DESIGNING A METHOD FOR IMPROVED (DISTRIBUTED) CULTURAL UNDERSTANDING – THE CULTURAL DIMENSIONS THINKING CAPS

Annika Bastian[1], Paula Restrepo Cadavid[1], Raphael Grau[1] and Albert Albers[1]
[1]Karlsruhe Institute of Technology (KIT) – Institute of Product Engineering (IPEK)

ABSTRACT
Designing a method, that assists culturally diverse and distributed development teams in better understanding each other's perspectives and, therefore, improving their creative output and collaboration is the goal of this contribution. To do so, the research on cultural theories and different creativity methods that engage communication have been analyzed. Thereafter, a method has been designed combining interactive elements that engage creativity with the content of what lies behind cultural differences. The method uses Hofstede's Cultural Dimensions as a theoretical basis and De Bono's six thinking hats as a practical basis to reach its goal and therefore successfully support multicultural distributed development teams in solving problems creatively.

1   INTRODUCTION

As businesses expand globally, the prevalence of distributed teams in product development has increased. The increased complexity of products requires a variety of skills and disciplines to meet the demands of these future products [1, 2]. Product development is a creative act leading to the creation of innovative products. Creativity in this context is defined by originality and appropriateness [3]. With team members spread across different regions and countries, the cultural impact on creativity has become a critical factor. Culture influences how individuals think, communicate, and solve problems, all of which can affect the creativity of distributed teams [4–10].

One significant way culture impacts creativity is through communication. While some cultures emphasize direct and assertive communication, others favor indirect and implicit styles. These differences can cause misunderstandings and hinder creativity when team members from diverse cultural backgrounds work together. For instance, a team member from a culture that values direct communication may become frustrated with a colleague who communicates indirectly, leading to collaboration difficulties and a reduction of creative ideas. On the other hand, a colleague who is used to indirect communication might be hurt by direct criticism and might not be able to see it objectively even if it was meant that way. This emotional involvement might again lead to emotions getting in the way of being creative. [4–6, 9, 11]

This circumstance calls for a specific support combining these aspects: designing a method that improves cultural understanding and works in a distributed setting. Developing such a method is the overarching goal of this contribution.

2   STATE OF THE ART

2.1 Distributed Product Development

Even though product development is a widely studied and relevant topic, there is no uniform definition in the literature; Many different definitions and approaches exist. Blessing and Chakrabarti [12] state that product development is a complex, multifaceted, and dynamic phenomenon in an organization's micro and macro context. This phenomenon involves people, a product under development, related processes, knowledge, methods, and tools. Furthermore, Albers and Gausemeier [13] complement the definition of product development by stating that it can be seen as a stage within a broader context,

including activities such as product creation, strategic planning, production system planning, and production of the finished product. Bavendiek et al. [14] note that the development of increasingly complex products requires the collaboration of experts, some of whom might be available only in different locations [15]. The definition of distributed product development in this contribution includes three aspects: the spatial separation (organizational or temporal) of at least one team member, the need to use communication technologies, and collaboration that takes place either synchronously or asynchronously [16–18].

2.2 Influences on Creativity in Distributed Product Development

Creativity and collaboration are two elements that enable teams to successfully work together and achieve their goals [19]. Creativity refers to a process either in the brain or shared that results in something that can be considered new and useful in some point of time [20]. This importance extends beyond teams working in a distributed setting; collaboration and creativity pose unique challenges for distributed teams. Research indicates that working together tends to be more seamless when teams are in the same physical space than when not [21]. In particular, creative processes may be perceived as challenging in virtual teams [22]. Brucks and Levav also examined the influence of different modes of communication (virtual or face-to-face) on creativity [23]. They concluded that face-to-face meetings lead to better idea generation, indicating that communication and personal human interaction significantly influence creativity. Nevertheless, the quality of the ideas and the decision of which idea to pursue may be independent of the mode of collaboration, whether face-to-face or distributed [23]. This finding is attributed to differences in the amount of information conveyed through screens compared to face-to-face communication and a narrowed visual focus that makes branching out and generating new ideas more challenging in a virtual setting. The necessity for support of creativity is further substantiated by Dühr [17], who asserts that creative teamwork, an essential component of the product development process, requires specific assistance in a distributed setting.

2.3 Cultural Influence on Creativity in Distributed Product Development

Culturally diverse teams possess a unique ability to generate innovative and high-quality solutions due to the range of perspectives, experiences, and approaches they contribute. This blend of different viewpoints frequently results in fresh insights and creative problem-solving strategies. However, it is essential to acknowledge that these teams are also more likely to encounter challenges in collaboration. Cultural norms, communication styles, and implicit assumptions can cause misunderstandings or friction within the team. Thus, while the potential for enhanced creativity and quality is significant, culturally diverse teams must implement strategies for effective communication, mutual understanding, and collaborative synergy to fully realize their collective potential [24].

In essence, culture functions both to integrate and differentiate. Individuals within a particular cultural background find a sense of identity and purpose through cultural norms that offer behavioral guidelines and a framework for interaction. Conversely, those outside this cultural framework might find certain attributes unfamiliar or requiring adaptation. These attributes can be limiting if they do not align with their cultural concept, potentially leading to disengagement from a system with unshared or divergent cultural distinctions [25].

Creativity can be supported through many methods, one of them being the Six-Thinking-Hats by De Bono [26]. This method is introduced in more detail since it is used as basis in the method design. This method facilitates switching the point of view to analyze a problem from multiple perspectives. Participants adopt a specific perspective represented by a hat in a specific color to collaboratively generate ideas before transitioning to a different viewpoint with the next hat [27]. As a decision-making and creativity method, each "hat" symbolizes a distinct perspective or cognitive style: white for objective facts and information, red for emotions and feelings, black for critical analysis and identifying potential issues, yellow for optimism and benefits, green for creativity and innovation, and blue for overseeing the thinking process [26].

To understand culture in more detail Hofstede's cultural dimensions can be used. Since Hofstede's theory still has the broadest data baseline up until today and is widely accepted and used his theory is used as another basis for the method design in this contribution and therefore introduced in more detail here [28–31]. The model has five cultural dimensions: Power Distance Index, Individualism vs.

Collectivism, Masculinity vs. Femininity, Uncertainty Avoidance Index, and Long-Term vs. Short-Term Orientation. Subsequently, Michael Minkov introduced a sixth dimension, Indulgence vs. Restraint [32]. This model's goal is to help understand cultural differences, enhance intercultural communication, and design communication strategies. It is used for managing culturally diverse teams and understanding the influence of culture on work dynamics and business practices. Additionally, it provides a foundation for academic research, facilitating empirical studies and intercultural training programs [28–31]. Each dimension offers insights into specific aspects of a culture's value system. The Power Distance Index measures the level to which less powerful members of a team accept and expect unequal power distribution [33]. Individualism vs. Collectivism evaluates whether individuals prefer a loose social framework, where they are expected to care for their closest family, or a tighter framework, where individuals look out for a broader circle of people [34]. Masculinity vs. Femininity reflects the distribution of gender roles, with masculine societies focused on competition and success, whereas feminine societies prioritize caring for others and enjoying a quality life. The Uncertainty Avoidance Index measures the tolerance for uncertainty and ambiguity, indicating how comfortable one feels in unstructured situations. Long-Term vs. Short-Term Orientation relates to the focus of people's efforts, whether on future benefits (long-term) or current benefits (short-term). Indulgence vs. Restraint assesses the degree to which free gratification of basic and natural human desires related to enjoying life and having fun is granted, as opposed to suppressing gratification and regulating it through strict social norms [29, 32].

3 METHODOLOGICAL APPROACH

The subordinate goal of this contribution is to design a method, that assists culturally diverse and distributed teams in better understanding each other's perspectives and, therefore, improving their creative output and collaboration.

To do so, the research on cultural theories and different creativity methods that engage communication have been analyzed. With this knowledge at hand, a method has been designed combining interactive elements that engage creativity with the content of what lies behind cultural differences. To accomplish this, the following research questions have been raised:

- RQ1: How can the knowledge of cultural differences be communicated without exposing oneself?
- RQ2: Which creativity method can be used to build the basis for creative discussions but can still be applied in an acceptable way for different cultures?
- RQ3: How can a method be designed that integrates changing cultural perspectives and engaging in creative discussions in a culturally appropriate way?
- RQ4: How can such a method be visually supported to assist the team in the application process?

4 RESULTS

The Cultural Dimensions Thinking Caps Method is designed to facilitate a shift in perspectives among team members. It seeks to transcend the limitation of individual viewpoints by encouraging members to consider issues from their standpoint and adopt and understand the perspectives of their peers. The method consists of three blocks: Cultural Dimensions (based on [29]); the Cultural Dimensions Thinking Caps (based on [29] and the Six Thinking Hats by [26]); and Discussion and Consolidation of the Cultural Dimensions Thinking Caps, two explanation activities and a discussion activity, respectively. The recommended duration of the whole method is 50 minutes or more to gain an understanding of Hofstede's Cultural Dimensions and the introduced Cultural Dimensions Thinking Caps and then properly discuss a chosen topic on the team's collaboration (fundamental topics like "communication within the team" or "punctuality in the team") from different perspectives. The duration depends on the team's size and the number of cultural dimensions represented by the team members.

4.1 Design of the Method

First, the Cultural Dimension Thinking Caps starts by introducing the six cultural dimensions defined by Hofstede [29]. Flexibility is provided here by only introducing the dimensions that should be used for discussion in the next step. The moderator can select dimensions that are specifically relevant based on the cultures represented by the team members or based on observation of the team prior to the workshop. If hierarchical structures concern the team, looking at the dimension of masculinity versus

femininity could be most relevant. This explanatory block and the following one form the foundational section of the method, which is essential for understanding and successfully applying it.

To avoid overgeneralization and the potential for stereotyping, the approach strategically avoids focusing on specific cultures identified by region or nation. Instead, the method is structured around Hofstede's Cultural Dimensions [29, 32, 35], a model recognized and respected in academic and applied settings [36]. Hofstede's framework was chosen for its clarity and ease of understanding, making it accessible to a broad audience [36]. To ensure clarity for those unfamiliar with Hofstede's work, the term Cultural Dimensions is used predominantly, with a reference to Hofstede provided at the beginning of the block.

Each cultural dimension is described clearly and concisely for quick and efficient learning. The use of colors and pictograms to represent the extremes of each dimension enhances the overall comprehensibility for the user. It allows dimensions to be more easily identified in the method application, especially if used as part of the entirety of the Cultural Synergy Spectrum method. This section concludes with an overview that includes descriptions of each cultural dimension, its extremes, and an explanation of the colors and pictograms chosen.

Table 1 illustrates the detailed description of each cultural dimension, along with its extremes, their descriptions, the chosen color, and the pictogram.

Table 1. Detailed description of the cultural dimensions Power Distance and Individualism vs. Collectivism based on [32]

Cultural Dimension	Power Distance		Individualism vs. Collectivism	
Description	This dimension is about how people view power and authority. In some cultures, it is normal for bosses to have much power and for everyone else to follow orders. In other cultures, people like everyone to have a say and be more equal.		This dimension is about whether people think doing things independently or as a group is more important. In some places, people focus on their own goals, while group or family goals are more important in others.	
Extremes	High	Low	Individualistic	Collectivistic
Description Extremes	People accept a hierarchical order without much question.	People prefer equality and challenge authority more readily.	Individualistic societies prioritize individual goals and rights.	Collectivistic societies emphasize group cohesion, loyalty, and collective well-being.
Color	Royal blue represents dignity, intelligence, and authority.	Light blue symbolizes openness, tranquility, and equality.	Red is a color of strength, passion, and boldness.	Green denotes community, growth, and harmony.
Pictogram	Crown	Handshake	Single Person	Two People

Table 2. Detailed description of the cultural dimensions Masculinity vs. Femininity and Uncertainty Avoidance based on [32]

Cultural Dimension	Masculinity vs. Femininity		Uncertainty Avoidance	
Description	This dimension is not about men and women but what a culture thinks is important. Some places value being the best and winning, while others care more about everyone getting along and being happy.		How comfortable people feel with uncertain or unknown things. Some cultures do not like surprises and prefer clear rules, while others are okay with taking things as they come and being more flexible.	
Extremes	Masculinity	Femininity	High	Low

Description Extremes	Societies with masculine values prefer achievement, heroism, assertiveness, and material rewards for success.	Societies with feminine values prefer cooperation, modesty, caring for the weak, and quality of life.	High Uncertainty Avoidance cultures try to minimize such situations by strict laws and rules.	Low Uncertainty Avoidance cultures accept differing thoughts or ideas more.
Color	Black conveys power, sophistication, and formality.	Light Purple represents care, compassion, and empathy.	Dark Grey symbolizes caution and formality.	Light Blue, suggesting calmness and flexibility.
Pictogram	Flexed Biceps	Tulip	Lock	Wave

Table 3. Detailed description of the cultural dimensions Long-/Short-Term Orientation and Indulgence vs. Restraint based on [32]

Cultural Dimension	Long-/Short-Term Orientation		Indulgence vs. Restraint	
Description	People's attitude toward the future or the present. Some cultures often plan for the long term and think about the future, while others focus more on the present and keep traditions.		This dimension is about whether people in a culture like to enjoy life and have fun freely or think it is better to control and limit these things. Some places are more about having fun and relaxing, while others believe in being stricter and more controlled.	
Extremes	Long-Term	Short-Term	Indulgence	Restraint
Description Extremes	Cultures with a long-term orientation are more pragmatic, modest, and future-oriented.	Cultures with a short-term orientation are more normative, respect traditions, and focus on quick results.	Cultures classified under indulgence generally allow relatively free gratification of basic and natural human desires related to enjoying life and having fun.	A society that suppresses gratification of needs and regulates it using strict social norms.
Color	Yellow indicates optimism and enlightenment.	Light Brown denotes practicality and reliability.	Bright Orange is vibrant and energetic.	Cool Blue reflects self-control and responsibility
Pictogram	Star	Hourglass	Party Popper	Person in Lotus Position

4.2 Application

After the theoretical segment of this method, users engage in a perspective-shifting activity block. The primary objective of this block is to facilitate a dynamic exchange of viewpoints, enabling users to articulate their perspectives and to understand and engage with the perspectives of other team members. The structure of this block is as follows: First, users select the Cultural Dimension Caps that reflect the diverse composition of the team. This selection sets the stage for a multifaceted discussion on a single topic central to team collaboration. A pre-selection of caps can increase efficiency in time management, especially when time is of the essence.

The range of potential discussion topics includes but is not limited to, strategies for meeting deadlines, effective teamwork and task delegation, setting and achieving goals, maintaining morale, and methods for resolving misunderstandings or conflicts.

A unique feature of this discussion is its structured format. The discussion begins from the perspective of the first Cap selected and continues for a predetermined period of time. At the end of this period, the discussion transitions seamlessly to the perspective of the next Cap. This process is repeated until all perspectives represented by the selected Caps have been explored. After discussing each perspective, there is a consolidation phase where users document their learnings and insights from each perspective in the space provided in the template. This methodical approach ensures a comprehensive understanding and integration of different perspectives within the team.

4.3 Visualization

The Cultural Dimensions Thinking Caps method was implemented in Miro [37] as the interactive whiteboard makes the operationalization of all three blocks possible. The information needed to be displayed for the first block, the Cultural Dimensions (based on [29, 35]); the information needed to be displayed for the Cultural Dimensions Thinking Caps (based on Hofstede [29, 35] and the Six Thinking Hats by De Bono [26]) as well as the possibility to take notes for each participant in this second block; and the possibility to collect everybody's insights in Discussion and Consolidation of the Cultural Dimensions Thinking Caps. Figure 1 shows an excerpt of the visualization for the first block, the Cultural Dimensions.
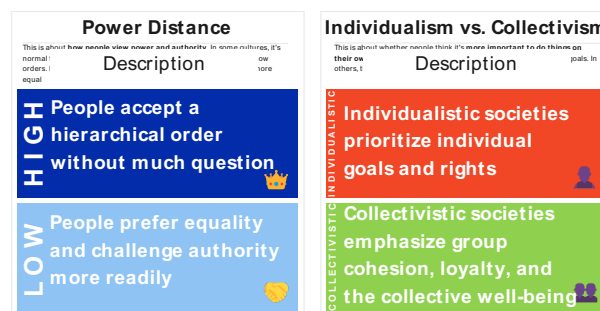

Figure 1. Excerpt from Hofstede's Cultural Dimensions - visualization of the first block within the Cultural Dimensions Thinking Caps

Figure 2 shows an excerpt of the visualization of the second block of the Cultural Dimensions Thinking Caps. The second block incorporates the information for each Cap; the excerpt shows the Caps for the two dimensions represented in Figure 1.

High Power Distance Cap The Hierarchical Cap	Low Power Distance Cap The Egalitarian Cap
Represents cultures with **structured levels of authority**. In these societies, **hierarchy is accepted** as part of the social order, and individuals are likely to **respect and follow** established **chains of command**	Symbolizes cultures that **value equality and minimal hierarchical differentiation**. These societies encourage **open communication and collaborative** decision-making **across all levels**
👑	🤝
Individualistic Cap The Autonomous Cap	**Collectivist Cap** The Communal Cap
Reflects cultures where **individual autonomy and personal achievements** are **highly valued**. These societies **prioritize personal goals** and the **independence** of individuals	Characterizes cultures that emphasize **group harmony and collective responsibility**. In these societies, the **needs and goals of the group** often take precedence **over individual desires**
👤	👥

Figure 2. Excerpt from the Cultural Dimensions Thinking Caps - visualization of the second block within the Cultural Dimensions Thinking Caps

Furthermore, this second block provides the possibility to take notes. Sticky notes can be taken from the so-called "Sticky note parking lot" at any time and used either anonymously or with name.

The visualization of the third block is again divided into the different Caps (see Figure 3). Insights and learnings generated when discussing in the viewpoint of a certain Cap can be directly noted in the respective card. The discussion takes place in smaller groups first, with different groups using different Caps. Afterward, the insights are collected by the entire group.

Learnings/Insights from the High Power Distance Cap	Learnings/Insights from the Low Power Distance Cap
☐ ☐ ☐ ☐ ☐ 👑	☐ ☐ ☐ ☐ ☐ 🤝
Learnings/Insights from the Individualistic Cap	Learnings/Insights from the Collectivistic Cap
☐ ☐ ☐ ☐ ☐ 👤	☐ ☐ ☐ ☐ ☐ 👥

Figure 3. Excerpt from the discussion and consolidation - visualization of the third block within the Cultural Dimensions Thinking Caps

5   DISCUSSION AND CONCLUSION

An initial validation was carried out while using the Cultural Dimensions Thinking Caps as part of the Cultural Synergy Spectrum Method [38]. Thus, the Cultural Dimensions Thinking Caps Method should be also validated individually. When the method is carried out within approximately 40 minutes of a method application workshop that is 120 minutes long, the feedback given is not only focused on the Cultural Dimensions Thinking Caps but on a lot more impressions. Therefore, applying only the Cultural Dimensions Thinking Caps and asking the participants for feedback directly on this method separately will help get more detailed impressions from the participants. An individual application is planned as a next step and is supposed to give insight into further improvement potential. Furthermore, there are other

options for communication about culture than using the Cultural Dimensions by Hofstede [29]. It has been used as the basis for this contribution and the developed method because it is widely used and based on the broadest explorative study on cultural differences. Other creativity methods could have also been used to engage the team in creative exchange.

The use of Miro as the tool to assist in the method execution might also not be optimal for every team. It is to be validated again in different settings to see if this tool is suitable for a multitude of teams or if it might be restricted to users who are familiar with such digital tools.

The first research question, how to communicate cultural differences, was answered by implementing Hofstede's six cultural dimensions in their opposing characterization as perspectives to be taken when discussing a problem. The resulting twelve options are formulated in the thinking Caps. A fundamental topic such as "communication within the team" or "punctuality in the team" can be discussed using the different Caps. The participants are divided into groups, and each group takes one of the twelve Thinking Caps and discusses the problem from that perspective. The findings are then consolidated. The way the discussion is led is based on De Bono's [26] Six Thinking Hats, which answers the second research question. The group is divided into different sub-groups that "wear" pre-selected Cultural Thinking Caps. A facilitator can make the selection in advance. To accommodate different communication styles, ideas for the Cap's perspective on the fundamental topic can first be written down silently and anonymously. Those who wish to participate in a discussion from their perspective can then do so. At the end of the discussion, the sub-group takes a different Cap, i.e., a different characterization of a cultural dimension, and starts again with the silent generation of ideas on the fundamental topic from this perspective. The time needed for this activity can be adjusted by changing the size of the sub-groups and the number of Caps each subgroup takes. The whole group then collect the insights gathered on the fundamental topic from the different perspectives.

The third research question is answered by systematically combining the elements of the first two research questions. And finally, one way to visually support the method is to use the Miro whiteboard which worked well in this initial validation but has been critically discussed for future applications.

Since the method has only been validated in the context of applying a broader method, the next step is to validate the Cultural Dimensions Thinking Caps individually with different culturally diverse and distributed teams.

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