

Editorial: Towards a collaborative understanding of Intercultural Engineering

Vorwort der Gastherausgeberinnen: Forderung nach einem kollaborativen Verständnis von interkultureller Ingenieursarbeit

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1. Introduction

In today's globalized and technologized world, many individuals work across cultures and locations. Often, work of such kind takes place in technical fields. The aim of this special issue is to conceptualize how culture and technology intertwine and what that means for current cross-cultural and intercultural theory and practice. In doing so, we map the field of intercultural engineering.

With this special issue, we suggest developing the field of intercultural engineering in theory and practice. With intercultural engineering, we mean any intercultural social or corporate field that is characterized by a high importance of technology and specialized knowledge of those working with this technology. We name those working in such fields engineers. We understand the term engineers broadly, as including any type of technical expert, project-leader or manager, be it with regard to computer science, electrical engineering, mechanical engineering or other related fields.

When speaking of intercultural engineering, we refer to all work contexts that integrate work practice of such kind across different perceived borders of culture – e. g. micro-individual, meso-organizational and macro-societal – whilst

being mediated through technology. We argue that the fields of Intercultural Engineering as defined above are currently underexplored, both in theory and in academic and corporate education. Hence, current intercultural theory and practice might not fit technical fields, and researchers and practitioners of intercultural communication and cross-cultural management might lack the understanding of how sense is made in technical fields.

With this special issue, we intend to address these shortcomings in order to facilitate the development and theories and educational practice which fit technical fields and are meaningful to those working in them. In our editorial, we summarize the macro- and micro-perspective in cultural research. Next, we conceptualize cultural complexity in organizations with regard to intercultural engineering. Based on this overview, we suggest an interpretative and collaborative approach to intercultural engineering. Next, we introduce the papers in this special issue.

2. Two approaches to studying culture

In the study of culture, two approaches need to be distinguished. They differ with regard to the level of culture which they study, namely the macro- and the

micro-level (Mahadevan et al. 2011d). Furthermore, they differ with regard to their paradigm, namely and objectivist or interpretative understanding of culture (overview in Martin 2003). They are based on two paradigms, the Given Culture and the Cultural Creation perspective (Mahadevan et al. 2011d).

2.1. Macro-level and objectivist studies of culture

The first approach is the macro-level approach based on cultural dimensions and standards. Cultural dimensions are orientations which try to establish relative difference between members of different societal cultures. The most prominent examples are the studies of Hofstede (1980, 1988, 2003, 2006), Hall and Hall (1997), Trompenaars and Hampden-Turner (1997), and House et al. (2004). Cultural dimensions assume that societies need to find specific answers to universal questions. This means: The question is the same, yet the answers might differ. Examples are cultural dimensions such as concept of time, hierarchy, gender roles: It is assumed that all societies need to have a concept of time, a certain hierarchy and gender roles. Yet, how these requirements are fulfilled might differ. These studies are therefore called cross-cultural as they compare different cultures.

Cultural standards (based on Thomas 2003) refer to the macro-level of culture as well. Yet, in contrast to cultural dimensions, they do not compare cultures with each other with regard to their orientations but try to establish the specific norms and values *within* one culture. They are similar to cultural dimensions as they also refer to the macro-dimension of culture.

The macro-level approach is based on an objectivist understanding of culture. This means: it is assumed that culture can be defined objectively and that it can be studied and researched upon by quantitative means.

2.2. Micro-level and interpretative studies of culture

The second approach to studying culture focusses on the micro-level. This means: It intends to study specific contexts in which individuals create culture through immediate interaction (Martin 2003). Most micro-level studies are based on the interpretative paradigm which intends to uncover the sense which groups of people give to their doings (Hatch / Yanow 2003). From this perspective, culture is conceptualized as a process of making and re-making collective sense out of changing social facts under certain boundary conditions (Mahadevan 2009).

Following the interpretative paradigm inside (emic) and outside (etic) perceptions on culture need to be differentiated. The interpretative paradigm is based on the assumption that *what individuals do must make sense to them – otherwise they would not do it*. If this sense is shared within a group of people, this constitutes emic cultural meanings. Through interaction, individuals give emic meaning to their doings which make sense from the perspective of those who act in such a manner. Yet, this emic meaning might not be understood by an outsider who gives different – emic – meanings to the same action. Hence, the outsider might interpret another person's actions based on his or her *own* values and motivations and not based on the motivations which the other person gives to his or her doings.

To give an example: A person might perceive him- or herself as structured (positive meaning, emic perspective) when solving a problem. However, this person might be perceived as dogmatic (negative meaning, etic perspective) from the perspective of a person who would act flexibly and would expect flexibility when facing the same issue.

From an interpretative perspective, it is the emic meanings which need to be uncovered in order to understand how culture is created (Hatch / Yanow 2003, Mahadevan et al. 2011a, 2011d, 2012a). This means: The interpretative micro-perspective resists the assumption that

societal cultures *prescribe* difference. Rather, it is assumed that individuals *create* sameness and difference between groups of people through their doings. Societal cultures are just one of many boundary conditions of these doings.

2.3. Given culture versus cultural creation

As the previous pages have shown, culture is a paradox: On the one hand, their cultural imprint influences how individuals interpret the world. On the other hand, individuals have the agency to create new meanings. Therefore, culture is a way of interpreting the world which in return shapes which interpretations are possible. Mahadevan et al. (2011d:61) have called these two aspects of culture the Given Culture and the Cultural Creation perspective.

Comparative and objectivist studies of macro-cultures focus on the prescriptive aspect of culture. The assumption is that how individuals interpret the world is to a large extent pre-shaped and limited by their societal cultural imprint. In cross-cultural management literature, this perspective has been called the contingency hypothesis (Thomas 2008). Macro-level cultural studies implicitly assume the contingency hypothesis to be correct; they are based on the understanding that societal cultural difference is an external given and that individuals are contingent upon it (overview in McSweeney 2010). Contrastingly, interpretative studies of micro-cultures focus on how individuals *create* culture, i. e. new collective identities from an emic perspective. When doing so, they act trans-culturally and create new *Intercultures* (Mahadevan et al. 2011d).

Hence, the terms cross-cultural, trans-cultural and intercultural have to be differentiated. *Cross-cultural* refers to the comparison between existing societal cultural entities. These are compared but continue to exist and pre-determine individual behavior. *Trans-cultural* refers to the actions required in order to bridge given cross-cultural difference. *Intercultural* describes the *between cultures* in specific contexts.

Any intercultural space is the result of successful transcultural interaction; it is contextualized and characterized by new shared emic meanings. When a new Interculture has been created, given cross-cultural difference has successfully been overcome through human interaction in a specific context.

This special issue does not intend to compare engineering styles as based on different societal cultures. Rather, it is the goal to understand how new meanings are created in technical fields and what that means from the perspective of those who interact. To reach this emic understanding, one needs to understand both engineering work and social sense-making in this specific field. Hence, we speak of Intercultural Engineering instead of Cross-Cultural Management as based on macro-dimensions of culture.

3. Cultural complexity in organizations

Since initial managerial encounters across cultures, intercultural interaction has become increasingly more complex (Primecz et al. 2009, D'Iribarne 2009, Mahadevan 2009). This has implications for both theory and practice.

3.1. The cultural complexity paradigm

Within academia, the limits of objectivist macro-studies of culture have become visible (D'Iribarne 2009, Yeganeh / Su 2006). Hence, in-depth and contextualized micro-studies of intercultural corporate fields are on the rise (Primecz et al. 2007, Mahadevan et al. 2011d). This has led to the understanding that individuals in organizations are members of many cultures and collective identities such as professional, organizational and societal cultures (Mahadevan 2009).

Cultural research based on the cultural complexity paradigm does not try to define given societal borders. Rather, it intends to understand from an emic perspective which cultural categories are meaningful. Culture is understood

from an interpretative perspective as any collective identity into which individuals categorize themselves. Examples of such emic cultural categories in an international company might be French versus German but also managers versus engineers, or headquarters employees versus subsidiary employees. The task of cultural research which is based on the cultural complexities paradigm is to uncover under which circumstances which collective identity becomes salient and why.

For example: Under which circumstances will a French headquarters engineer consider herself as *French*, when will she consider herself *an engineer* or when will she consider herself a member of corporate headquarters when interacting with a manager from the German subsidiary and how will this influence the behavioral strategies chosen? For giving the answer to this question, research on cultural complexity in organizations pays attention to how macro-level cultural difference is made sense of in micro-individual contexts. It furthermore acknowledges processes of transference between micro- and macro-level and pays attention to the institutional and structural boundary conditions of human interaction.

3.2. The intercultural training context

Amongst practitioners, the impact of culture on corporate business has become visible; hence, intercultural training has become a standard tool of the corporate human resource development (HRD) curriculum (Szkudlarek 2009). Still, intercultural practice in organizations is impacted by the structural limitations of what we call the *intercultural HRD triangle* in organizations in this article. The partners in this triangle are external intercultural trainers, members of the corporate HRD department and those whose intercultural competencies need to be developed (based on Mahadevan 2011c).

Often, intercultural training activities required a highly specialized competency, e. g. with regard to a specific culture.

Therefore, an intercultural expert – called *Interculturalist* (Dahlén 1997, Mahadevan 2009, 2011c) – is needed. At the same time, most intercultural training activities are individualized, single-time activities based on fluctuating internal demand. Hence, most companies do not have the intercultural demand which justifies employing highly-specialized interculturalists full time. Therefore, most intercultural HRD takes place with the help of external freelancers.

These freelancers are familiar with societal cultures, yet, might not be aware of emic organizational sense-making within the organizations whose members they need to train or coach. Hence, they are not familiar with a very important context that influences how individuals give meaning to their doings. To assume that external interculturalists can prescribe cultural meaning to these individuals seems too large a claim from an emic and interpretative perspective. It does not acknowledge cultural complexity in organizations.

Freelance interculturalists are influenced by market pressures: They need to sell their expertise as those who enable others to overcome societal cultural difference. Hence, when selling this expertise to the corporate HRD department, they might need to exaggerate cultural difference in order to sell themselves as the experts who can help overcome it. The corporate HRD department needs to justify its expenses. The more alien another culture is, the higher the risk is that those untrained in dealing with it will cause financial losses to the company. Therefore: The more differently another culture is presented, the better for the interculturalist and the safer for the corporate HRD department. As Mahadevan et al. (2012c) have shown, this situation results in a tendency to present cultures such as China and India as more alien than they actually are. In such a way, the commodity of cultural difference is *sold*.

The corporate HRD department, on the other hand, is not familiar with the work context of those who need to be trained. This is especially true when tho-

se working together do so in engineering fields (Mahadevan 2011c, 2012c). As Kunda (1992) has highlighted, managers and engineers are antagonistic actors in organizational fields. Managerial control and technological freedom on an engineering level create diverging, and often conflicting meanings in organizations (Mahadevan 2009). Those working in technical management need to bridge the cultural divide between central managerial departments such as HR and engineering (ibid.).

3.3. Understanding the social dimension of engineering

The American Engineers' Council for Professional Development has defined *engineering* as the:

“creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property” (cf. Encyclopaedia Britannica 2012:286).

This definition applies to many types of engineering work, be it computer science, the creation of micro-chip design, the testing of circuits, the manufacturing of machines, or the invention of new technical products.

Based on this definition, engineering is a creative activity during which individuals work together and try to solve or prevent future problems (overview in Rammert 2000, 2007). They try to find solutions and invent new technologies; they market technology or research new potential technologies. This means: Humans and technology are linked through human-machine interaction (Latour / Woolgar 1976, Suchman 1987). Furthermore, humans need to master technology: They need to prevent it from being erroneous or faulty, and they need to be able to predict whether a certain technology will do what it is expected to do when put into usage or when manufactured.

An engineer's identity is based on his or her ability to master technology (Rammert 2010). Hence, any fault or flaw in the system also questions a person's ability to *be* an engineer. To be part of the engineering community individuals need to demonstrate that they are capable of the creative, problem-solving and meaning-making activity of engineering. Therefore, good engineering can be seen through whether an individual *behaves* like a good engineer. In such a way, engineering is a community of practice (Bourdieu 1976, Mahadevan 2008): membership is based on what people *do*.

Yet, often, technology cannot be seen. In the case of software engineering, for example, individuals work in individual human-machine interaction (Mahadevan 2009). Other engineers cannot see whether another engineer works like a good engineer. Therefore, engineers tell each other stories about the technological issues which they have already mastered (Orr 1996). Alternatively, they display a certain habitus (a way of being which is specific to a certain social class, see Bourdieu 1997) to make others trust their expertise. For example, research and development engineers might collect and display Dilbert cartoons or make a point *not* to wear business attire when interacting with management (Mahadevan 2009). In such a way, they display a community of engineers, they construct their belonging to this community, and they create a respective group of non-engineers, namely their own management. As Mahadevan (2009, 2011c) has shown, professional engineering identity might actually be stronger than societal cultural difference between engineers.

3.4. The need for intercultural collaboration

Neither the corporate HRD department nor the external interculturalist is part of engineering culture. Yet, based on the understanding of cultural complexity, they need to understand the emic meanings which engineers give to their work practice in order to contribute to this field.

To give an example (based on Mahadevan 2008, 2011c): Intercultural training which does not take organizational and professional engineering cultures into account, might actually have detrimental effects. In the given case, the external interculturalist needed to train engineers at the German headquarters for working together with engineers at the Indian subsidiary. The external interculturalist was not aware of the fact that some German engineers feared that they might lose their job due to outsourcing to India and a simultaneous downsizing process in Germany.

At the same time, the corporate HRD department demanded from the interculturalist that she justified why intercultural training was actually needed with the alienness of Indian culture. Therefore, the interculturalist delivered a standardized power point presentation which highlighted dichotomist descriptions of *Indian value / behavior versus German value / behavior*, therefore creating given cultural difference based on cultural dimensions and standards. This presentation was then ISO-certified by the company which made the content of the intercultural training reliable and enabled the HRD department to justify the expense.

In the actual training sessions, the interculturalist presented Indian culture as very different and traditional and its members as very limited by their cultural imprint. Those German engineers, who did not fear losing their job due to outsourcing to India, resisted this presentation and argued that their Indian counterparts were *just engineers*. For doing so, they were considered interculturally incompetent and still in the early stage of *minimization* (based on Bennett 1986) by the external interculturalist.

Over the next months, those engineers who feared losing their job due to outsourcing to India used the information delivered to justify *why* work from India was late or bad quality as based on cultural dimensions and standards. Those German engineers who were not afraid of losing their job interpreted the same incidents as *bad management*

and blamed corporate management for it. To them, Indian engineers were still *good engineers*.

This example highlights the importance of understanding how emic meanings are made in intercultural engineering fields. It also shows that many cultural levels influence emic sensemaking on an engineering level. However, not many studies have analyzed these processes in intercultural engineering fields. In practice, interculturalists and HRD personnel often lack the knowledge and understanding of intercultural engineering fields. Yet, this understanding is needed to conceptualize collaborative approaches of how to enhance intercultural competency in engineering fields. What seems clear is that neither the interculturalists nor the HRD experts are able to be the sole prescribers of cultural difference in today's complex and technologized organizational fields. Rather, one needs to integrate managerial and intercultural theory and engineering practice collaboratively.

4. Summary: Interpreting intercultural engineering

Intercultural engineering is a complex organizational field. On the one hand, engineering is based on universal principles of science. These principles of science are culture-free, yet, engineering also implies to make sense out of technology and how to use it. On the other hand, technology is a cultural actor which needs to be interpreted (Latour / Woolgar 1976, Suchman 1987). The ensuing interpretations need to be shared by those working with this technology in order to establish a minimum of coherence within the technical community of practice (Orr 1997). This is called the social mediation of technology (Orr 1997, Mahadevan 2009). Based on the cultural complexity paradigm, the social mediation of technology might be contingent upon societal cultural difference, yet, it might also be specific to a certain organization, department or profession (ibid.). Only the interpretative analysis of emic micro-cultural sensemaking will deliver the emic social

meanings of technology in a specific context.

Due to the complexities of intercultural engineering, societal cultural difference cannot be prescribed etically, e. g. by external interculturalists or by corporate management. Given Culture and Cultural Creation go hand in hand in engineering fields, especially if engineers work together trans-nationally and trans-culturally and collaborate virtually across different corporate sites. Based on the cultural complexity paradigm, one needs to understand under which circumstances which cultural level – e. g. organizational, professional or societal culture – becomes salient and why.

In summary, intercultural theory and practice needs to deepen its understanding of whether cross-cultural dimensions are meaningful to those working in these fields. Questions to be answered are, for example: How are macro-cultural orientations translated and transferred to micro-engineering contexts? When and how does cross-cultural difference impact the professional engineering community of practice? When and how do new engineering interculturalities emerge that bridge initial cross-cultural difference?

With regard to practice, this calls for collaborative approaches to HRD and intercultural training. Rather than prescribing societal cultural difference from an etic perspective, corporate HRD departments and interculturalists should focus on interpretative intercultural training activities which try to uncover the social dimension of engineering. This also implies a resource-based view on the social competencies of those working in engineering and a re-structuring of the intercultural HRD triangle. Ultimately, this requires actions of intercultural creation across the legs of this triangle in order to integrate the HRD department, the interculturalists and engineering.

5. The articles in this special issue

The articles in this special issue deal with the topic of cultural engineering in various contexts and from different perspectives, bringing together interculturalists, management scholars and engineering academics and professionals.

Claude-Hélène Mayer emphasizes that intercultural competences are key competences in international engineering organisations. Her article is based on selected empirical findings from a multi-method research study. It focuses on cultural engineering in a specific Engineering organisation in South Africa and investigates how managers in an international and culturally diverse engineering environment define intercultural competence, how they cope with intercultural challenges in their daily work routine and how intercultural competence could be promoted within cultural engineering contexts.

The contribution by *Kirsten Nazarkiewicz* focuses on the relevance of conversation as a learning tool to gain intercultural competence. Her paper reflects on communication as a crucial dimension of intercultural learning processes while focusing in particular on the target group of engineers. She presents three significant findings on the characteristics of communication in educational settings. The author argues that the unconscious reproduction of this pedagogical structure is not helpful for intercultural learning and shows how to use these orientations for a collective intercultural learning process that involves experts of different subcultures (technical and intercultural expert) interacting on equal terms. Finally, four approaches for trainers' conduct of talk are introduced to foster intercultural competences.

Henning Hinderer highlights the cultural complexities of intercultural technical projects across organizations. He shows how the incorporation of external consultants into a technical project multiplies cultural complexity and suggests a model of how to con-

ceptualize this condition. The author identifies processes of identity-making and othering as crucial constituting factors of intercultural engineering across organizations. He suggests strengthening the position of hybrid individuals who are between professional or organizational cultures to utilize their integrative potential as intercultural boundary-spanners. Project managers are encouraged to incorporate cultural complexity into their activities. Adding to the interpretative understanding of intercultural engineering,

Jasmin Mahadevan and *Christian Klinke* propose analyzing failure and success stories in technical project management. Based on a long-term interpretative study, they show that project reality does not exist as such but is constantly created through stories of project success and failure. They identify three, interrelated types of stories and show when and how intercultural conflict and culturalized interpretations impact the development of intercultural competencies and neglect the complexities of project reality. To overcome these obstacles, they give recommendations to academics and practitioners from various fields.

What these articles have in common, is an interpretative approach to specific intercultural settings between social reality and technology. One of their aims is to deconstruct reified national cultural containers and to facilitate a dialogue between such diverse fields as engineering, management and intercultural communication. For doing so, one article concerns the education of future intercultural engineers, another focuses upon intercultural training practice. One article highlights the construction of culture amongst technical management while two other articles conceptualize the complexities of intercultural engineering in technical projects across societal cultures and organizations.

The articles presented in this Special Issue outline the field of Intercultural Engineering, this being an academic first. They bring about new thoughts and ideas to empirical research and theoretical approaches in this field and intend to

stimulate further debates, research and discussion. You are now welcomed to read on and be stimulated to move the discussion forward, in a constructive, intercultural and controversial way.

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