 1990; Ancona & Caldwell, 1992). This is achieved by representing the team and advocating for its interests while simultaneously acquiring knowledge and resources and establishing relationships with both external and internal groups and individuals (Marrone, 2010).

Previous research has identified several boundary spanning activities. These include i.e., representational or ambassadorial (Ancona & Caldwell, 1992) roles, coordinative action as well as information or expertise seeking (Marrone, 2010). Several studies have discussed the antecedents of boundary spanning activities. Tushman and Scanlan (1981) state, that boundary spanning can be managed and supported by facilitating and encouraging internal and external communication networks as well as promoting an interaction-supporting structures, such as a favourable work culture. For individuals within groups, boundary spanning activities can be both rewarding, but at the same time highly demanding. This burden arises, as individuals need to balance internal and external demands, potentially facing conflicting priorities (Marrone et al., 2007; Marrone, 2010)

Translational networks

Networks in general have been defined in multiple ways and studied from the perspective of several scientific disciplines. In this study, networks are understood as networks formed by people, whereby networks between organizations also consist of ties between representatives (people) of organizations (Aira 2012). A network is therefore a group of people who are connected to at least one other member of the network through interaction (Berends et al., 2011). Interactional relationships are formed and maintained through interaction, so interaction is the force that holds the network together. (Aira 2012).

When it is emphasized that networks are formed between people, research also speaks of social networks or interpersonal networks, and when it is emphasized that interaction between people is also spoken of as communication networks (Aira 2012). One can also talk about networking work. For example, the Finnish Institute for Health and Welfare provides guidelines for the development and management of networking work (Hirschovits-Gerz 2019).

Research on networking work focuses more on activity than on describing networks as structures. It is understood as the establishment of dialogue between people and the organizations they represent in a network-like manner. Networking work is equal in terms of power relations and nothing is bought or sold in it. This is how it differs from hierarchical and market-based relationships (Järvensivu et al. 2010). In networking, cooperation is based on the desire to gain added value for oneself and for the common good. Networking can create partnerships in which reciprocity is condensed into goal-oriented cooperation and action. (Hirschovits-Gerz 2019). Networking work is not created solely by increasing interaction, but also

requires enabling structures in the organization and sufficient working time. In addition, a work culture and operating practices are needed in which actors actively work in networks. (Hirschovits-Gerz 2019).

Translational research networks provide an enabling environment in which translational research can be designed and carried out to bring about successful and sustained practice change (Long et al., 2016) Thus, these networks increasing personal and collaborative links between clinicians and researchers breaking down the “us and them” mentality, based on discipline specific paradigms. Earlier studies have identified six networking motivations: affiliation, prosocial, status, learning and performance, career management, and social-normative (Porter et al., 2023).

Mentoring as a platform for boundary spanning

Mentoring is a common practice in socialising students, researchers, and early-career professionals both in academia and other professional communities (Asgari & Carter, 2016; Nokkala et al, 2022). While mentoring is often organised as one-on-one or a dyad of a senior mentor and a junior mentee, it can also be organised in group constellations – as peer mentoring, group mentoring, or collaborative mentoring (Asgari & Carter, 2016) and may also take place among junior scholars without senior mentors (Gregoric & Wilson, 2012). Mentoring organised in peer groups emphasises professional and emotional support offered by peers and the benefits of being able to reflect on one’s own experiences (Nokkala et al, 2022). Non-hierarchical discussions taking place in peer communities are important, as dialogue facilitates the shared process through which learning and professional identity can emerge. The mentors or coordinators of mentoring groups hold considerable role in creating a safe space for participants to share their experiences, as well as contributing to an emergence of a constructive atmosphere in mentoring groups. Confidentiality, voluntary participation, and rapport between group members are important characteristics. (Nokkala et al., 2022). Transdisciplinary peer-mentoring refers to mentoring in which pairs from different organizations come together to discuss their own work and roles within a structured program (Gisbert-Trejo et al., 2019).

Methodology

In Finland, translational research collaboration has been promoted by creating enabling structures, while at the same time dismantling obstacles hindering collaboration. One concrete example of this is the formation of national and regional cancer centers (FICAN) and the creation of related funding instruments.

This study builds on a cross-mentoring pilot that was organized in cooperation between the Western Cancer Center (FICAN West) and the Turku School of Economics as part of a project funded by the Occupational Safety and Health Fund. Participants were recruited through an open application process, targeted to both basic and clinical researchers at the University of Turku and Turku University Hospital. It is worth noting, that both the basic and clinical researchers represent two relatively heterogeneous groups representing different disciplines and fields of medicine, the common nominator on both sides being

cancer research and treatment. Table 1 summarizes the broad boundaries between clinical and basic research.

Table 1. Boundaries of basic research and clinical research within the network.

	Basic research	Clinical research	Boundary types
Organization	University	Hospital	Physical boundaries: Different locations, no shared places or natural locations to meet during work day
Education	Natural science or technology	Medical doctor	Behavioural boundaries: Different focus of work: care vs. research focus creates different priorities, allocation of time and resources
Main task in organization	Research	Treating patients	Cognitive boundaries: The closeness to patient work creates different value connection of research work: providing the solution or being part of the solution

In total, 13 applications were received for the program. They were reviewed by the Western Cancer Center's expert team, and potentially compatible pairs were formed based on research interests and goals the applicants described in their applications. One of the pairs had a clinical background and the other a person doing academic basic or applied research, and they did not know each other in advance. researcher. Otherwise, the pairs were peers in terms of professional experience, i.e. at approximately the same career stage. In addition to the applicants, 5-9 people were recruited through the pilot planning group's own networks. The final research group consisted of 10 mentoring pairs, as one of the pairs left the program.

The cross-mentoring program consisted of joint introductory, intermediate and final seminars as well as independent meetings between the pairs. The mentoring program was scheduled for February-September 2023, during which the pairs met each other independently 3-6 times. Research data was collected in two rounds of interviews: the first in spring 2023 and the second in autumn 2023/spring 2024 after the program. The interviews in the first round focused on conducting research and related collaboration, and in the second round on the mentoring program as an experience. For the first round only one participant declined the interview request, thus this round includes 19 interviews. For the second round after the mentoring program ended, 13 out of the 20 participants were reached for interviews. Thus, the data includes 32 interviews with the program participants, and researchers notes from the joint meetings.

The responses were reviewed by researchers from Turku School of Economics. The analysis followed qualitative content analysis (Elo & Kyngäs, 2008; Lindgren et al., 2020). The overall goal was to identify potential challenges, related background factors, and identify potential benefits from bringing together the perspectives of clinical and basic researchers to develop a regional research network. The analysis progressed in two stages. First, the responses were grouped by theme: researcher, research, research

collaboration, and research networks. This was done by identifying boundaries at different levels from individual, task, groups and organizations. After this initial thematising, in the second phase of analysis, the data was coded with theoretical framework guided coding scheme. The codes included three boundary spanning actions (representation, coordination of task performance and general information search) and types of boundaries (physical, behavioural and cognitive). Thus, the aim was to identify both the different type of boundaries and actions taken to overcome at the different levels (themes). Building on this analysis we were able to identify challenges of research collaboration between the clinical and basic researchers within the network as well as different types of actions that could help to overcome these challenges.

Results

Following the framework presented by Marrone (2010) and combined with the boundary types presented by O'Bryne (2007), we identify several factors of significance for individuals either engaging or withdrawing from boundary spanning activities within the cancer network. Table 2 summarises the findings.

Stemming from the context of the study we identified multiple member and team level factors influencing the degree of engagement for boundary spanning activities. The FICAN West network is part of a top-down organisation of Finnish national cancer research network. This structure sets boundaries to the purpose of the network. In addition, the network includes different organizations, two regional hospitals, one University hospital, and University of Turku, thus it consists of heterogenous research cultures and leadership practices across individual research teams. In addition, the mentoring program participants represented different phase of one's individual career and tenure as well as different previous experiences of cross-team activities. What all participants shared was intellectual curiosity and strive for greater good for cancer patients.

Table 2. The types of boundaries and related boundary spanning activities enhanced by the mentoring program.

Types of boundaries → Boundary spanning activities at different levels ↓	Physical boundaries	Behavioural boundaries	Cognitive boundaries
Team level boundary spanning			
<i>Activities</i>	<i>Regular meetings with the mentoring pair</i>	<i>Opening up one's personal networks</i>	<i>Visiting each other's workplaces</i>
Main outcomes	Identification of individual level expertise	New research project initiatives	New research ideas; Clearer identification of the role of one's own research
Network level boundary spanning			
<i>Activities</i>	<i>Sharing resources</i>	<i>Knowledge dissemination of requirements, needs and possibilities</i>	<i>Joint mentoring program meetings</i>
Main outcomes	Increased interaction between network members	Identification of organizational development needs	Identification of network embedded know-how and capabilities

The physical boundaries stemmed particularly from the different locations, as the research teams of the participants were located in different buildings in the city. For two of the ten mentoring pairs the locations of the clinical and basic researchers were close by and thus, there was natural meeting space in cafeteria or in shared meeting rooms. One of the participants research team had relatively recently moved to new premises in same building with clinical research facilities, and considered that this proximity enhanced collaboration.

"So, those patient samples are so much closer than, for example, at my previous workplace, yes, yes, they were talked about, but those contacts were missing. Now it feels like we have, for example, a tube straight from the operating room in the lab." -Basic researcher

To overcome the physical boundaries, the mentoring program offered timetable and a contact with whom to meet regularly. At the individual level this provided space to identify participants own expertise and also enhance the program participants role in his/her research team through gaining knowhow and contacts of the "other side". On network level the overcoming of physical boundaries related to sharing resources from tissue samples to analysis tools with new partners. Thus, increasing the network interaction and lowering the boundary stemming from different locations as more knowledge of existing expertise is more broadly shared between network members.

The behavioural boundaries originate from the different foci of the work. The clinical researchers are firstly medical doctors and their priority is treating their patients. Research is focused around that goal. For basic researchers the focus is on research and creating new knowledge that can help to improve or create new

knowledge of cancer or its treatment. Thus, the priorities are different as well as the perspective of research. To overcome this boundary was related to opening up the own personal networks to the pair. This, created new opportunities for further research projects among the network members. On the network level the discussion from the mentoring meetings sparked identification of shared knowledge and resource needs that could be pursued to solve together. However, some mentoring pairs were not able to overcome this boundary. Thus, it is important to find common ground from the research in order to get the pairs to commit and the potential outcomes would be achieved.

"I didn't really understand his stuff, and he probably didn't understand mine. That's how it went a little wrong." -Basic researcher

The cognitive boundaries stemmed from the responsibility over the cancer patients. As mentioned the clinical researchers have their focus on the patient work and for basic researcher the focus is on the research. Thus, the value they connect with research is different. The clinical research connects the research and its results more directly to treating patients and for basic research this connection is wider. They can see that the results can have potential at some point to create advancement in treatment.

"They [research ideas] probably come from that practical work. A thought, a question, an idea comes and then a discussion with other researchers or colleagues follows and then an idea comes and then another idea comes and from that another" -Clinical researcher

To overcome this boundary related to the visiting of the pair's workplace and getting deeper understanding of the practical work related to research. This opened up new research ideas for the participants. On network level the joint meeting of the mentoring program participants created space for shared discussions that helped identify existing know-how and capabilities within the network as well as needs for further developments.

Our research identified different types of boundaries in the translational research between clinical and basic researchers in the local cancer research network. The mentoring program enabled multiple types of boundary spanning activities to overcome the different boundaries. However, some mentoring pairs did have challenges in finding shared understanding and interests, thus it is important to carefully select the mentoring pairs.

Discussion and conclusions

The challenge of translational research is the increasingly fragmented funding of research and the increasing demands for, for example, research permit procedures. In medicine, basic research is concentrated in universities, where funding is increasingly so-called external and project-based. This means that a researcher must apply for funding for their new idea, both for their own salary and that of other

members of the research group, as well as for other necessary resources. Clinical research, on the other hand, is complicated by the tightening of healthcare resources, which means that doctors' opportunities to spend their time on research are decreasing, as all busy doctors are needed for patient work.

Solving these challenges is not simple and there is unlikely to be one panacea that would solve the whole problem. Planning resources and developing structures is key, as is seeking and developing smaller but impactful changes in everyday work. In translational research, it is essential that communication and cooperation work between different interfaces. Partly at the organizational level, operating models can be developed that enable encounters and interaction at these interfaces in everyday work.

Our preliminary results highlight the potential of a formal cross-disciplinary peer mentoring program in enhancing collaboration in transdisciplinary research network. Firstly, by increasing understanding of the different perspectives of research and research practices. Secondly, thorough creating new network connections and awareness also beyond the program participants. Thirdly, by providing time and structure to engage in networking.

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