Towards a Competence Profile for Inter-Organizational Learning in Open Innovation Teams

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While inter-organizational learning in open innovation teams has received much attention lately, research into its human dimension is lacking. This paper, therefore, explores the competencies professionals need for this process. Three studies were executed: a theoretical study, explorative interviews and focus groups. A competence profile was compiled from an analysis and synthesis of theoretical and empirical data. The paper concludes with a discussion on the robustness of the competence profile and its relevance for HRD.

Keywords: Inter-organizational Learning, Open Innovation, Competence Profile

Expensive production factors, critical consumers that want to be surprised, and the pressure to use safe production techniques urge companies to avoid wasting money, to identify and to exploit opportunities, and to operate in a socially responsible way. To confront these issues, more and more companies engage in open innovation teams: innovation teams in which different companies are represented. In practice, this means that professionals from different organizations share and create new knowledge collaboratively or, to put in other words, to learn together (Madhavan & Grover, 1998). This process is also referred to as inter-organizational learning (Holmqvist, 2003). The diversity of organizational backgrounds in open innovation teams is a source for creativity and is considered to be a critical success factor (Ritter & Gemünden, 2002). Interestingly enough, this factor is also a source of social and communicative dilemmas that may lead to leakage of information, loss of control and diverging aims and objectives, and often results in conflicts and project failures (Tidd et al., 2001). The way partners manage the collective learning process plays a central role in its success or failure (Larsson et al., 1998). Team members need strong communication and relationship skills or, what we call competencies, but this human dimension of alliances and innovation teams is still undervalued (Moss Kanter, 2006). Consequently, a clear overview of the competencies open innovation professionals need is lacking, which makes it difficult for companies to select the right professionals or equip them to operate successfully in open innovation teams. This paper, therefore, represents an explorative study towards a competence profile for open innovation team members. The paper is constructed as follows. First, it theoretically examines the concept of competence, open innovation and inter-organizational learning. This is followed by the research question, a description of the research method, which consisted of three separate studies: a theoretical review, explorative interviews and focus group discussions. The paper concludes with the results of the three separate studies, the preliminary competence profile, a discussion of the robustness of this profile and its relevance for HRD.

Theoretical Framework

Competence is viewed as the integrated set of knowledge, attitudes and skills of a person (Mulder, 2007). The concept of competence assumes that it is recognizable, assessable and relevant for practice (Caird, 1992). It can be developed, learned and described on different levels, and it is supposed that there is a strong relationship between competence and organizational effectiveness (Prahalad & Hamel, 1990). A competence profile is the overview of the essential elements of professional competence, existing of knowledge, skills and attitude requirements for effective performance. Organizations very often use competence profiles for managing and developing human resources. A competence profile for open innovation team members would enable organizations to better select and/or equip professionals for open innovation teams and, as such, enhance the success rate of open innovation projects. There are different approaches to competence identification, modeling and assessment. They include the process-driven, output-driven, invented, trends-driven and work responsibilities approach (Rothwell & Lindholm, 1999). Key methodologies in rigorous competence studies within these approaches are task analysis (Caird, 1992) and critical incidents techniques (Rothwell & Lindholm, 1999). Du Chatenier et al. (2007) have made a literature review on how open innovation processes actually occur and what their critical incidents, i.e., dilemmas or challenges, are. The review of Du Chatenier et al. (2007) includes various studies and theories on (open) innovation management, learning and (inter) organizational learning and resulted in a new extended model for inter-organizational learning in open innovation teams (Figure 1). In this model, the *overall innovation process* consists of three phases. First, team members *scan the environment* and process relevant signals about threats and opportunities for change. Second,

team members *define the project* by making decisions about what the object of innovation will be and how the project has to be carried out. Third, team members *develop the product*, and obtain the resources to enable its successful implementation. In each innovation phase, the team members are involved in various activities. To synchronize their activities, state-gate models are often used (Cooper, 1994) that provide clear process steps that are separated with tollgate decision making. Depending on the phase team members are in, their activities must result in common goals, prototypes, plans, and/or strategies. Although the purpose may differ, the process underlying each activity is *collaborative learning* or *collaborative knowledge creation*. In order to define the stages for collaborative knowledge creation, Du Chatenier et al. (2007) compared several models on learning and knowledge creation of various disciplines. Among these models were: the knowledge creation model of Nonaka and Takeuchi (1995), the information processing model of Huber (1991), the social learning cycle or the new knowledge flows of Boisot (1995), Engeström's (1999) model of expansive learning, Beers et. al's (2005) model of collaborative knowledge construction, and collaborative learning of Van Boxtel et al. (2000). The comparison of these models resulted in four common process stages. These stages are a central part of the competence profile that we develop in this paper. Therefore, we will elaborate on each of the four stages individually. First, *externalizing and sharing*, in which team members interpret their experiences in order to externalize and share their (implicit) knowledge, information and needs with other team members. Second, *interpreting and analyzing*, in which team members absorb what they hear from others and interpret and analyze it by associating it with their own knowledge base. Third, *negotiating and revising*, in which team members gather and order different interpretations and build mutual understandings and meanings, for which they sometimes have to revise their own way of thinking. Fourth, *combining and creating*, in which team members combine different knowledge bases, accumulate and integrate ideas and create new ideas.

In an open innovation setting internal and external sources are combined for both the development and implementation of new technologies or products (Chesbrough, 2003). This means that the collaborative learning process is sometimes carried out with professionals from different organizations, sometimes with professionals from one organization from the same department or different departments, see Figure 1. When the collaborative learning process takes place with professionals from different organizations, the process is also called *inter-organizational learning*. As stated earlier the involvement of different organizational backgrounds can, on the one hand, spark creativity and make the learning process more successful, but on the other hand, it can challenge the process as well. The challenges derived from the literature review are as follows. The overall innovation and collaboration process must often cope with the fact that the team members work at different locations, within a decomposed team, typically without a learning history, but with a learning future, with inadequate material and immaterial resource availability, without a single central overview, with a high team member enter and exit rate, and high levels of creative turmoil. More specific challenges related to the afore mentioned stages are as follows. The stage 'sharing and externalizing knowledge' may be challenged by highly complex innovation goals and low levels of trust between the innovation partners, which makes it difficult to share and/or articulate knowledge. The stages 'interpreting and analyzing', 'negotiating and revising', 'combining and creating' may be challenged by a high team diversity concerning different knowledge bases, working cultures, and innovation objectives. This jeopardizes the creation of common goals, a common work plan and mutual understandings. At the same time, power differences inside and outside of the team, make it difficult to maintain control and establish ownership. The open innovation team can achieve the optimal benefit from the advantage of the diverse organizational backgrounds of its members, only if the team members involved are competent in dealing with these challenges. However, a competence profile for open innovation professionals is still missing in the literature, which has led to the following research question:

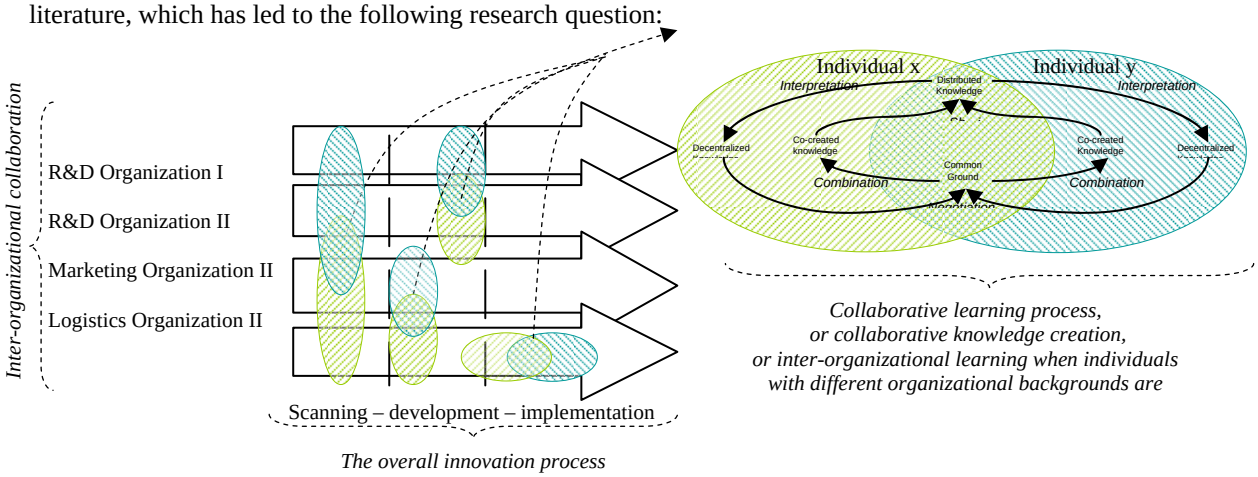

Figure 1: The open innovation process and its underlying processes

Research Question

Which competencies do professionals need for inter-organizational learning in open innovation teams, and to deal with the challenges or dilemmas of inter-organizational learning in an open innovation context?

Methodology

Since there are, as yet, no existing competence profiles, an explorative study using qualitative methods was chosen to identify and elaborate the competencies. The research consisted of three studies: a literature study, explorative interviews and focus group discussions. The literature study aimed at constructing a theoretical competence profile that would serve as a framework to interpret and code the empirical data. The two empirical studies aimed at discovering the competencies with a bottom-up approach in two different ways. The data of the three separate studies were then compared in order to derive a preliminary competence profile. .

The literature study was done by selecting relevant competence lists for each task and challenge, based on three criteria: 1) they should match with our definition of competence being a mixture of knowledge, skill and attitude at the individual level; 2) they should fit closely to the task or challenge at hand, and 3) there should be empirical evidence indicating the relevance of the competencies for the task or challenge. The selected competencies were put into a framework consisting of three layers: 1) task-and challenge- related clusters of competencies, 2) the competencies themselves and 3) their underlying aspects. This framework was used after the explorative interviews and the focus groups to categorize and analyze the empirical data.

Sixteen explorative interviews were undertaken (three by telephone, thirteen face to face) with professionals from different organizations and intermediaries working with open innovation teams. The open innovation professionals were selected through personal contacts, and the intermediaries were selected to represent well-known organizations that initiate and facilitate open innovation projects in the Dutch agribusiness sector. The interviews took about 1.5 hrs and were semi-structured, according to the critical incidents method. The main questions were: tell me something about the open innovation project you took part in, what were the challenges/critical situations (that are typical for open innovation projects), (how) did you deal with them? The interviews were conducted in an open and non-directive way, not only, to identify the competencies, but also to understand its empirical context. The empirical data gathered was mainly on a self-reporting basis and allowed for the gathering of a wide variety of insights into competencies for open innovation professionals.

The focus group discussions were held to gain insight into the degree of consensus on the required competencies for operating in open innovation settings. Two focus group discussions were organized with inter-organizational learning (HRD) experts, scientists and professionals and open innovation (OI) experts, scientists and professionals. Two members of each of these six groups were invited based on their expertise and knowledge in that particular field. This wide variety of respondents guaranteed a broad range of competencies and more reliable insight into the degree of consensus on the required competencies.[1] The discussion was open and designed according to the critical incidents technique. The main questions asked were: give an example of a typical open innovation project, what makes this project different from normal teamwork (concluding in challenges/critical incidents), which competencies or personal qualities are needed, and how important are they? The discussions were held in a Group Decision Room, using group decision software. This tool helped to gather and categorize all of the answers to the questions and subsequently to rate the importance of each answer in an efficient way. The empirical data derived from the explorative interviews and focus group discussions was interpreted and coded with the help of the conceptual competence profile, i.e., the framework of the first study. Table 1 summarizes the goal, method, data source and number of data collection units per study.

Table 1: *Goal, Method, Empirical Data Source and Numbers of Empirical Data Collection Units per Study*

Goal		*Study 1:* Framework for analysis and synthesis	*Study 2:* Various empirical insights	*Study 3:* Converging various empirical insights	
Method		Literature study	Explorative interviews	Focus Group1	Focus Group2
Empirical	OI Professionals Retailer		2 (2 interviews, 1 phone)		
Data Source	Processor		7 (6 interviews)	1	2
	Producer		2 (2 interviews phone)		
	Knowledge inst.		1 (1 interview)		
	Stakeholders		2 (2 interviews)		
	OI Intermediaries		5 (3 interviews)	2	1
	OI Consultants			1	1
	HRD Consultants			2	2
	OI Scientists			1	1
	HRD Scientists			2	1
	Total n		19 (16 interviews)	9	8

[1] In practice, not every group was represented by two respondents, as some respondents had to cancel the meeting at the very last moment.

Results and Findings

Theoretical Study

Concluding from the theoretical framework, the main tasks that open innovation professionals should manage are the overall innovation process, the collaborative learning process, and the inter-organizational collaboration process. Next to that, eleven challenges to the inter-organizational learning process were mentioned, which were: (1) complex innovation goals, (2) low proximity, (3) team decomposition, (4) low level of trust, (5) high diversity, (6) power differences, (7) no learning history, but a future, (8) insufficient resource availability, (9) no single, central overview, (10) team instability, and (11) high level of creative turmoil. Relevant competence lists that were selected for dealing with these challenges and tasks are mentioned in the table below. Based on the competence lists a first draft competence profile for open innovation professionals was constructed, consisting of 13 competencies and 38 aspects. The competencies are clustered by the main tasks, which we called content management, project management, and interpersonal management, in the profile. The cluster, self-management, was added as this appeared to be the basis for all tasks. See table 4 for an overview of the profile.

Table 2*: Selected Competence Lists for Dealing With the Tasks and Challenges*

Overview tasks and challenges	*Relevant competence lists*	*Competence aspects*
Main tasks		
1. Overall innovation process	Entrepreneurial competence (Lans, et al., 2005)	Opportunity competence, relationship competence, conceptual competence, organizing competence, strategic competence, commitment competence
2. Collaborative learning process	Learning competence (Bolhuis & Simons, 2001; Du Chatenier et al., 2007)	Learning knowledge (basic knowledge and perceptions); Learning skills (social skills, reflective skills, meta cognitive skills); Learning attitude (appreciation of learning domain, learning motivation, self confidence, daring to take risks)
3. Inter-organizational collaboration process	Competencies for Boundary Spanners (Williams, 2002)	Building sustainable relationships; Managing through influencing and negotiation, networking; Managing complexity and interdependencies; Managing roles, accountabilities and motivations
Main challenges		
1. Complex innovation goals 2. Low proximity 3. Team decomposition	Teamwork competence (Stevens & Campion, 1994; adapted by Miller, 2001)	Conflict Resolution; Collaborative Problem Solving; Communication; Goal Setting and Performance; Planning and Task Coordination
4. Low level of trust	Key components of trust (Tschannen-Moran & Hoy, 1998)	Being benevolent; Being reliable; Being competent; Being honest; Being open
5. High diversity	Negotiating Reality (Friedman & Antal, 2005)	Openness (treats differences as important opportunities); Active awareness of own perceptions; Ability to engage with others to explore assumptions
5. High diversity	The novelty generation / creativity model (Schweizer, 2006)	Novelty seeking; Novelty finding; Novelty producing; Innovative performance
6. Power differences 7. No learning history, but a future 8. Insufficient resource availability	Political skill (Ferris, et al., 2005)	Social astuteness; Interpersonal influence; Networking ability; Apparent sincerity
9. No single centtral overview	Skills of self-directed learning (Knowles, 1990)	Engaging in divergent thinking; Accepting feedback; Diagnosing learning needs; Formulating objectives; Identifying resources for accomplishing objectives; Designing strategy plan; Carrying it out; Collecting evidence of accomplishments
10. Team instability 11. High level of creative turmoil	Coping with chaos tools (Eoyang, 1997)	Managing butterfly effects; Managing boundaries; Transforming feedback; Using fractals; Using attractors; Self organization; Coupling

Empirical Studies

Table 3 shows the kinds of challenges that were mentioned during the explorative interviews and the focus groups. In contrast with the theoretical study, no challenges caused by complex innovation goals, low proximity, team decomposition learning history and future and team instability were mentioned. However, challenges caused by low levels of trust, high diversity, no single central overview, high levels of creative turmoil, and insufficient resource availability were mentioned in both the interviews and focus groups (although 'insufficient resource availability' was mentioned in only one focus group). 'Power differences' was mentioned only in the interviews. Some quotes from the respondents that illustrate the challenges mentioned here are: 'Working together on one project with your buyer is complicated, as he is in fact also your competitor'. 'You have different interests; everyone looks for the solution outside his or her own company'. 'It is difficult to give each other feedback because you don’t have a direct responsibility to each other'. 'There are no traditional hierarchical lines, which make the management of these teams more complicated'.

Table 3: *Challenges Mentioned by Explorative Interviews and Focus Groups (in Frequencies)*

		Explorative interviews (n=16)	*Focus group discussions (n=2)*
1.	Complex goals	0	0
2.	Low levels of trust	3	2
3.	High diversity	7	2
4.	Power differences	3	0
5.	Low proximity	0	0
6.	Team decomposition	0	0
7.	No learning history, but future potential	0	0
8.	Insufficient resource availability	9	1
9.	No single, central overview	2	2
10.	Team instability	0	0
11.	High level of creative turmoil	1	2

The competencies mentioned by the respondents and focus groups to deal with these challenges are summarized in Table 4, which also shows how often they were mentioned. All competence aspects were mentioned in the studies except for 'Explores assumptions by knowing when and how to interrupt automatic functioning', which belongs to the competence ‘negotiates and revises’. Seventeen aspects were mentioned in all studies:

1. Is committed: ‘motivation’, but ‘appreciation of the learning domain’ was only mentioned by one focus group.
2. Interpersonal influence: ‘influencing skills’ and ‘assertiveness’.
3. Builds trust: is ‘honest’, ‘open’, ‘competent’, but ‘is reliable’ was only mentioned by one focus group and ‘is benevolent’ was not mentioned during the interviews.
4. Is entrepreneurial: is ‘result oriented’, ‘seeks novelties’, ‘finds novelties’, but ‘pro-activity’ was only mentioned by one focus group.
5. Controls and coordinates: ‘coordinates and synchronizes’, ‘identifies resources’, but ‘sets goals’, and ‘identifies situations of group problem solving’ were only mentioned by one focus group and ‘monitors’ was only mentioned in the interviews.
6. Interprets and analyses: ‘has a certain knowledge base’, ‘listens’, but ‘reflects’ was not mentioned by only one focus group.
7. Negotiates and revises: ‘sees differences as opportunities’, ‘is competent in techniques of lateral thinking’, ‘combines high inquiry with high advocacy’, but ‘recognizes and handles conflict’ was only mentioned by one focus group.
8. Combines and creates: ‘creating a win-win situation’.

Thirteen aspects were mentioned in all three studies, except by one focus group. Some of them are already mentioned above, the others are:

1. Governs him/herself: has ‘self confidence’, ‘meta cognition’ and ‘perseverance’, but ‘manages different multiple accountabilities’ was only mentioned in the interviews.
2. Social astuteness.
3. Networking ability.
4. Copes with chaos and uncertainties: ‘problem finding’, ‘is flexible and improvises’, but ‘being not too systematic’ was only mentioned by one focus group and ‘having an overall picture’ was not mentioned during the interviews.
5. Externalizes and shares: ‘communication’.

In summary, seventeen aspects were mentioned in all studies, thirteen by all, with the exception of one focus group, one aspect was not mentioned at all ('interrupting automatic functioning'), two aspects only during the interviews and not by the focus groups ('managing different multiple accountabilities', and 'monitors or evaluates'). Three aspects were not mentioned during the interviews and only by one focus group ('appreciating learning domain', 'conflict handling', and 'being not too systematic'). Two aspects were mentioned only by the two focus groups and not during the interviews ('is benevolent' and 'has an overview').

In general the competencies derived from the empirical studies are similar to those that were found in the literature. There were, however, also additions to the competencies derived from literature. These are indicated with italic font in Table 4. Most striking are those that contradict each other. See, for instance, 'interpersonal management', 'interpersonal influence', and 'assertiveness': on the one hand, respondents said that they needed a certain diplomacy to express things correctly, on the other hand, it was said that one needed to be straight and even rude now and then. Likewise, it was said that one needs to share his or her knowledge even if (s) he is not sure, but it was also mentioned that one must ‘share with boundaries’. Also, it was said that one sometimes needs to put his own goals aside, whereas others said that one must not accept other goals than his or her own and must be able to 'agree to disagree' on certain points.

Table 4: *The Competence Profile (in frequencies, additions in italics based on our own empirical studies, c=challenge, I=explorative interviews, F=focus group discussions)*

Competencies	*Aspects*	*Authors*	*I*	*F*
Self Management				
Is committed	Has the motivation to learn, *sense of urgency and wants to learn from others*	Bolhuis & Simons	4	2
	Appreciates the learning domain	Bolhuis & Simons	0	1
Governs him/herself (c5)	Has self confidence, *knows what his or her qualities are*	Bolhuis & Simons, Schweizer	1	1
	Is aware of, and regulates, own thinking *and feeling*	Bolhuis & Simons, Friedman & Antal	1	1
	Has perseverance, *keeps on thinking positively, having end-goal in mind*	Schweizer	3	1
	Manages tensions created by multiple accountabilities, *tasks and roles*	Williams	1	0
Interpersonal management (main task 3: inter-organizational collaboration)				
Has social astuteness (c8)	Understands social situations as well as interpersonal interactions. Is sensitive to the roles and responsibilities of all partners, aware of their collaborative motivations and expresses understanding and empathy.	Ferris et al., Williams	5	1
Inter-personal influence (c6)	Appropriately adapts, calibrates his behavior to each situation in order to elicit particular responses from others. Uses influencing skills (as opposed to instructing): *position, coalition, stimulates, knows who, when to inform*	Ferris et al., Williams	8	2
	Is assertive, extrovert. *Phrases own perceptions and feelings (in a diplomatic way). Is sometimes straight forward*	Schweizer	3	2
Networks (c7)	Develops, maintains, uses effective networks. Is approachable, develops friendships easily and strong beneficial alliances and coalitions.	Williams, Ferris et al. Miller	3	1
Builds trust (c4)	Is honest: possesses high levels of integrity, authenticity, sincerity, and genuineness. Can be counted on to represent situations fairly.	Tschannen-Moran & Hoy, Williams	2	2
	Is open: shares information freely with others. *Even when he is not sure. With a feeling for boundaries, knowing value of knowledge.*	Tschannen-Moran & Hoy, Williams	4	2
	Is competent: able to perform the tasks required by his position. *Is professional, takes a role in the group, works independently*	Tschannen-Moran & Hoy	3	2
	Is benevolent has the best interests at heart for others, s*hares successes, allows people to make mistakes. Trusts the other party*	Tschannen-Moran & Hoy, Williams	0	2
	Is reliable: ensures that the others can depend upon him to come through for them, acts consistently, follows through. *clear in own role*	Tschannen-Moran & Hoy	4	1
Project management (main task 1: overall innovation process)				
Is entrepre-neurial (c5)	Manages situations of ambiguity, dares to take risks. *Is result oriented, is pragmatic, experiments, makes attempts. .*	Bolhuis & Simons, Williams	1	2
	Seeks novelties. Is sensitive to his environment and is market oriented	Lans, et al., Williams	5	2
	Picks up signals, sees chances, has intuition for innovation, creates vision	Schweizer, Lans, et al.	1	2
	Is pro-active. *Comes up with ideas him/herself and takes initiatives*	Schweizer	1	1
Controls and coordinates (c2, 3, 9)	Establishes specific, challenging, accepted team goals. Diagnoses, formulates learning objectives in performance outcomes n*ot too soon.*	Miller, Knowles	1	1
	Identifies situations for participative group problem solving, recognizes obstacles and corrective actions.	Miller, Eoyang	1	1
	Coordinates and synchronizes activities, information, and tasks between team members. Designs a plan of strategies. Carries out the plan systematically and sequentially. *Feels responsible for the team and acts as such*	Miller, Knowles	3	2
	Identifies human, material, and experiential resources for accomplishing various kinds of learning objectives. *Organizes complementarities*	Knowles, Eoyang	2	2
	Monitors, evaluates, and provides feedback on overall team and individual performance. Accepts feedback about his/her performance nondefensively. Collects evidence of accomplishments. A*sks many critical questions*	Miller, Knowles, Eoyang	7	0
Copes with chaos and uncertainties (c10, 11)	Has an overall picture of the project and influencing factors. Understands and manages complexity. Supports many things on his/her mind at the same time.	Williams, Schweizer, Eoyang	0	2
	Finds problem. Balances short and long term goals. *Discerns sub/ main issues*	Eoyang	1	1
	Deals with unexpected situations, is flexible, improvises. *Deals with a flexible team composition, knows when one has to quit the team*	Schweizer, Eoyang	3	1
	Is not too systematic, rigid: is flexible with plans, deadlines.	Eoyang	0	1
Content management (main task 2: collaborative learning process)				
Externalizes (c1)	Communicates clearly and understandably.	Williams, Miller	1	1
	Recognizes open and supportive communication methods.			
Interprets (c5)	Has good reflective skills, and techniques of analysis. *Is critical, but constructive*	Bolhuis & Simons, Williams	4	1
	Possesses basic knowledge and perceptions, of various technical/professional areas *and languages*. Experienced in partnership working	Bolhuis & Simons, Williams, Schweizer	2	2
	Listens actively: listen with a view to being influenced, not closed. I*s curious*	Bolhuis & Simons, Williams	5	2
Negotiates (c5)	Openness: treats differences as important opportunities. *Respects, values, appreciates people and their ideas.*	Friedman & Antal, Williams	2	2
	Is competent in techniques of lateral thinking or divergent thinking.	Williams, Knowles	2	2
	Combines high advocacy (egocentrism) with high inquiry. *Is aware that he represents an organization, refuses to accept less*	Friedman & Antal, Williams,Schweizer	3	2
	Explores assumptions by knowing when and how to interrupt automatic functioning and brings theories of action into awareness.	Friedman & Antal	0	0
	Recognizes types and sources of conflict, encourages desirable conflict but discourages undesirable conflict.	Miller, Williams	0	1
Combines (c5)	Employs integrative (win-win) negotiation strategies rather than distributive (win-lose) strategies. Brokers solutions or outcomes. Thinks in ways that differ from established lines of thought. *Agrees to disagree (lose-lose). Considers common goal as most important. .*	Miller, Williams, Schweizer	8	2

Conclusions and Recommendations

This research has revealed quite a lot of correspondence among the three studies that were used as input for the competence profile. Therefore, it can be concluded that the competencies needed by professionals for inter-organizational learning in open innovation teams to optimally deal with its challenges or dilemmas are: 'being committed', 'being able to govern yourself', 'possessing social astuteness', 'possessing inter-personal influence techniques', 'having networking abilities', 'building trusting relationships', 'being entrepreneurial', 'being able to control and coordinate', 'coping with chaos and uncertainties', 'being able to externalize and share knowledge', 'interpreting and analyzing information', 'negotiating and revising knowledge', and 'combining and creating new knowledge'. All of the competencies mentioned were added to the profile regardless of how often they were mentioned. Table 4 shows a preliminary competence profile containing these competencies and its underlying aspects. With respect to the robustness of this competence profile, it should be mentioned that the amount of empirical evidence differs greatly among the sets of competencies. Its validity should therefore be further investigated, together with the following four issues:

First, the variety of answers may be explained by the background of the respondents. They participated, for instance, in different open innovation projects, which can differ in the way they are financed, initiated and facilitated, the innovation goals can be incremental or radical. Next to that, the respondents fulfilled different roles in the open innovation team, for instance, the role of a buyer, supplier, strategic alliance, competitor, knowledge institute or university. They also differed in the kind of team role they had, for instance, mediator, developer or initiator. The context dependency of the competencies may explain the variance in responses in our research. However, our data set is too small and too diverse to analyze which competencies are needed in which situation. A question further research should address is therefore: how do the competence sets depend on the context, i.e., team roles and typical characteristics of the open innovation project?

Second, although there are many studies that confirm that personal competencies matter and call for more research in this area, there are also studies, that argue the contrary. They suggest that the success of an open innovation project depends on factors at organizational and team level, rather than individual level (Lee & Choi, 2003). It is obvious that professionals operate as individuals in an open innovation team. Apparently, Lee and Choi (2003) believe that the institutional environment (at the organizational and team level) prescribes, to a high degree, the behavior of individuals in an open innovation team. This could be true although we have not observed such prescribed behavior in our studies. Nevertheless, the impact of the institutional environment on individual behavior would be an interesting topic for further research.

Third, reflecting on the preliminary competence profile in table 4 one could easily wonder if this set of competencies is unique to open innovation, (which was also a topic of discussion during one of the focus groups. The participants were asked to mention challenges and critical incidents that would not occur in closed innovation projects or other kind of teamwork within organizations. However, the competencies mentioned for dealing with these challenges do not necessarily have to be unique to open innovation projects as well. Further (comparative) research is needed to reveal whether competencies can be defined that are unique to open innovation settings, and thus can be neglected in closed innovation settings or regular teamwork.

Fourth, the challenges caused by low proximity, team decomposition and team instability, learning history and future were not mentioned, but all competencies belonging to these challenges were mentioned in the context of other tasks or challenges. This may indicate that these challenges play a role, but may not be unique to open innovation. Another explanation could be that the competencies that belonged to these challenges were also needed to cope with other challenges that were mentioned, which could mean that the categorization of the competencies is not right, i.e., mutually exclusive. Further research should therefore address the question whether a mutually exclusive categorization can be made or whether we should accept that certain competencies contribute to more than one task and/or challenge.

In conclusion, this study gives insight into which competencies open innovation professionals need, but further research is needed to know how context dependent the competence profile is, which competencies are crucial for the success of open innovation, how unique they are, and how the competencies need to be clustered.

How This Research Contributes to New Kknowledge in HRD

HRD is responsible for the development and training of employees in certain competencies. As open innovation becomes more and more common practice in organizations, it is very important to define the competencies to train for successfully operating in these kinds of teams. Next to this, open innovation is very much an inter-organizational learning process, but research in HRD pays little attention to it. As it seems now, there is no safe learning climate in this setting, which is also difficult to build. Politics plays a big role as well, which become prevalent in, for instance, the concept of power differences, which is another topic that is not investigated very much in HRD. This research provides a preliminary insight into the issues that play a role in this learning setting and what professionals or team members need to do to cope with them effectively.

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