



MASTER THESIS

**MISCOMMUNICATIONS ON IT
PROJECTS: A CASE STUDY OF THE
EFFECT OF USER'S AND
DEVELOPER'S CULTURAL
BACKGROUND**

Master Communication Science

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Abstract

To satisfy the increasingly complex needs of users, companies have developed multidisciplinary teams to integrate the knowledge of different fields into technology development. Participatory design has grown in the last years as a form of multidisciplinary team collaboration. Born as a method to involve the user in the design process, it has proven a valuable tool for ensuring user satisfaction. However, the miscommunications among the users and developers may diminish its advantages. Among the reasons behind communication flaws, culture is an essential factor that has not been considered in the existing literature about user-developer interactions, although it is a recurring issue among international organisations. Therefore, this research aims to study the influence cultural background has on the miscommunications between users and developers. To do so, qualitative and quantitative studies have been used to collect data during an academic project part of the Bachelor of Communication Science, where students had to deliver a virtual reality environment with the help of developers. In addition to filling out a survey, the participants were interviewed twice during the project. The results show that cultural traits like leadership, disagreement and persuasion were fundamental but not predominant to explain the miscommunications. Our analysis concludes that culture, together with context and personality traits, are essential factors in understanding the challenges of user-developer interaction. Therefore, cross-cultural management should be considered a richer field merging with team management to address the future of technology development.

Keywords

Multidisciplinary teams, participatory design, culture, cross-cultural management, software development.

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1 Introduction

Globalisation has enhanced collaboration across countries in various disciplines and fields. Online or face-to-face, communication among individuals from opposite parts of the world occurs daily, enriching the diversity of interactions and approaching perspectives, cultures, and people. However, it does not come without challenges. Several authors have discussed globalisation's positive and negative economic and societal consequences (Fortanier et al., 2012). Hence as communication across countries becomes accessible, understanding the underlying meaning of the message exchange gets more challenging.

However, the translation of meaning is a challenge even for people from the same culture. Especially in multidisciplinary teams, diversity of backgrounds leads to different communication tools, which in some cases may cause inefficient communication (Kim et al., 2015). Cultural differences are an additional challenge to the already complex context of collaborative teams, which often are overlooked or not easily identifiable.

Ken Liu said, "Communication is a miracle of translation" (2016), and he certainly was right. Decoding information can be challenging. When interpreting a message, the personality traits of both the sender and the receiver play a significant role. Successful communication lies partly in understanding these unique individual differences (Meyer, 2014a). However, this could not be enough when translating meaning in an international context. Cultural patterns are also essential to ensure a successful understanding and are often forgotten. Failing to consider cultural differences significant could impact personal and work relationships, especially if you are unfamiliar with the person you interact with. These invisible barriers are sometimes hard to detect in an organisation, and decoding them is a challenge many companies must face as globalisation transforms the perception of work (Meyer, 2014a).

Multicultural teams are increasing to address the complexity of global markets and coordinate companies internationally (Janssens & Brett, 2006). Furthermore, the globalisation of the economy makes diverse cultural teams inevitable and harnessing its full potential, an urgent requirement (Distefano & Maznevski, 2000). However, the strategies to do it effectively remain unclear (Schalk & Curşeu, 2010). One of the consequences of unsuccessful cooperation within international organisations is miscommunication. This issue is mainly present in areas where cooperation and communication are essential. IT projects fall into this category, as cooperation among members in charge of developing technology updates is required to guarantee success (Xu & Xu, 2011). Furthermore, cooperation in multicultural teams is even more challenging when actors with different backgrounds and roles are involved in the development process, as in multidisciplinary teams.

In particular, the involvement of end-users in the development process presents challenges in collaborative teams. Although having the user perception about technology can enable user acceptance, the incorrect management of this involvement could diminish its advantages (Gallivan & Keil, 2003). Mainly because the methods for designing technology have and are still evolving towards participatory design (Sanders et al., 2013), putting the users' role more and more into centre stage. In this discipline, users are seen as co-creators (Sanders, 2008) and, therefore, active members of the design process. On the one hand, involving the end-user in the development has many benefits. For example, developing more precise requirements in the software avoids unnecessary and often expensive features, ultimately increasing the software's quality (Abelein & Paech, 2013). Additionally, considering users' perception of the technology facilitates a more effective use (Abelein & Paech, 2013; Hunton & Beeler, 1997). On the other hand, user participation (UP) in IT projects is not a guarantee of success. Ineffective communication can nullify the benefits of user involvement (Gallivan & Keil, 2003), among other factors.

There is extended literature on improving communication in IT projects (Abelein & Paech, 2014, 2012, 2013; Gallivan & Keil, 2003; Xu & Xu, 2011). However, these recommendations or models do not consider cultural context as a source of miscommunication. Furthermore, the current literature about cross-cultural management (Janssens & Brett, 2006; Meyer, 2014a; Pauliene et al., 2019; Sørderberg & Holden, 2002) focuses on the business side of managing or the relationships between members of the team, but not in the interactions between developers and users.

This research aims to fill this gap in the literature, studying the miscommunications on user-centred IT development projects within a multicultural team. To achieve this goal, this study answers the research question; *Q1: How does the user's and developer's cultural background influence the miscommunications between them?*. Furthermore, as several cultural traits were analysed, the following sub-question is answered, *Q1.1: To what extent are some cultural traits more influential than others on the miscommunications between users and developers?*.

The data collection was carried out during a project of the BMS laboratory at the University of Twente, a multicultural and multidisciplinary organisation aiming to address societal challenges using technology. The study aims to better understand the interactions in multidisciplinary, multicultural teams, providing practical advice on dealing with miscommunications. Therefore, favouring knowledge sharing, which consequently will enhance development processes and increase users' satisfaction.

In the next section, the information presented as background for the research justifies the research question introduced at the end of the chapter. After the methods used are explained, the results found during data collection are detailed and further interpreted in the discussion section. Finally, the paper concludes with the theoretical and practical implications, followed by the limitations and future research advice.

2 Theoretical framework

This section starts acknowledging the challenges multidisciplinary teams faced in knowledge sharing. Furthermore, as part of this multidisciplinary teams, co-designing methods with users are introduced, including the type of users and their different levels of involvement. Also, the life cycle of an IT project will be explained, followed by the miscommunications that may arise when the user is involved in this process. Next, the differences in cultural perceptions and how they could affect the IT development process are introduced. Finally, based on this information, the research question is presented.

2.1 Collaboration in multidisciplinary teams

In the last 15 years, the value of products has shifted from prioritizing their functionality to representing the values and personality of the user (Kleinsmann et al., 2010). The change in customer needs has necessarily increased the complexity of the products to adequate them to the higher demands of customers (Garcia & Calantone, 2002). Furthermore, the globalised market favours a higher number of competitors that must constantly adapt to the new technology developments. To satisfy these needs, collaboration across disciplines to integrate their knowledge is required to ensure user satisfaction (Garcia & Calantone, 2002; Olson et al., 2001).

However, knowledge integration is often challenged by the diverse backgrounds and perspectives of the individuals involved in developing a product (Bucciarelli, 1996). In addition, the different languages used and perceptions of the design process, often prevent the mutual understanding of the actors involved (Kleinsmann et al., 2010). Nevertheless, this shared understanding is crucial to ensuring the quality of the final product (Kleinsmann et al., 2010), making effective communication a central element of multidisciplinary teams (Bucciarelli, 1996).

Co-designing with users is part of multidisciplinary collaboration, as, during this interaction, two parties with different backgrounds are involved in the development process. However, in addition to the communication misunderstanding that may occur in a regular multidisciplinary team, users are not as familiar with the design process as other stakeholders present in the process. The lack of a common starting point may add uncertainty to the development of the products, preventing mutual understanding.

The role of the users is becoming more relevant to technology development, but so are the challenges that come with it (Gallivan & Keil, 2003). Among them, cultural misunderstandings are often an overlooked reason behind the miscommunications between both parties. This paper will focus on addressing the miscommunications among users and developers and identify the role cultural backgrounds play on them, all of it in the context of multidisciplinary teams' collaboration.

2.2 Design with users

Co-designing or designing with the users is a growing field. New tools and methods are arising to support the idea of designing for a target audience and in addition, designing with a representative sample of this target audience. As a consequence, the development and implementation of technology is conscious, addressing real issues and preventing new problems from arising. Developers focus on designing systems and products with the user, driven by the idea that end-users are the authority on their future (Sanders & Stappers, 2014). Users' needs drive technology design, and innovation puts the user's mindset at the forefront.

The design field has become more interdisciplinary, and the figure of the designer has evolved, becoming the facilitators of others ideas, channelling their creativity into innovation (Sanders & Stappers, 2014). The users have in the design process a central role; not only their ideas are valued and considered, but they participate directly in the development process. However, their

involvement varies depending on the methodology approach chosen for design (Millerand & Baker, 2010).

In the field of software development, there are two main approaches for co-creating with users user-centred design and participatory design (Mirri et al., 2018). They differ on whether the user takes part in decision-making and, overall, how active it is the user's figure (Abelein & Paech, 2015; Kujala, 2003). User-centred design started as a method that prioritised usability and focused on users' needs rather than technical features (Gould & Lewis, 1985; Kujala, 2003). It is an iterative process where the designers focus on ensuring the application meets user needs, but the users do not necessarily have an active role in it (Mirri et al., 2018). Participatory design originated later in Scandinavian countries, aims for close collaboration with the users and deeply involves them in decision-making. Democracy and skill enhancement play an essential role in this approach, developing applications that are more conscious of human needs. (Kujala, 2003; Mirri et al., 2018).

As seen, user involvement varies depending on who, where and how the co-designing strategies are implemented. Therefore, it is essential to define user participation in this research and distinguish between user involvement. User participation is defined as the "behaviours and activities users perform in the system development process" (Abelein & Paech, 2014, p. 96). In contrast, user involvement relates to the personal importance and relevance of the system to the user (Barki & Hartwick, 1994). In conclusion, the user-developer communication process is a form of user participation and could be defined as all the interactions between users and developers, such as evaluation, communication and approval of activities (Abelein & Paech, 2014; Barki & Hartwick, 1994).

2.2.1 IT development methods

In addition to the user participation approaches seen, several methods exist in system development that involve users in their stages. According to Hughes and Cotterell (2002), there are seven stages on a classic IT project:

- *Requirement analysis:* At this stage, user requirements for the project are figured out.
- *Specification:* Generation of the specific documentation for the proposed system.
- *Design:* The desired product is developed according to the needs of the users.
- *Coding:* Writing the code for the design to work.
- *Verification & validation:* Check if the developed software meets user requirements through testing.
- *Implementation/installation:* After the software is developed, the system is installed; this stage involves the set-up of the data files and systems parameters, the development of the user manuals and introducing the users to the new systems.
- *Maintenance and support:* The last stage involves correcting any errors or improving the systems.

However, these stages have evolved and adapted to the needs of nowadays systems and the user's involvement in the system development processes, resulting in three methods: traditional development approaches, rapid application development, and agile or lightweight development. The traditional development process, like the waterfall model, focuses on elaborating a detailed requirement list before moving on to design and implementation (Isomäki & Pekkola, 2011). Users role is not predominant, as mainly are involved only in the requirements and, later on, the validation phase (Abelein & Paech, 2015). Rapid application development is characterised by a short cycle that involves four phases: requirement, design, coding, and cutover. Users are usually involved in the design and development phase. Finally, agile development increases the system

life cycles through constant iteration of the process and increases the stakeholders' involvement; end-users feedback is required through the whole process (Abelein & Paech, 2015).

IT projects can develop on a large and a smaller scale. Some authors have suggested that the users' participation has only a significant impact, and therefore contribution, on large scale IT projects. According to them, on small IT projects, the impact of the User Participations is limited to feature suggestions (Zhao & Elbaum, 2003). However, According to Harris & Weistroffer (2009) The impact of user participation increases with the complexity of the project rather than its size, and IT projects can be challenging regardless of the project's size.

2.2.2 UP is not equal to success

User participation and its contribution to system development have been widely researched in the literature. Even in the early days of system design, the role of the users was important to increase usability (Gould & Lewis, 1985). Nevertheless, these ideas were criticised by authors who showed doubts about user participation's positive impact on system success (Cavaye, 1995; Gould & Lewis, 1985; M. H. Olson & Ives, 1981). However, recently, most authors agreed on the importance of user contribution for system success (Harris & Weistroffer, 2009). System success occurs when the goals of the information technology project have been achieved (Abelein & Paech, 2015). The increasing complexity of technology, compared to years ago, may be the reason why systems benefit more nowadays from user engagement (Harris & Weistroffer, 2009).

The benefits of UP in systems development are extended. Among them are an increase in the quality of the system due to precise requirements and convenient features, a rise in the level of user acceptance due to the higher involvement of the user, and higher effective use of the system (Abelein & Paech, 2015; Harris & Weistroffer, 2009). As seen, user participation is the key to success in system development. However, the benefits of this contribution may be diminished by ineffective communication between users and developers (Gallivan & Keil, 2003). Even if user participation is encouraged in all the stages of the development processes and the users' requirements are addressed, the resulting system may not fulfil users' needs.

For example, in Gallivan & Keil (2003) case study, the developers addressed the requested user problems of the system, but the system, in the end, was not successful. Although some technical issues mentioned by users were fixed, the critical system barriers were not overcome: a lack of incentives and technology fit to use the system. Moreover, during the development process, these critical barriers were not mentioned by users nor detected by developers, despite some users being aware of them. This lack of understanding caused communications gaps resulting in an unsuccessful system and low user engagement.

The case study mentioned above is one of the many that underlines the need to focus on the translation process from users, through developers, to system requirements. Several examples in the literature detect this gap in communication as the main issue to ensure system success (Abelein & Paech, 2012; Bjarnason et al., 2011). The result of ineffective communication is the misunderstanding of requirements, leading to improvised changes and increased development and implementation costs as a consequence (Abelein & Paech, 2014). Therefore, developing suitable conditions to allow user influence is essential to leverage user participation benefits (Gallivan & Keil, 2003).

In addition to translation problems, the barrier of culture adds another layer of complexity to the challenge of mutual understanding. Transnational projects are becoming more popular as a way of reducing costs and, at the same time, adapting to the changing market of technology (Chevrier, 2003). The increase of cross-cultural teams due to globalization in several business contexts has led to extensive literature about cross-cultural management (Søderberg & Holden, 2002).

However, this literature often emphasises on the stakeholders of international teams, failing to consider the role users may play in the development process.

On the other hand, the models, communication requirements and recommendations present in the literature to address the miscommunications gaps between users and developers focus on incentives for user involvement, the development of transparent, simple information of the developers towards the user and guidelines for user developer coordination. (Abelein & Paech, 2014, 2015, 2012, 2013; Bjarnason et al., 2011; Gallivan & Keil, 2003). But the cultural context of the actors involved is not considered a cause of translation problems. However, several studies support the idea that ineffective management of cultural differences could lead to process losses (Janssens & Brett, 2006). Therefore, we consider cultural traits to have an essential role in the miscommunication among users and developers and identifying when and how cultural context plays a role is crucial for enhancing the co-creation methods for software development.

2.3 Culture models

Culture can be defined as the norms and beliefs that define a group or society and shape the interactions and activities within the members of this society (Distefano & Maznevski, 2000). Culture has been extensively studied across the literature, It is a collective phenomenon that many authors intend to explain in the form of dimensions (Hofstede, 2011). One of the first approaches was made by Inkeles and Levinson (1969), who developed three standard analytic issues based on the existing literature about national character. The three categories were, relation to authority, the conception of self, and main dilemmas and how to deal with them. Later, Hofstede (2001) proved this theory empirically and extended it, developing the six dimensions of culture.

- *Power distance*: relate to the perception of inequality and distribution of power.
- *Uncertainty Avoidance*: relate to the level of comfort facing an unfamiliar or ambiguous situation.
- *Individualism versus Collectivism*: relate to the preference for social responsibility that primes in societies. Societies with low responsibility towards their members, or in contrast, societies with high responsibility and loyalty towards their members.
- *Masculinity versus Femininity*: relate to the preference to align with either women's or men's emotional roles.
- *Long term versus short term orientation*: relates to the preference on focusing on the present or the future when making choices.
- *Indulgence versus restrain*: relates to choosing to enjoy or control the pleasures of life.

Hofstede's ideas were based on the conception of the human mindset as unique and shared with others (Hofstede, 2001). These unique and shared values form the individual and could somewhat predict human behaviour. However, the levels within this mental configuration have blurred frontiers, especially as they grow in uniqueness. Three levels broadly shape the mental configuration of an individual. The universal level is the most basic and shared by most of humankind and shapes biological aspects of the human body. It follows the collective level, which is shared only between members of the same group. Culture belongs to this level and includes language and the perceptions of interactions with the environment. Finally, the individual level is where the personality traits come from, and is the unique part that allows diverse behaviours even within the same collective level (Hofstede, 2001).

The frontier between the collective level and individual is blurred. It is challenging to distinguish individuals' behaviours from those inherited by culture and the other way around. Furthermore, literature has different opinions regarding which aspects relate to the universal human phenomena and which traits are specific to culture (Hofstede, 2001). The difficulty to set a sharp distinction between individual and collective levels underlines the fact that making assumptions about an

individual behaviour due to its cultural background without taking into account personal individual characteristics is a mistake (Meyer, 2014a). Every individual is unique and should be treated as so. Moreover, culture shapes the way we perceive the world and failing to consider the cultural context in international interactions could lead to unfortunate judgments based on the cultural lens an individual has been raised with. These preliminary ideas can lead to misunderstandings, mistaking the real meaning of the message (Meyer, 2014a).

Furthermore, Hall (1976) developed a specific communication orientated theory regarding culture. The theoretical background for it was that individuals create meaning through a combination of information and elements inherited by their culture-specific context. Consequently, Hall divided cultures according to the degree of shared context used in communication. High-context cultures send messages with essential information, as most of it is shared with the pre-program code of the receiver. On the other hand, in Low-context cultures, there is not much pre-program shared information; therefore, the message must be complete to be understood by the receiver.

An extent of Hofstede's theory is the model presented by Meyer (Meyer, 2014a). This model considers eight scales that define national culture. Through these scales Meyer explained how cultural traits play a role in international business organizations. Some relate to Hofstede's dimensions, while others are influenced by Hall's theory or based on research made by Meyer. The eight scales are the following.

- *Communication*: Low-context vs. High-context
- *Evaluating*: Direct negative feedback vs. Indirect negative feedback
- *Persuading*: Principles-first vs. Application first
- *Leading*: Egalitarian vs. Hierarchical
- *Deciding*: Consensual vs. Top-down
- *Trusting*: Task-based vs. Relationship-based
- *Disagreeing*: Confrontational vs. Avoid confrontation
- *Scheduling*: Linear-time vs. Flexible time

Across the literature, the work related to culture management typically addresses culture in terms of national differences (Connaughton & Shuffler, 2007). Like is the case for the authors presented in this section (Hall, 1976; Hofstede, 2001; Meyer, 2014a; Trompenaars & Hampden-Turner, 2020). These studies are mainly based on Hofstede's dimensions, their focus in national culture may limit some aspects of cultural dynamics. For example, Hofstede's model may fail to represent the continuously on-the-move contemporary societies (Connaughton & Shuffler, 2007). This statement extends to Meyer's scales (2014a) based on national differences.

Moreover, Kittler (2011) revealed the lack of empirical support for Hall's theory. Consequently, they claimed that most of the works related to high-context and low-context classification are based on inadequate evidence. Which includes Meyer's work (2014a) who incorporates Hall's theory as part of the communication scale. Despite criticism related to the national distinction of cultural traits, Hofstede's work, especially the individualism versus collectivism dimension, has been proven helpful for cross-cultural teams research (Connaughton & Shuffler, 2007).

However, Hofstede's dimensions are limited for the aim of this study. Although, he developed a version of his theory that applied to organisations (Hofstede, 2001). These dimensions relate to organisational culture rather than individuals' behaviour within organisations. On the other hand, Meyer (2014a) presented dimensions that applied to individuals working in cross-cultural teams, which fits our research population. Furthermore, Hofstede's work is older and is based on 1972 data, societies, and as a consequence, cultural traits have swift from then. Meyer's work was published in 2014, and the data collected is up to date.

Moreover, other authors use Meyer's scales' theoretical background in their studies. For example, Brett (2001) explains that decision-making is different in analytic thinking countries from those with a holistic culture. In addition, Canney Davison & Ward (1999) support that differences in power perception could prevent team members from suggesting ideas.

As seen, the scales are based on consolidated sources like Hofstede's and Hall's studies. In addition, they relate to the cultural traits present in the work environments of international organisations, and the theoretical background they are based on can be found in other cross-cultural management studies. Therefore, Meyer's work is a reliable source that fits our research scope and population and will be the base for the data collection.

2.3.1 Culture and teams

In a multicultural team, having members from different backgrounds and subsequent cultural differences is relevant for its performance. On the one hand, these cultural differences can limit the effective interaction of the teams (Distefano & Maznevski, 2000). Each culture has a distinctive predefined way of team performance and interaction. Often these values and norms are taken for granted by the members of each society; therefore, identifying and addressing them is a challenge for team smooth performance (Ali & Lai, 2021; Distefano & Maznevski, 2000; Janssens & Brett, 2006). On the other hand, these different values and norms that rule each culture provide diverse points of view, allowing teams to potentially create more excellent value (Distefano & Maznevski, 2000).

The challenges and advantages of multicultural team members can also be applied to user developer collaboration. For example, the cultural differences between them could prevent the users from understanding the real meaning of what the developer is trying to say. This is a reason for misinformation on the translation of meaning. Moreover, cultural differences could prevent the user from sending the information correctly to the developer. However, if managed right, cultural differences could allow the users to freely transmit their ideas and the developer to understand and channel these ideas into meaningful system success.

If process losses are prevented, multicultural collaboration benefits could be fully utilised (Janssens & Brett, 2006). Unfortunately, information-sharing deficits often cause process losses and, in some cases, political conflicts (Janssens & Brett, 2006). Ali & Lai (2021), in their review about global software development challenges and benefits, identified several factors which influence cross-cultural teams; the most mentioned ones in the literature are power perception, trust, perception of work, organisational culture, lack of cross-cultural guidance, lack of skills, lack or absence of communication. To face the challenges mentioned, communication across all the system development life cycle should be enhanced (Ali & Lai, 2021).

The common factors influenced by cross-cultural teams found by Ali & Lai (2021) answer to the model by Meyer (2014a). The leading scale explained the differences in power perception found by Ali & Ali (2021), each country answer different to the distribution of power depending on their hierarchical or egalitarian conception of power. Furthermore, the trust challenges relate to the task-based vs relationship-based. The lack of communication may be influenced by each individual's low-context or high context characteristics. Moreover, to end, the perception of work can be influenced by the evaluating, persuading, deciding, and disagreeing scales.

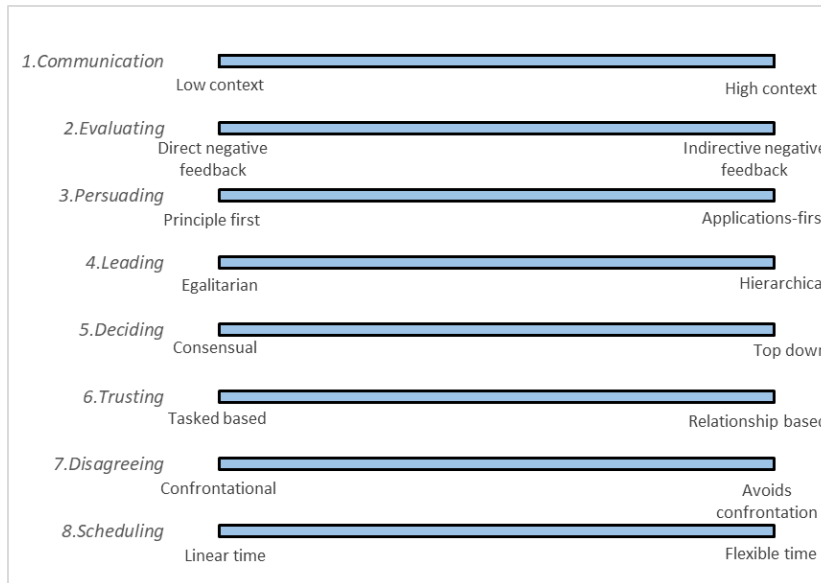
These scales are crucial to understanding cross-cultural team performance and can decode the interactions between users and developers. Allowing this research to investigate whether the communication gaps are related to cultural differences or not. The following section will explain these scales further as the data collection process is based on this model.

2.3.2 The Culture Map

The eighth scale model is presented in The Culture Map (Meyer, 2014a) to guide managers on the areas to focus on when dealing with cross-cultural teams. It is essential to consider that each scale obeys the cultural relativity concept. To understand the scales, the relative position between two (or more) countries is the aspect to consider, rather than its absolute position within the scale.

Figure 1

Eight scales model from “The Culture Map” (Meyer, 2014b)



The communication style regarding cultural traits is divided between low and high-context cultures. In low-context cultures, effective communication is considered precise, simple and straightforward, and repetition is appreciated in the case that clarifies the message. There is a low level of shared context. However, effective communication is considered sophisticated, subtle and layered in high-context cultures. Listeners are often required to read between the lines to understand the real meaning of the message. Therefore, the level of shared context is necessarily high.

Furthermore, the perception of constructive criticism varies from one culture to another. The evaluation scale distributes countries according to the directness of their negative feedback. Criticism is frank and honest in cultures that lean toward direct negative feedback. Negative messages are not softened with positive ones and are characterised by definite descriptions. Moreover, negative feedback may be given to an individual in front of a group. On the contrary, cultures with a preference for indirect negative criticism are often soft and diplomatic. Negative messages are softened with positive ones and are characterised by qualifying descriptions. To end, negative feedback is given generally in private.

The reasoning styles of the individuals play an essential role in the acceptance of new ideas and therefore are another vital layer of cross-cultural management. The persuading scales distinguish between two types of reasonings. Principle-first or deductive reasoning, where individuals start understanding the general principle or complex concept to later move on to a specific example or practical conclusion. The core information is the conceptual principle behind each situation presented. Furthermore, in application-first or inductive reasoning, individuals first understand the practical application of a concept to move on to the theory later. Discussion is practical, avoiding the theoretical side of the concept.

However, on the reasoning scale, Asian cultures are not represented. The reason is that their approach towards perception obeys a diverse classification. Asian cultures are characterised by holistic thinking in contrast to the specific thinking of Western cultures. Holistic thinking, influenced by Chinese religions and philosophers, tends to focus on the interconnectedness of elements. In other words, when deciding, they emphasise on the big picture. On the other hand, Western cultures isolate elements when making decisions studying the consequences of their actions regardless of what surrounds them. However, this perception of reasoning of Asian cultures is discussed in the literature as some authors have categorised the reasoning of Asian cultures as inductive thinking (Li et al., 2020) rather than applying the holistic approach.

The fourth scale is based on Hofstede's "power distance" dimension (2001). The leading scale applies to leadership management in the business world. There are two types of leading depending on how a culture perceives power. First, egalitarian, where the power distance between boss and subordinate is small. The boss is seen as an equal, a facilitating figure in the organisation. Therefore, communication can skip hierarchical lines favoured by a flat structure of the organisation. Second, hierarchical, the power distance between boss and subordinate is significant. The boss's status is essential, consciously above his superiors, and reflects its power. Communication rarely skips hierarchical lines in organisations that are fixed and layered

Across cultures deciding is an action that some societies overcome in a consensual or top-down manner, as shown by the fifth scale. Consensual decision-making requires de agreement of the group part of it. The decision takes a long time, but when it is made, it is inflexible. Implementation, therefore, is fast. The person in charge takes top-down decisions, and responsibility is on an individual. However, decisions are handled quickly and subject to change and discussion afterwards. Therefore, implementation takes a long time.

Trust comes from different routes depending on which culture the individual belongs to. According to the sixth scale, there are two types of gained trust. Task-based trust is based on another person's skills and reliability. Work relationships are built quickly, and so are drop. Trust is cognitive and based on the reliability of the work done. Relationship-based trust is based on emotional closeness to another person. Work relationships take time to build but last long. Trust is based on affection and is developed through personal connections.

The seventh scale shows there are two ways of disagreeing. In confrontational disagreement when disagreement is acceptable and encouraged across the organisation. Open confrontation favours new ideas and will not negatively affect members of the organisation and their relationships. On the other hand, in the avoiding confrontation style, disagreement is harmful to the organisation. Conflicts are handled in private because doing it in public will negatively impact the individual and the group.

To end, Hall distinguishes between monochronic and polychronic cultures. The first takes a fixed perception of time, while the second is more flexible and dynamic. In line with this, the scheduling scale presents two opposite perceptions of time. Linear time, where the main focus is the deadline and organisation over flexibility. Therefore, issues are addressed one step at a time. Flexible time, the main focus is on flexibility and adaptability rather than organisation and deadlines. Several issues are managed simultaneously and fluidly, seeing changes as potential opportunities.

2.4 Research Question

User participation has been a growing field in academia and the technology development industry. So much so, that multidisciplinary teams often count on users' involvement in the design process to address the growing complex needs of customers. Furthermore, in the last years, new methods and tools favour users' involvement in projects. The users not only have a central figure in the

design process but are active actors that provide ideas and make decisions. Although the implication of the user is subject to each project and the design method applied.

User involvement is relevant in the IT development field due to the benefits that its participation provides to the final product. However, this participation is not always successful and has recurrent barriers that influence the translation process in the communication between users and developers. Several models and solutions have been proposed in the literature to overcome this barrier. However, they do not mention culture as a possible cause of these translation problems, even though cross-cultural management is often an issue in the international business life of organisations. The lack of research on the influence of culture in this area is an urgent matter to address as cultural challenges are often present in international companies, particularly in co-creation IT projects.

Although several models in the literature try to make sense of the cultural phenomenon. In this paper, we understand culture in the context of organisations in terms of national differences. Based on Meyer's theory (2014a), each society has cultural traits that can be translated into seven scales, covering from how each culture communicates to how trust and knowledge is built or decisions are taken in the work environment. Based on these scales, this paper aims to find if the problems caused between users and developers in IT project development have their origin in their different cultural backgrounds. To fill this gap in the literature, this research aims to answer the following research questions:

Q1: How does the user's and developer's cultural background influence the miscommunications between them?.

Q1.1: To what extent are some cultural traits more influential than others on the miscommunications between users and developers?.

3 Research Design and Methods

A qualitative and quantitative study has been chosen to study the effect of cultural traits on users' developers' communication. The data collection will occur in the BMSLab an organisation related to the University of Twente.

3.1 Research Design

This paper aims to study the influence of cultural backgrounds on the interaction between users and developers. To do so, we conducted a case study during the persuasive design module of the bachelor's in communication science at the University of Twente. The students of the persuasive design module acted as users, and the developers of the BMSLab working on the module as the developers.

The methods of data collation were double. On the one hand, a qualitative approach was the most suitable choice for the research as the methods of this approach look for meaning among certain social phenomena (Boeije, 2010) and therefore is ideal for analysing the interactions between users and developers. Furthermore, the flexibility of qualitative methods allows us to study and contact the people involved in the sample (Boeije, 2010), therefore being the right choice to collect data in an academic environment where we had to adapt to the rhythm of the course. Therefore, the methods of data collection used were participant observation and semi-structured interviews under the qualitative method scope.

On the other hand, a quantitative approach was chosen to study the participants' cultural backgrounds through the dimensions proposed by Meyer (2014a). A survey containing 24 questions was used to evaluate the position in each of the 8 scales proposed by the author to evaluate culture. The survey questions were obtained from Meyer's online article (Meyer, 2014b), and later transformed into a Qualtrics survey for its distribution.

The data collection occurred during the first four weeks of the module, the BMSLab allowed this research and gave access to the meetings and the interviews with the participants. The data collection occurred during the first weeks of the module, and the research population were the users and developers who participated in these meetings as part of the persuasive design module

During the first week, the aim of the research was partially transmitted during the information session. We could said a partial deception was used as the information told was incomplete but veracious. The participants were told the research was focused on the communication between users and developers in multidisciplinary groups, omitting the influence of culture in the research. Owing that this information could make the participants feel attacked or judged by their cultural backgrounds. Moreover, the results could be biased even if they accept to be part of the research. Furthermore, participants were repeatedly informed of the anonymous data treatment of data during the interviews and during the information session.

By the end of the module, debriefing of the deception occurred. The complete information about the research was transmitted as the participants were told that the research aimed to analyse how cultural backgrounds may affect the relationship between users and developers. Debriefing was informed through email to the students and a message posted on the Teams general page of the skills lab. They were told that the information about cultural traits was withheld to prevent possible bias in the research and inform them of the possibility of dropping from the study if they wanted to.

3.1.1 BMSLab and Persuasive design module

The case study was conducted in the first part of the module of persuasive design, where the BMSLab was in charge of supporting the job done by the students. The BMSLab is an organization part of the University of Twente within the Behavioural, Business and Social

Sciences faculty. The BMSLab aims to address societal challenges using advanced technology. They support researchers and students who want to conduct studies regarding societal challenges. The equipment and facilities are constantly updating and developing to be at the forefront of technological development.

This organisation was chosen as the sample due to its unique characteristics. First, the organisation is part of an international university where students and researchers come from across the globe to conduct their studies. Therefore, the people who work and collaborate with the BMSLab come from different cultural backgrounds, which is relevant to the aim of this study. Second, the organisation provides technology resources to students and researchers, so the technology has to be adapted to the needs of the study. Therefore, students and researchers are the users, and BMSLab acts as the developer providing the system according to their requirements.

Moreover, the BMSLab actively participates in the educational programs of the University of Twente. Offently provides the necessary tools for thesis development and is directly involved in educational courses in the programs. This research was conducted in the Persuasive technology course, where the BMSLab actively participated in the first phase. The Persuasive design module is part of the Communication Science bachelor's. Its purpose was to test the behaviour change towards certain design elements in a virtual reality (VR) environment.

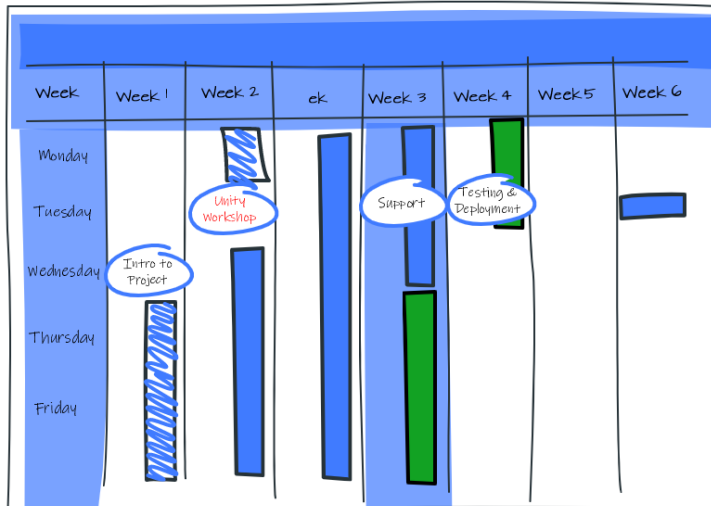
In this module, the BMSLab takes part in the first phase of developing the VR environment called "skills lab". The BMSLab provided two options for a VR environment, a supermarket and a nature scene. The students, divided into groups of 4 to 5 people, had to choose between these two environments to conduct their research. As a group, they had to make the necessary changes to the environment depending on the variables they wanted to test during the skills lab. The skills lab lasted four weeks, with one holiday week in the middle that was not considered. In the Figure 2 the distribution mentioned can be observed. The first week provided an introduction to the project and the module. Furthermore, the communication strategy between the student and the BMSlab was explained. Teams was chosen as the main channel for exchanging messages and booking facilities as well as arranging meetings with the developers.

In the second week, the VR environment possibilities were introduced, explaining Unity, the software used to develop the VR environment and the Oculus glasses, the VR headset used to introduce the participants to the VR environment. Moreover, in this technical workshop, the four foundations of the project and how to approach them were explained; Research, Design, Development and Project management. The BMSlab acted as a facilitator through the four weeks for the third one, Development. However, the workshop also explained the transition from research ideas to requirements leading to the final design of the environment, which was the critical process of the project.

The technical workshop was followed by a personalised meeting between each group and the developer from BMSLab. In this meeting, participants discussed matters such as requirements or technical questions related to Unity. Although the BMSLab set no official events in the third week, the groups were free to arrange meetings with developers to solve problems or ask questions. Finally, in the fourth week, there was a final meeting of the developer with each group to evaluate the VR environment created. The group had to deliver a report beforehand called "One page", summarizing the methods, requirements and the user journey of the participant in the VR environment. This final meeting was approximately one hour and was divided into two parts. First was the presentation and simulation of the project, where D1 would act as a participant in the students' research to test the VR environment. Followed by a reflection meeting where D1 and the students discussed the flaws and positive points of the project. In the case something was missing, a plan on how to accomplish it to finish the VR environment was elaborated.

Besides the support from the BMSLab during the skills lab, each group had a supervisor for advice regarding the project's research side. This assistance remained after the skills labs, in the second part of the course, where the students had to test participants and submit a research paper with the results obtained. However, the meetings with the research supervisor during the skills lab will not be considered for the research as they are out of the project's scope.

Figure 2
Calendar of the Persuasive Design course (Rabago, 2022)



3.1.2 Participants

The research population was the students and developers that took part in the persuasive technology module. The students were divided into ten groups of four to five people to develop the project. In the end, seven groups were considered for the research, including both developers, resulting in 31 research participants. The selection criteria was made based on the relevance of the information provided during the first round of interviews and the group member's nationality with the goal of having a diverse sample. Among this final research population, there were 13 different nationalities. One participant from each of the following countries; Austria, Mexico, Bangladesh, Italy, Taiwan, Egypt, South Korea, China, Brazil and Romania. Two participants were from Vietnam, another two were from South Korea, nine from Germany, and nine from the Netherlands.

Table 1. Sample characteristics

Demographic characteristics		
	<i>N</i>	%
Gender		
Female	20	64.5
Male	11	35.5
Nationality		
Afghanistan	1	3.2
Austria	1	3.2
Bangladesh	1	3.2
Brazil	1	3.2
China	1	3.2
Egypt	1	3.2
Germany	9	29.0
Italy	1	3.2
Mexico	1	3.2
Netherlands	9	29.0
Romania	1	3.2
South Korea	2	6.5
Viet Nam	2	6.5
Role		
Student	29	93.5
Technician	2	6.5
Total	31	100

3.2 Data collection

In the second and fourth weeks, the meetings between the users and developers were analysed through participant observation methods. The sessions were recorded and later transcribed into text through Amberscript, a transcription software. The meetings were partially coded with the help of the Atlas software. The coded parts were selected based on the information gathered from the focus groups or individual interviews with the participants. If any of the parties mentioned an issue, the meeting's section related to it was analysed to understand it better. The observation focused on how ideas were communicated, how discussions were conducted, and the language style used by each meeting member. The transcribed meetings were analysed to find a relationship between the users' and developers' miscommunications and Meyer's scales (Meyer, 2014a).

In addition to the participant observation semi-structures interviews were conducted. During the first round of interviews on week one, each student group was interviewed together. The reason is that the group meetings happened right after one another; therefore, there was not enough time to interview each group member and the developer, as the group interviews would overlap with the meeting recordings. Therefore, the interview with the developer was followed by the group interview. These interviews focused on finding communication flows between the user and the developer in the meeting if existent. Therefore, three to four questions were asked. First, the interview started with questions regarding the general impression of the participants about the meetings, followed by a specific question asking about possible misunderstandings with the meeting members. Then, depending on the participant's answers, more questions will be asked regarding the reasons or not for these miscommunications.

In the second round of interviews (week 4), the meetings were individual for the developer and the users. Due to the limited time, not all the group members of the team were interviewed. However, at least one group member was interviewed, and when the time allowed, more. In total, 19 students from 7 groups were interviewed. In this final round of interviews, the focus was on the participant's reflections on the process. Afterwards, specific questions related to the issues or their favourite part of the project were asked. Followed by questions related to the communication within the group and the developer and the lessons learned.

The interviews were recorded, transcribed, and coded using specific software as in the previous phase. The analysis focused on finding the reason for miscommunications between users and developers in case this miscommunication exists.

Furthermore, quantitative methods were also used. At the beginning of the module, a survey was distributed among the students and developers in the course. In that survey, participants were asked to give their consent for taking part in the study. They also agreed on being recorded during the meetings and interviews and were informed of the anonymous treatment of the data collected.

The survey asked personal data like names, surnames, and nationality. Although later the data was anonymised, personal information like names was requested to identify the cultural traits of each participant and analyse them together with their interventions during meetings and interviews. The survey then followed with 24 four questions that evaluated the participants' cultural backgrounds based on the survey developed by Meyer (Meyer, 2014b). Each scale was evaluated with three questions, and participants answered on a five-point Likert scale that ranged from “strongly agree” to “strongly disagree”.

The maximum score per question was 5 points. In most cases, 1 point corresponded to “strongly agree”, and 5 points were assigned to “strongly disagree”. However, the points were inverse in questions 6, 7, 14, 15, 17, 19 and 22. Therefore, these scores were changed in SPSS to compute the final score for each scale.

The scores for each scale were computed with the following questions. The communication scale was created with questions 1,2, and 3. The evaluating scale came from the scores of questions 4,5 and 6. Persuading scale was created with questions 7,8 and 9. The leading scale was based on questions 10,11 and 12. The deciding scale came from the scores of questions 13,14 and 15. Trusting scale was obtained from questions 16, 17 and 19. Disagreeing scale sum up the points from questions 20,21, and 22. To conclude Scheduling scale was based on questions 18,23 and 24. Next, the three correspondent questions were summed up to compute the final scores of the eight scales. Finally, with the use of excel, the final data was visualised to compare it to the results obtained by the qualitative methods, and therefore obtained the conclusions of the research.

3.3 Data analysis

The coding process was done with the help of Atlas analysis software. First, all the transcribed documents are categorized into groups of work. Then a fast read of the transcription of the first and the second round of interviews was done. Following the process of coding started. We selected the first group and started coding the first round of interviews, followed by the second round. With each round, we started coding the developer, afterwards the users' group meeting or the individual student interviewed in the case of the second round, and finally, we partially coded the meeting between both parties. Then we would code the second round of interviews of the same group following the same other. If there was a miscommunication about something said in the first round meeting, we would go back to that meeting to understand the issue better and code more parts of the meeting if necessary. To ensure the reliability of the analysis, the codes were clearly defined (Rose & Johnson, 2020), adding descriptions in cases where the name was not enough information.

After this process was done with the seven groups, the codes created (121) were revised. Codes only used once or twice were merged with other codes. For example, “Clear communication with BMSLab” was merged with “Clear communication”. And “Perceived confusion” and “Feel confusion in others or feel confused yourself about something” was merged into a new code called “confusion”. Furthermore, some parts were recoded into new codes and deleted the ones less used. Reducing the number of codes to 88. After the final list of codes was made, they were merged

into three categories. Each of the following categories was subdivided into positive, negative and neutral, representing the sentiment of the code.

- Group dynamics: Organizational patterns found within the teams.
- Attitudes and actions of users: Attitudes or actions perceived by developers about users or observed in users.
- Attitudes and actions of developers: Attitudes or actions perceived by users about developers or observed in developers.

Furthermore, to ensure validity, a member check was made with an individual external to the research (Rose & Johnson, 2020). The transcriptions of one randomly chosen group were given to the reliability analysis coder together with the codebook, highlighting the parts we coded. The external individual who conducted the reliability analysis was given four interviews from group 1 and one focus group interview. The reliability analysis of all the interviews resulted in a kappa coefficient of 0,746 for all the interviews. The individual coefficient of each interview ranges from the lowest kappa coefficient of 0,657 to the highest of 0,8. According to Cohen, these values are within the substantial agreement range of 0,61-0,80 Kappa (McHugh, 2012). The disagreements between the two coders were discussed, and the coding changed if necessary. However, these changes did not influence the structure or the content of the codebook. Therefore, the validity of the codebook was assured. The final coded list can be found in Appendix A and the results of the reliability analysis can be found in Appendix B.

4 Results

The following results were based on the information of 14 meetings, 7 group interviews, and 31 individual interviews. This section presents the results of each group studied during the research. First, the demographics of the members of each group in addition to the anonymous labels given are presented in Table 2 for a better understanding of the information in this chapter. Then, for each group, the virtual environment choice and the process their project went through from the first to the second meeting with developers is introduced. After, three subsections focus on different aspects of the information gathered. First, the cultural traits of the group members are analysed with the information obtained from the survey. Second, there is a specific section about the communication with developers where miscommunications or disagreements between both parties are mentioned if existent. To end, the relevant team dynamics encounter are introduced.

Table 2. Demographics per group

Group 1			Group 2		
	<i>Gender</i>	<i>Nationality</i>		<i>Gender</i>	<i>Nationality</i>
U1.1	Female	Netherlands	U2.1	Female	Germany
U1.2	Male	Netherlands	U2.2	Female	Romania
U1.3	Male	Netherlands	U2.3	Female	Italy
U1.4	Female	Germany	U2.4	Female	Germany
Group 3			Group 4		
	<i>Gender</i>	<i>Nationality</i>		<i>Gender</i>	<i>Nationality</i>
U3.1	Male	Germany	U4.1	Male	Netherlands
U3.2	Male	Netherlands	U4.2	Female	Germany
U3.3	Male	Germany	U4.3	Female	Netherlands
U3.4	Male	Netherlands	U4.4	Female	Germany
Group 6			Group 10		
	<i>Gender</i>	<i>Nationality</i>		<i>Gender</i>	<i>Nationality</i>
U6.1	Female	Germany	U10.1	Male	China
U6.2	Female	Netherlands	U10.2	Female	South Korea
U6.3	Male	Netherlands	U10.3	Female	Taiwan
U6.4	Female	Brazil	U10.4	Female	Vietnam
Group 7					
	<i>Gender</i>	<i>Nationality</i>			
U7.1	Female	Vietnam			
U7.2	Female	Vietnam			
U7.3	Male	Germany			
U7.5	Female	Egypt			
U7.4	Male	Austria			

4.1 Group 1

Group 1 chose the supermarket as the virtual environment for the project. They developed avatars and greenery elements to study the healthy choice of products. During the first week, they understood the concept of the project, although they did not have a clear design idea. However, in the final meeting, most of the tasks were incomplete.

Regarding the cultural traits, the three Dutch students have similar scores on all the scales. However, the German student differs by at least two points in the communication, evaluating, persuading, leading, deciding and scheduling scale scores. Furthermore, her scores also differ from the leading developer, although they had an outstanding communication and translation process. This result suggests that the affinity in personal traits overcomes the differences in

cultural traits. Moreover, D2 follows the general cultural scales of this team towards the Dutch trend.

Figure 3
Culture scales group 1 and D1

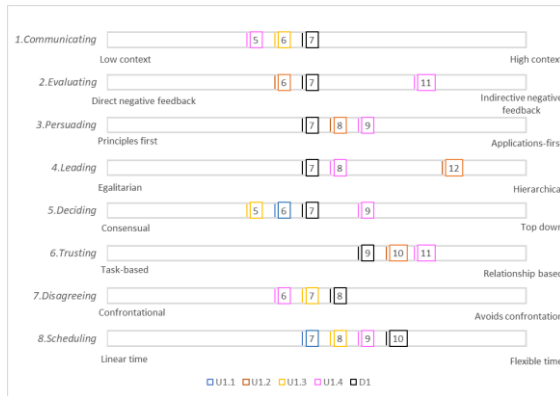
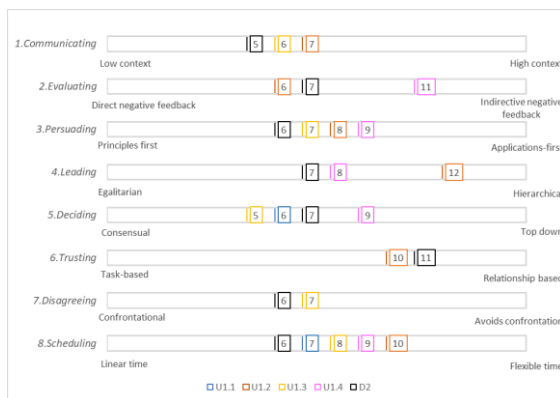


Figure 4
Culture scales group 1 and D2



4.1.1 Communication with developers

During the four weeks, the communication with developers was limited to two official meetings. The group did not request an additional meeting with them between the two mandatory meetings to solve the problems they had. Instead, they arranged a meeting with the research supervisor where they asked technical questions instead of going to the developers. Although, after the final deadline considering many things were incomplete, D2 helped them to overcome the technical issues to deliver the project.

About the interactions with this group, the main developer mentioned that she perceived an absence of reflection, which added to the bad project management. She used negative adjectives like “negative”, “frustration”, and “be more humble”. However, D1 also had positive comments. She mentioned the creativity of the elements developed and appreciated U1.4. Interventions during the final meeting praising her understanding of the project.

The main developer, while differing from U1.4 follows the cultural traits of the Dutch side of the group. However, in the confrontation and scheduling scales, she is opposed to the U1.2 and U1.3, the two students she had disagreements with during the meetings. Although in this last scheduling scale, she is closer to U1.4, the students she had better communication with.

On the other hand, the second developer was delighted with this team, she used positive words towards this team, “patience”, “respectful”, “independent”, and “creative” are some of them. In her opinion, they had good project management. Something D1 had a different opinion on.

4.1.2 Dynamics within the group

Feasibility VS time management

There was a debate between feasibility and time management among the students and the developers in this team. During the last interview, D1 claimed that they assumed feasibility was equal to time management, which is why they did not deliver the project in time. Furthermore, although D1 mentioned they did not ask her how much time would it take to accomplish specific tasks, they did during the first meeting.

As seen in the following dialogue, D1 had no straightforward answer to the questions asked by the students about time spent. U1.3, after the main developer answered, changed the topic and focused the questions on feasibility rather than time management. However, during the last interview, D1 acknowledged that she should have clarified the difference between feasibility and time management.

This miscommunication may be based on cultural differences, as there is a considerable distance between D1 (Mexican) and U1.3 (Dutch) in the scheduling scale, where they scored 10 and 7 points, respectively. Showing the flexibility and adaptability characterised by D1 against the goal-oriented scheduling focus of U1.3, who acted as the group developer.

“U1.3: (...)But we were wondering how much time that will probably take.

D1: There is a video on that, And then it takes a little bit of time (...)

U1.3: Ok, so we could do that, then it's going to take time.

D1: You know it is like changing the scenes, you do not know how much time, you know how much we want to do and how you want it. I would play a little bit with it see how much time it takes. (...)

U1.3: But it is possible. Yeah. I mean, I think everything is going to take time. Just how feasible is that.

D1: You can do those changes, basically there are elements of the shelves and so on, so you can just move them around. It depends on your computer and how fast your computer can actually edited.(...)”

Absence of team communication

According to D1, there was no clear communication within the group. The students in their interviews did not mention group communication at all, as other groups did. Furthermore, U1.4 (German) was the student who understood better the project in terms of project management. She differs from the rest of the team on the evaluating scale. Her tendency was towards indirective negative feedback rather than the directness characterized by the rest of the group. She only intervened at the end of the meeting and with politer arguments than her teammates. And even though she made points that D1 agreed with, the rest of the team did not acknowledge her opinions. The difference in the evaluating scale may be significant for this matter.

Demand for external guidance

The group would have liked more guidance to realise their unrealistic goals were not feasible within the time frame. Although they reflect on that, as U1.3 mentioned in the interview, “we should have seen it coming”. They suggested having another meeting in the middle of the course to prevent this unconscious struggle. This additional meeting would have helped them realise the project was too ambitious and had to adapt it to deliver it within the time frame. However, between the first and the second control meeting, they had a week where they could have to arrange a meeting with the developers. They did not use the possibility and were one of the few groups

without communication with the developers during the process. They mention that they did not ask for help because they struggled unconsciously.

Disagreements

During the last meeting, D1 had disagreements about the reason behind the incomplete delivery of the project and the consequent frustration of the team. This confrontation occurred meanly with U1.2 and in a lower degree with U1.1. During the individual interview after the meeting, D1 said they were getting a bit defensive in the interview. However, as seen in the dialogue, she gets defensive in the conversation when the students mention the organizational problems they encounter. Furthermore, the evaluating scales of both parties are similar in their scores, inclined towards indirect negative feedback (7 and 6). On the other hand, D1 is more inclined toward avoiding confrontation (8), while the students feel comfortable in confrontational disagreement (6), which may be significant for the reason behind the disagreements.

U1.2: Yeah. For example, yesterday we also came here and, and we were put in a new room, so we had to load everything again (...) Because of that, we lost a lot of time as well.

D1: Yeah. You lost a little time for that or for not project managing properly to get the time to do that because that is a function that can happen, right?(...)

U1.1: We asked for flex 3. They put it on flex 4.

D1: But normally D. asks, and she says I can't because of this and this reason, I only have this room.

U1.2: Well we didn't, we didn't get such messages. We just put into our group chat like, can we have flex 3 from this time to this time?

D1: So you think it's the fault of the team.

U1.2: I am not saying that. I am not poting fingers.

D1: I'm just asking. Yeah, I'm just asking. Let's not get into a hostile. I don't want to put a hostile. I'm trying to understand what is the process because if I look into it and you guys can tell me if it's right or wrong, but I go in and the whole test was if it was working or not. Correct? Yeah. And for me, it looks like it just doesn't work yet."

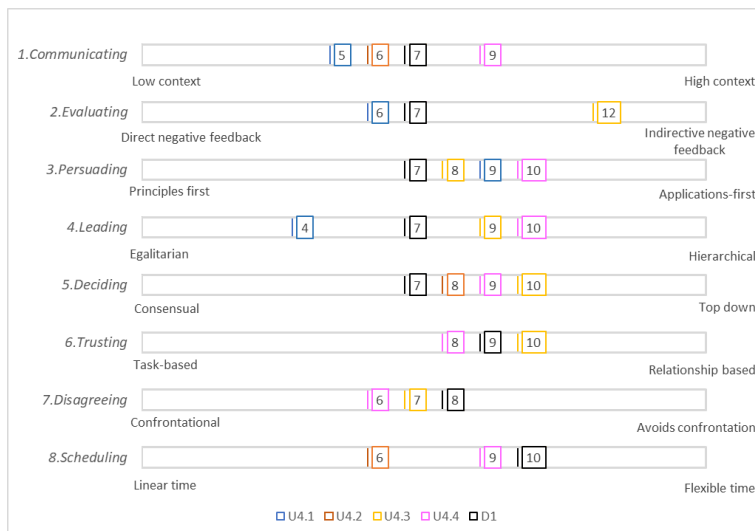
4.2 Group 4

This group has formed by four members, three girls and one boy. Two members were from the Netherlands (U4.2 and U4.3.) and two from Germany (U4.2 and U4.4.). They choose the Supermarket as their virtual environment scenario. Among their tasks, they set up a clock and changed the aisles to evaluate the choice of healthy products in the supermarket. They excelled in project management during the first week as they showed a detailed plan to develop the project during the meeting. However, the final document was not delivered on time by the last meeting, and some elements were not complete. Despite the successful start, the project was not delivered on time by the final week.

The survey results showed the clear cultural pattern among all group members throughout the scales. Although on some scales, like disagreeing, both students and developers agree considerably, there are some outliers. For example, on the communicating scale for U4.4 (9), evaluating for U4.3(12), leading for U4.1 (4), and scheduling for U4.2 (6).

Figure 5

Culture scales group 4



4.2.1 Communication with developers

The communication between D1 and the group was fluent and frequent during the process. Even during the third week, the group had meetings with D1 regarding doubts about issues in the project. U4.3 pointed out that D1 tried to help her with issues related to Unity and understand the process she was following. Both students interviewed said, referring to D1, that she is strict but fair. Both agree that the communication is straightforward with D1 as long as you are prepared and have specific questions about the problem you want to solve. Furthermore, D1 thought their work was creative and the project ambitious. She was impressed with the clock as one of the students coded it from scratch. However, in her opinion, they did not deliver the project on time because of their lack of testing and team communication.

4.2.2 Dynamics within the group

Absence of team communication

D1 thought there was no team communication because two girls (U4.2 and U4.4) were not talking much during the meetings, meaning they were unaware of the project. Therefore, in D1 opinion, the lack of communication between the team members was why the documentation was not delivered on time. However, U4.1 and U4.3 both pointed out that they missed the announcement in Teams because they do not check the platform periodically since they are used to Canvas, where you received the announcements directly in the institutional email. Furthermore, the two members of the group who, according to D1, had a lower degree of participation were from Germany, while the other two were from the Netherlands. However, there is no clear cultural scale distinction between the students from Germany and the Netherlands in this group that may explain the absence of communication.

Time management

The project was not delivered on time, and the task they planned to do were incomplete. Although there as a significant lack of time management, two students, U4.1 (Dutch) and U4.3 (Dutch), mentioned they prioritise the task to deliver because of the lack of time. Both score high on the Scheduling scale, 9 and 10. Furthermore, while U4.4 (German) also scored high on the scheduling scale, the last member scored much lower (6), but she was not involved in the development, so she did not significantly impact the skills lab.

During the individual interviews, when talking about lessons learnt, while U4.1 focused on anticipating struggle, U4.3 talked about time management, although both are related. U4.3 pointed out that she spent more time learning and working with Unity than expected. In this case,

the bad time management may be related to the student's lack of experience with technical projects and software.

Lack of testing

The lack of testing was critical for the unsuccessful outcome of the project. D1 mentioned they did not test the environment enough. Because during the final presentation, several elements of the environment did not work correctly. Furthermore, the students also recognize the lack of testing during the final meeting. However, in the persuading scale, the developers (U4.1 and U4.3.) tend to be inclined to the application first of the scale, which usually indicates that they tend to have a practical approach to learning. So this should indicate that they are more inclined to test.

Demand for external guidance

Both students interviewed mentioned they would have appreciated a midterm meeting to check on the project. Because having a deadline in the middle would have helped improve the group's time management and made them realise the project was too ambitious. Although this group had several meetings with the developer during the third week, they were mainly related to the technical issues in the project than to the general progress, as mentioned by U4.3. However, U4.3 pointed out that demanding external guidance may be contradictory to the objective of the class, which is to be more independent in managing a project with multidisciplinary groups.

4.3 Group 3

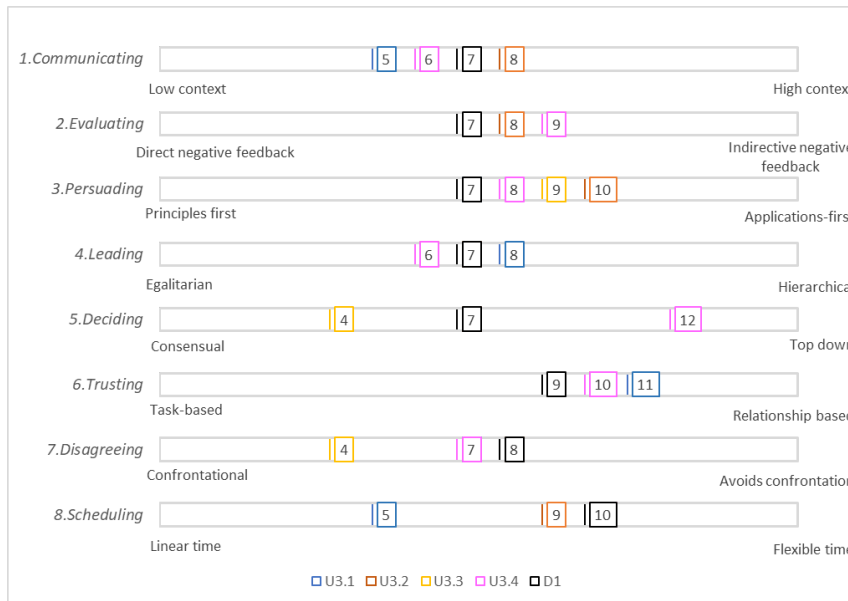
This group had four male members who chose the supermarket to develop their research project. Half of the members were Dutch (U3.2 and U3.4), while the other half were German. Among their task, they changed the labels of the products to test if this would influence the participants to choose healthy products and developed a static shopping basket at the end of the aisle. During the first week, they dominated the technical sides of the project, but the research idea was not as clear. This dynamic extended until the last meeting, where although the project was delivered in time, the research bases were not solid.

The two nationality groups present in the team, Netherlands and Germany, were close throughout the scales. However, there were some outliers, from U3.1 in scheduling towards linear time and U3.4 and U3.3 in the deciding and disagreeing. The group's leaders and most proactive members were the two students from the Netherlands. Meanwhile, the other two German students interact less during the meetings. Although based on the interviews, U3.1, one of the Germans students, was also really proactive in the development part but did not take the lead in the project management. According to the scales, U3.4 scored much more on the deciding scale towards the top-down area and was more proactive in talking. On the other hand, U3.2, the other leading figure in the team, scored 7. During the interviews, U3.1 claimed that the people who talked more in the interviews were those whose idea for the project was followed.

D1 stays in line with the scales of the groups. However, it differs a lot for deciding and disagreeing compared to U3.3, the student with whom she disagreed. While D1 tended to take top-down decisions and avoid confrontation, U3.3 was three to four points toward consensual decisions and confrontational disagreements. Scales where U3.3 also differ respect their teammates.

Figure 6

Culture scales group 3 and D1



4.3.1 Communication with developers

All the team members mentioned that the communication with the main developer was straightforward, they described D1 as strict but fair. U3.3 also pointed out that this directness motivates him to learn. However, this was the first team mentioning that the last meeting was stressful. Therefore, it is important to point out that D1 was more direct and straightforward than usual with this team.

Although they mentioned the communication was good, they encountered some technical issues and did not request help from the developers. During the third week, they had several meetings with D1 but asked questions related to other project issues. Furthermore, although they were one of the groups that tested the most, this test was not systematic. One of the reasons may be that they focused on the development and not on the research. During the last interview, when asked about lessons learnt towards working with developers, there was a contradiction among the group members. U3.4 (Dutch) mentioned being direct but not detailed. On the other hand, U3.1 (German) and U3.2 (Dutch) emphasize being more detailed.

4.3.2 Dynamics within the group

No conceptual understanding

According to D1, this group lacked an understanding of the translation from research ideas to requirements to design. Instead, they focus more on the technical side of the project. Indeed, U3.4 mentioned that the more challenging part of the project was choosing a research idea, but when talking about the development, he mentioned they were motivated to work in the Unity environment.

U3.4 scored an 8 on the Persuading Scale, which is not high considering U3.3 or U3.2 scored 9 and 10, respectively. This scale should indicate their tendency towards more practical related study. However, it does not diverge from the previous groups (Group 4) with a similar evaluation scale but insufficient testing.

Good team communication

All group members mentioned good communication within the team and a good division of tasks. They knew each other in advance, which probably made communication easier. Furthermore, U3.3 pointed out that even though the communication with the team was good, he would have liked to write down the ideas they had because some information may have gotten lost in the way.

Disagreements

In the last meeting, D1 disagreed with U3.3. The reason was that the student blamed the software for some issues during the project. Furthermore, during the interview, she pointed out was annoyed with him rather than with the rest of the team. The cultural traits may play an essential role as they are on opposite sides of the scale. D1 is towards avoiding confrontation (7), and U3.3 (Dutch) is close to the confrontational side (4). On the other hand, they score a 7 and a 9 in evaluation.

U3.3: I think it was a problem of the software, actually.

U3.4: Maybe. Yeah, but we figured it out.

D1: So it's a problem of the software? .

U3.3: Yeah, I think it was the software alone.

U3.3: I am pretty sure we tried all the buttons (...)

D1: The point that i am trying to make is that I get a lot that comment and I feel infuriated by it. Because it's not the software working on its own."

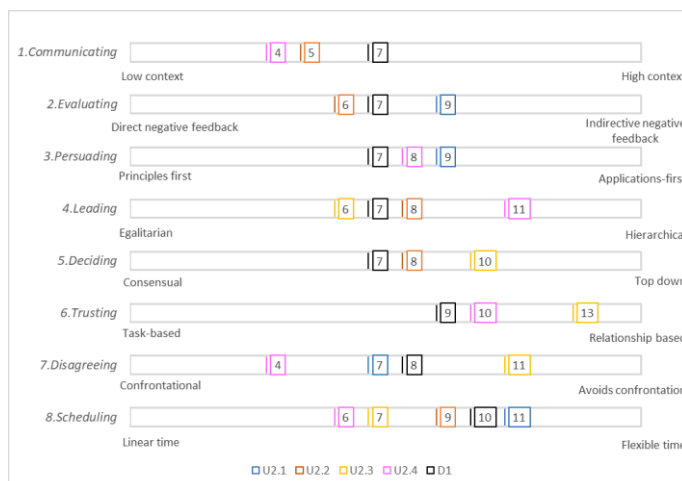
4.4 Group 2

This group, formed entirely by girls, had three different nationalities. Two students were from Germany (U2.1 and U2.4), one member from Romania (U2.2) and the last one from Italy (U2.3). The supermarket was the environment this group chose, which changed its distribution and introduced greenery elements to condition the healthy choice of products. Furthermore, they try to make all the products in the supermarket grabbable. Since the first week, the group was afraid of the technical side of the project, as they did not have much experience with the software or the VR technology. In the last week, the project was not delivered on time. Most of the elements in the environment were not working or were not finished. However, they reflected considerably on the mistakes made and how to overcome the issues left to finish the project.

The group is composed of two Germans (U2.1 and U2.4), one Italian (U2.3) and one Romanian (U2.2). Most of the work and the leadership were on these last two nationalities. U2.3 scored significantly higher on top-down decisions on the scales, with a 10. She was one of the two taking the lead and making most of the decisions. The Romanian and Italian students are more similar in the scales' scores than the Germans. However, overall, the scales are distributed more that in the case of German and Dutch students. The significant scales outliers refer to the relationship-based side of the trusting scale, where U2.3 (Italian) scored a 13. Furthermore, on the confrontational side of the Scheduling scale, U2.4 (German) scored 4.

Figure 7

Culture scales group 4 and D1



4.4.1 Communication with developers

The team members thought the communication was straightforward and felt supported during the process. However, at the beginning of the course, U2.3 repeatedly said that she was scared to ask the wrong questions to D1. Furthermore, D1 was mad at the group during the first meeting because of miscommunications regarding communication channels. Moreover, in the scales, D1 is the opposite side of U2.4, the person she had a conflict with about communication channels.

Furthermore, during the development process, there were some slight miscommunications during the meeting arranged by the group in the third week. According to U2.3, The questions asked to D1 were not clear and precise, and in the words of U2.3, “she reacted a bit”. However, in the last meeting, even though the project was not completed. Students and developer understood each other and agreed on most of the missing points of the project, finding ways to solve them. Mainly D1 and U2.3 communicate well with each other.

4.4.2 Dynamics within the group

Technical skills and bad project management

Their lack of technical skills was the main reason for not delivering the project on time. There was no student with predominant developers’ skills in the group, which was the case in the rest of the teams. Because of this, the technical issues and the unfinished task were the problems in the final delivery. They did not account for these possible issues in advance and therefore did not have time to fix them before the final presentation. However, they were proactive towards asking questions and were initiative-taking in terms of participation in the meetings and the lessons.

Self-reflection

In the last meeting, even if the program did not work, they reflected on what they did wrong, and specially U2.3 was syntonise with Lucia, they quickly understood and communicated with each other. She immediately got that D1 wanted them to realise that they had to adapt the project, changing the requirements to deliver it on time. Furthermore, U2.3 was realistic project management-wise; meanwhile, U2.2 lacked effectiveness in planning and scheduling. However, the scheduling scale results show U3.2 scores more toward linear time than U2.2. This means that in the case of this group, adaptability is not linked to the cultural scales.

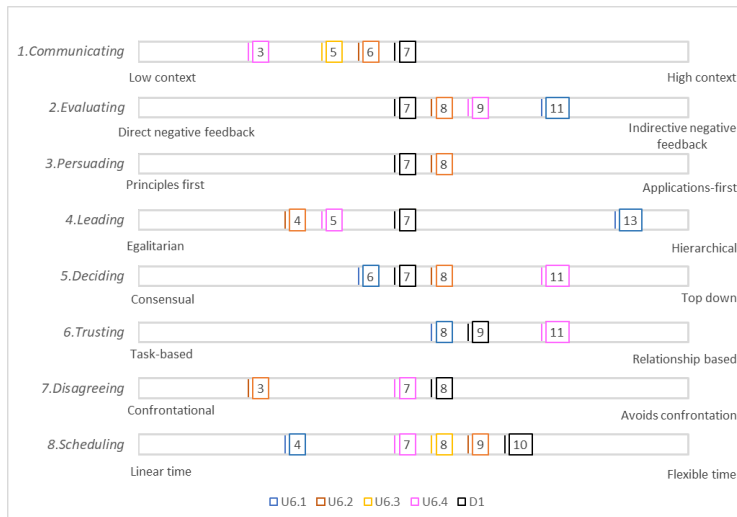
4.5 Group 6

Three girls and one boy formed this group. There were two students from the Netherlands, one boy (U6.3) and one girl (U6.2) and the two girls remaining came from Brazil (U6.4) and Germany (U6.1). They choose the nature environment for carrying out their research. They developed human-related sounds in the virtual environment to evaluate users' stress level towards them in nature. The stress was tracked through a wearable device called Empatica. The group did not have a clear project idea during the first week. Furthermore, some group members were lost and afraid of facing the project's technical challenges. However, this was the only group that presented the project on time with a detailed document explaining the project and time management they followed.

The scales are scattered among the students, especially those from Brazil and Germany. The two Dutch students have identical scores, except for some outliers on the Leading and Disagreeing scales. Meanwhile, the German and the Brazilian girl are diverse, with some outliers. For example, regarding communicating and deciding in the case of U6.4 (Brazil), the German student towards the evaluating and leading scales.

Figure 8

Scales group 6 and D1



4.5.1 Communication with developers

The communication with the developers was limited. The group did not arrange meetings with them besides the two mandatory ones at the beginning and the end of the course. During these meetings, there were no disagreements between both parties. However, U6.4 pointed out after the first meeting that she felt scared to ask specific questions because she feared the leading developers' reaction and did not like this type of communication. Other teammates pointed out that they feared her reaction (although they claimed at first felt they could ask her questions freely). They pointed out that D1 is more approachable during individual meetings, and they feel they can ask her more questions. On the other hand, D1, after the first meeting, though U6.4, is lost compared to the rest of the group, which she tough had more clear ideas.

Although this fear of asking questions is linked to a considerably high position on the confrontation scale in other groups, it is not in this case. All the members of the team tend to be on the confrontational side. However, they are placed on the indirect negative feedback side of the scale, especially U6.4.

4.5.2 Dynamics within the group

Considering the groups that worked in nature environments generally had better outcomes. Group 6 had the best outcome in terms of project management. This group was the only one that delivered the project on time and completed. The fact that D1 designated the role of the project manager in the first meeting main has been the differentiating factor to their success in the project. Even though D1 talked about roles division with other teams, with group 6, she assigned U6.4 the role of project manager.

During the skills lab, U6.4 took this assigned role very seriously, being the leading role in terms of management. The timetable presented by the team in the last meeting shows a clear division of work, assigning each person a task with a fixed time to overcome it. This is the only group showing on paper their project management. U6.4, scored 5 on the leading scale, a considerable low amount compared to the rest of the group members (and the rest of the students). However, her score was towards the top-down side on the deciding scale with an 11.

Team communication and the division of roles were essential for successful project management. With U6.4 as the leading figure, the times were respected. However, the communication also had challenges as U6.2, U6.1, and U6.4 were unfamiliar with the technical skills required for the project. Therefore, they fear that because of their lack of this skills, U6.3 would have been left alone with development. As an answer, the team tend to be more implicated with one another.

U6.1 and U6.2 make an effort to work with U6.3 and the other way around. It is the only group that mentions these kinds of dynamics.

Furthermore, they all knew each other and worked together, which may have helped in the team communication. U6.3 uses “confidence” several times, referring to her relationship with her teammates. She emphasises that their confidence in each other made the work much smoother. On the trust scale, 3 out of 4 members of the team score 11 on the relationship-based type of relationship. However, other groups also had higher scores and were not successful.

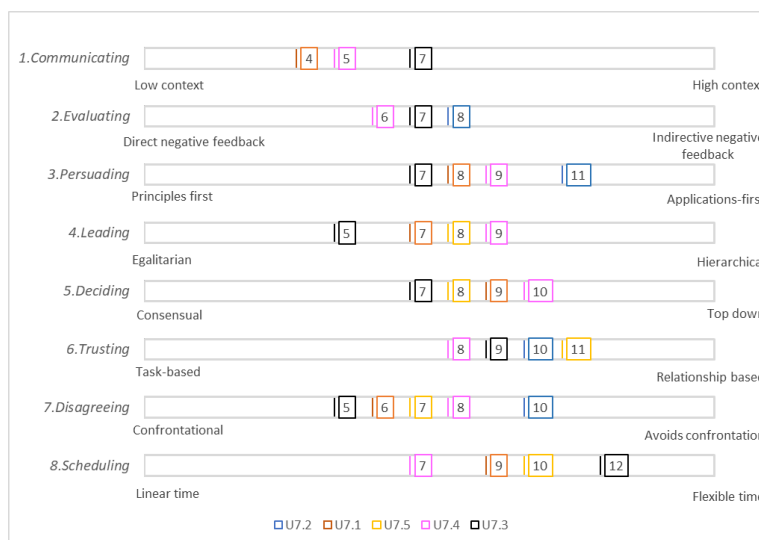
4.6 Group 7

Group 7 had, unlike the rest of the groups, had 5 members. There were three girls, two came from Vietnam (U7.1 and U7.2) and one from Egypt (U7.5). And two boys, one from Germany (U7.3) and the other from Austria (U7.4). They develop changes in the supermarket environment to study healthy product choices. Their tasks developed involved arrows placed in the aisles, making some products grabbable and developing a basket that participants could carry. During the first week, they were overwhelmed by the project. In addition to the technical challenges, some group members had re-sets. Therefore, their time available was limited. However, the group had the best supermarket environment by the final meeting. Except for some minor environmental flaws, they delivered the project on time and with all the elements completed.

As mention, there were four nationalities among the group members: Vietnam, Austria, Germany, and Egypt. The leadership role was among the last three. However, there is no clear trend on the scales among the Vietnamese girls in the group. Neither it is towards the German and Austrian students. However, the students from Egypt and Austria have similar scores on all the scales. U7.2 scored an 11 on the persuading scale, being an outlier compared to the rest of the group. Furthermore, U7.3 scored a 5 on the leading scale, while the rest of the group scored at least two points on the application-first scale. U7.3 also has a significant outlier towards scheduling with a 12.

Regarding the developers, D2 was close in most scales with the group members. However, the scheduling scale scored a 6, closer to the 7 of U7.4 but far away from the 12 of U7.3. On the other hand, D1 was closer to the students on most scales than D2. Except on the persuading scale where they had a difference of 4 points.

Figure 9
Culture scales group 7



4.6.1 Communication with developers

Group 7 had continuous and intensive communication with the developers. They requested several meetings with them where they asked questions and openly discussed their project issues. The group, aware of their limited time, acknowledged their strengths and limitations and asked for help from the leading developer when they had problems with the project. They were in contact with both of the developers of the group. However, the developers had different views toward them. And the students also differ in their opinions towards the developers.

On the one hand, U7.4, though D1 was more authoritarian and focused on the big picture. On the other hand, he thought D2 was more detailed, and described her role as a technician. The only communication problems claimed by the student were technical issues during the online meeting with U7.4. However, none of the members blamed D2 for these problems.

The developers also had two different views toward this team. D1 mentioned several times that she was impressed with the work done and that she felt proud of the group's effort in the project. However, D2 was disappointed with them as, in her opinion, they were disrespectful. In addition, the communication was ineffective during the process. She claimed they ignored her messages and perceived they talked bad about her during the meetings, but she did not understand because they were not speaking in their language, and she did not understand. On the other hand, the students mentioned the online meeting was annoying because of technical problems and did not mention personal issues with her. These negative feelings of D2 were towards U7.3 and U7.5, while she excludes U7.4 from this criticism.

4.6.2 Dynamics within the group

Good project management and adaptability

This project was a big challenge for group 7. In the beginning, they were the only group asking D1 where to start, as they felt overwhelmed by it. However, after the first meeting, they acknowledge their strengths and limitations (time limits and technical challenges). As a result, they quickly adapted when things were not going as expected. They changed several parts of the design when technical issues appeared and did the necessary iterations to deliver the project in time.

Furthermore, they delivered the project on time and were, according to the developer D1, the best group in the supermarket environment. Their project management was also one of the best, and the documentation delivered was completed. In particular, they were precise about time management. For example, group 7 is one of the only teams that wrote down hours together with the task. This is an interesting fact considering that this group mentioned at the beginning of the project that the time frame was compressed, one of the few groups that expressed wonders about time management during the first week.

Good and bad group communication

The communication of three group members was fluent during the entire process. They were constantly in touch with each other and the developers. As a result, the final paper shows a clear connection between the students in charge of research and those developing the environment. However, the communication with the two Vietnamese members (U7.2 and U7.1) was not effective.

U7.2 acknowledged that the communication with the rest of the team members was missing and admitted that she should have been more proactive. However, during the meetings and interviews, both of the students that acted as developers within the group, although they agreed on the missing communication from her side, mentioned that they should have been more proactive in delivering information to the other two members. Furthermore, regarding the relationship with the Vietnamese girls, U7.4 said they would do the job if they asked, but he felt frustrated that

sometimes they made an effort to interact with the rest of the team. According to U7.4, when he told U7.1 to do something, she did it; however, she delivered it at an unusual time frame.

Although the reason for this ineffective communication may be cultural, the scales say otherwise as the scores of all the group members are distributed on the communication scale. There is not a clear pattern among the member of the team in terms of nationality. There is a difference between U7.2 and U7.4 (Vietnam and Austria), with U7.2 scoring a 7 for high context communication and U7.4 scoring a 5. However, the German student scored a 7 and the other Vietnam student a 4.

4.7 Group 10

The group was composed of one student from Vietnam (U10.4), one from China (U10.1), one from Taiwan (U10.3), and another from Korea (10.2). The student from China was a boy, while the rest of the students were girls. They pick the nature environment to study stress-reliving strategists. They intended to test stress-relieved through a metaphor where the participant will throw something that represents the stress into a whole to simulate that it disappeared.

Since the beginning of the course, the group was lost. They failed to schedule the first meeting on time, so they had it one day after the rest of the teams. Furthermore, even though they had a clear research idea, they did not know how to develop it. As a result, during the last meeting, they could not demo the environment with the VR glasses, being the only group unable to simulate and show the environment.

The analysis of the cultural traits shows the two students from Taiwan and South Korea had similar answers on all the scales. However, the student from China (U10.1) had outliers in the disagreeing, leading, and trusting scales. She scores between three to four points lower than the rest of the students. The leading figure in the team was U10.2, who scored the highest on the Leading and top-down scales. Furthermore, there was no significant difference between the developers and the group. Unfortunately, the data from the student from Vietnam (U10.4) was not considered for the analysis because of her inconclusive results. She answered all the questions “neutral”, meaning she did not want to answer or did not understand the questions.

Figure 10
Culture scales group 10 and D1

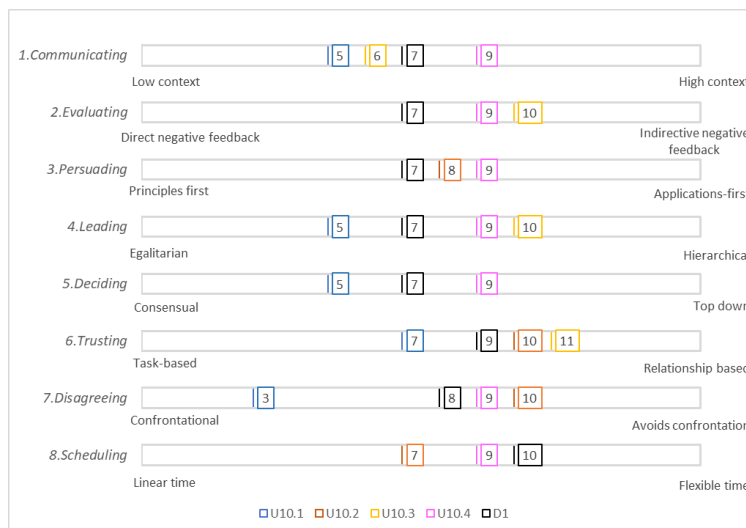
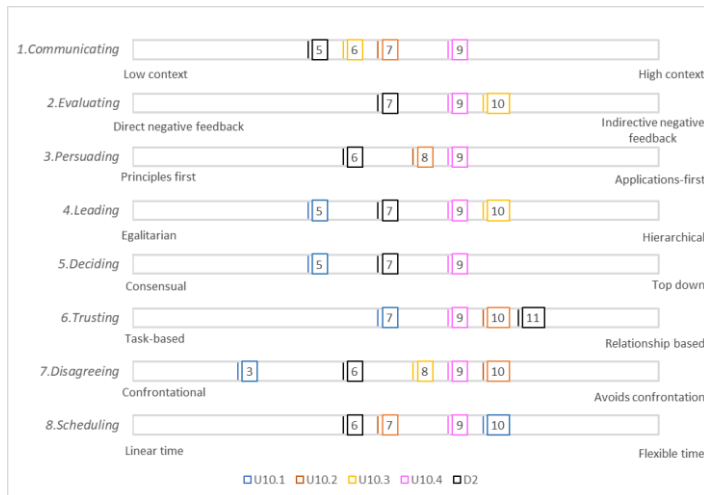


Figure 11
Scales group 10 and D2



4.7.1 Communication with developers

The communication with developers was limited during the course; besides the two mandatory meetings, they requested another one during the third week. However, the interventions during these meetings belong mainly to D1. The students were not proactive and took much time to answer if not addressed directly by the developer.

Communication with the leading developer was scarce. Besides the two mandatory meetings, there was only one between the two parties. During these meetings, D1 will intervene by presenting questions to the group, on every occasion, followed by silence until one of the group members decided to speak. This dynamic was also repeated in the group interview at the beginning of the course. Furthermore, the answers given were short and, in some cases, monosyllabic. The main developer mentioned they were lost during the process due to a lack of supervision, although she did not understand them. During the interviews, when asked why they did not ask for help before, the students mentioned that they wanted to finish things independently (U10.1). However, one of the students, U10.2, mentioned that she was afraid of the reaction of D1.

D2 opinion about the group was different to the one by D1. She said that at the beginning, they were shy and that communication was a challenge. However, because she has worked with people like this, she knows how to handle them. Therefore, she acted more approachable; as a result, the group attitude changed, opening up and even asking for help. Moreover, in her opinion, they were even quick learners and understood things quickly besides being patient. At the same time, she valued their idea, which D1 also thought was creative.

4.7.2 Dynamics within the group

Incomplete work

Since the begging of the project, this group has been behind in the process. The first week the documentation required was not delivered on time, and they already started with a delay with respect to the rest of the teams. Because of this, they need to have the kick-off meeting one day after the rest of the groups. Furthermore, in the last meeting, this was the only team that did not demo anything during the final presentation. They showed the developer the project but did not run it or demo the VR headset. The developers thought they had the most creative idea among all the groups. However, they could not develop it, and neither showed it on the presentation day. D1 was confused about this team; she thought they did not understand the project and were missing guidance.

In the last meeting, D1 assigned every person a role, dividing the task and assigning a time frame for them. The students in the interviews mention being motivated by this external guidance, which

helped them finish the project. These results suggest that the presence of an authoritarian figure that divided the task was essential for the project's successful outcome. In the absence of this leading role, the project was not successful.

Absence of communication with developers and within the team

While developing the project, they acknowledged they had problems. However, they did not ask for help, although they knew they could receive it. Instead, they thought they could solve them by themselves. Furthermore, the poor communication dynamics were not exclusive to the developers. They also extended to the team members. For example, one of the students in the last interview mentioned that some team members were unaware of the work done during these weeks. This proves the bad project management in the groups since, as mentioned by the same student, before the last meeting with developers, they will divide the task and work on them separately rather than working together.

Furthermore, as mentioned by the leading developer, there were some language barriers to overcome. Since one of the group members had a lower level of English than the rest. During the individual interview and during the project meetings, her answers would not relate to the questions asked. In addition, she filled in the survey distributed with a “neutral” answer to every question. She was either showing that she did not want to answer the questions or did not understand them.

5 Discussion

This research tries to understand better the communication flaws between users and developers while working on high-tech projects. The results show there were several miscommunications and disagreements between them. Although culture was not a determinant factor in all the cases, cultural traits like communication, persuasion, decision making, or disagreement were relevant to identifying the reason behind some communication problems among both parties. However, other issues were related to the individuals' personal traits or the specific context of the situation and, therefore, were not relatable to culture.

These findings answer the research question presented at the beginning of the paper, *How does the user's and developer's cultural background influence the miscommunications between them?*. The results show that culture partly influences the development of multidisciplinary teams, but that personality traits and context play an important role in communication flaws. Therefore, both elements should be considered together to analyse challenges in multicultural user-developer communication. This means that cross-cultural and multidisciplinary team management fields should merge to understand and provide solutions for these interactions.

Furthermore, regarding our sub-question, *To what extent are some cultural traits more influential than others on the miscommunications between users and developers?*. The results show an evident influence of cultural backgrounds on leading, disagreement and persuading. In most groups, there was a common pattern where the conflicts and decisions made directly depended on the feedback's directness or the actors' reasoning mechanics. Therefore, these cultural patterns should be acknowledged in user-developer intercultural relationships. However, although the rest of the traits did not show cultural patterns among most of the groups, behaviours like scheduling influence the project's performance in some situations and should not be dismissed for future interactions.

This section is divided into two parts. First, the communication flaws between users and developers are introduced, explaining the implications of these findings. Furthermore, the challenges encountered were not exclusive related to miscommunications between users and developers but also to the inside dynamics of the team. Therefore, the patterns of team dynamics found are explained and related to the cultural influences. In addition, their relevance to the work of users and developers is discussed and related to the literature.

5.1.1 Communication flaws

Absence of communication

Most of the groups presented communication problems among users and developers. However, the main communication issues involved the Southeast Asian students and the leading developer. Specifically in the case of the group formed only for South Asian students. Users and developers failed to understand each other during the process. The absence of communication between both parties prevented the project from being finished on time, among other reasons. Although based on the literature on high context versus low-context communication (Meyer, 2014a), we initially interpreted that the lack of participation in the meetings suggests the students tended to be better active listeners when communicating, prioritizing listening and decoding a message over-communicating itself. However, the answers to the survey suggest otherwise, as the leading developer and the students had similar scores on the communication scale.

One of the reasons behind the absence of communication may be the difference in hierarchical position between the students and the developers. Their scores of the students on the Leading scale are inclined toward the hierarchical position, proving the importance of power distance for them. According to the literature, the higher hierarchical position could prevent them from addressing them directly (Y. Liu, 2007). Furthermore, some authors suggest (Brown & Levinson,

1987) that the politeness of East Asian cultures is characterized by prioritising avoiding someone from losing face over expressing opinions freely. This politeness may have prevented them from directly addressing the leading developer due to her higher hierarchical position. In addition, the communication with the second developer was more effective. This is because she was closer in a hierarchical position to them, proving that the difference in power distance was a determinant factor for enabling or preventing interaction.

Moreover, the team communication was limited in both groups with east Asian members. Even though the groups had chosen different environments and the members were, of course, not the same. The communication problems follow the same pattern. The absence of questions from East Asians left them behind in the development process. Furthermore, they did not interact with the rest of the team members to solve the problem. However, the data collected during the interviews suggest the absence of team communication is due to the working methodology, as they work separately on the project.

These findings suggest that the reason for miscommunication is double. First, the decentralized working environments, sometimes virtual, favour ineffective communication between team members. Second, these separately working spaces enhance the necessity of a project leader who will coordinate the different individuals working separately. Due to the absence of a project manager, the team members were lost in the process and their interactions. The existence of external management would have been able to assign the task and coordinate the team members working remotely. These findings show that culture and context play a determinant role in this situation. The requirement of a leader was more vital in the students from the Southeast as hierarchy and power are used as motivation to reward individuals (Schwartz, 1999). Nevertheless, after the developer gave them guidelines in the last meeting, Southeast Asian students mentioned being motivated by them, while the rest of the course students did not. In conclusion, the communication problems in this case are not related to culture. Although the obstacles of separated working spaces have already been mentioned as a cause of conflicts in multidisciplinary team collaboration (Kim et al., 2015).

Confrontation

Furthermore, the communication flaws between users and developers were not limited to the Southeast Asian students; there were also disagreements involving Dutch students. These findings align with our expectations about direct versus indirect disagreement (Meyer, 2014a). Because we have a culture used to open confrontation and being emotionally inexpressive (Dutch), facing a culture that prefers to avoid confrontation and is emotionally expressive (Mexican). During the confrontation, the students address the leading developer blaming their project's problems on something under the developer's scope. The leading developer feeling attacked would answer defensively toward the students. The reactions of both parties are in line with the literature about cross-cultural conflict management. When the students mentioned their problems even though they were not blaming the developer, she felt disrespected, as the relationship conflict is conveyed within the message in confrontation (Brett et al., 2014), leading to emotional escalation from the developer. These findings imply that the different disagreement perceptions must be considered in multidisciplinary teams, where the parties have different expertise. Because the existence of different backgrounds adds a complex layer favouring the appearance of disagreements that should be managed considering the cultural and personal traits to maintain effective communication.

Moreover, the second developer also had disagreements with one group of students. The students, on the other hand, did not mention any problems with her. Based on the results from the interviews and the scales, these disagreements do not seem to have an origin in cultural differences. Instead, the virtual meetings and individuals' traits may seem to be the reason for the conflict between

users and developers. The findings suggest the technical problems during the meetings caused misunderstandings between both parties, leading to a bad relationship between them.

Overall, the groups the leading developer had a conflict with, the second developer had a good feeling about them, and the groups the second developer had trouble with worked smoothly with the leading developer. The developers' diverse opinions did not have a relationship in all the cases with their cultural backgrounds as we expected. Except for the East south Asian student group, the different roles and stages where the developer intervened influenced the developer-student relationship. The groups with a positive relationship with the leading developer delivered the project in time meanwhile, the groups that had a positive relationship with the second developer failed to do so. However, they had advanced technical skills and worked with her after the final meeting, meaning there was no pressure of an incoming deadline.

These findings suggest that the developers are inclined to have a better relationship with the users that align with the goals they want to achieve in a development process. And that the interaction context (ex. deadlines, virtual or off-line environments) plays an essential role in the appearance of miscommunications and conflicts. In the literature, several examples mentioned that the different priorities of the members of multidisciplinary teams were a source of conflicts when making decisions about a product (Kim et al., 2015; Lovelace et al., 2001). Based on these results, we could argue that these priorities also play an important role when dealing directly with users and could influence the communication during the co-design process, affecting the final product. Thus, each team member's role and the goal they intend to pursue should be predefined to clarify their priorities.

External guidance

The demand for external guidance from the Dutch students was another source of miscommunication between developers and users. Although, a German student also mention the lack of guidance. These demands came from students struggling to deliver the project on time. However, even in groups where the project was delivered on time, students demanded guidance to acquire the necessary technical skills to work with Unity.

These findings were unexpected as we consider that Dutch societies, characteristically egalitarian, are willing to find consensus when making decisions (Benders et al., 2000) and, therefore, do not expect these decisions to be taken by a superior. However, the reason behind this request is not lack of guidance but of evaluation. As an extension of education, the Dutch work system works with a clear goal definition during a limited time period and a set of resources available in addition to a continuous evaluation during the process (de Bony, 2010). The skills lab was missing the evaluation part as there were two mandatory meetings with the developers, allowing only a final evaluation without a middle iteration of the process. These findings suggest that receiving feedback during a project is a determinant requirement to ensure performance quality in Dutch teams. Especially when the members of the team are not familiar with the technology, like this case.

Furthermore, During the skills lab, the developers' supported technical issues rather than giving management advice. Thus, the students' most common struggle was project management. Nevertheless, there was one group whose performance in project management was perfect. Consequently, the project was delivered on time with the best outcome out of all the groups. The differentiating factor was that the developer designed a project manager directly, which was determinant in ensuring the satisfactory outcome of the project. Thus, assigning the roles and understanding which activity each member has to develop is essential to ensure the quality of multidisciplinary teams. Furthermore, similar findings can be found in the literature (Kim et al., 2015).

Moreover, both developers at the end of the project acknowledged this lack of management. The leading developer mentioned that a third meeting in the middle of the skills lab should be established for the following editions of the course. In addition, the second developer proposed that they should design roles among the group members.

5.1.2 Group dynamics

Lack of understanding of the course

The lack of understanding of the course of the Southeast Asian people was another reason for not delivering the project on time. The reason for this may answer to the holistic thinking characteristic of Asian cultures (Meyer, 2014a). That is because, during the skills lab explanation, there was a short connection to the research part of the course, failing to explain the big picture and the interrelations between both parts. Instead, the focus was on providing the steps from requirements to technical development in addition to how the project would be evaluated. This led to a short or null connection between the Southeast Asian students' research idea and the development part.

Although these findings answer our expectations based on the literature framework, they contradict some authors that sustain Easter Asians are inclined toward an inductive approach to learning (Li et al., 2020; Y. Liu, 2007). Indeed, the scores in the survey of the East Asian students showed their preference for an inductive learning approach, but so did the scores of the rest of the course participants, who generally had no trouble understanding the concept of the course. Therefore, these results suggest that although the presentation of the skills lab was mainly deductive, it did not influence the adequate understanding of the students who preferred an inductive approach.

Leadership

Regarding leadership, there is a tendency to have two clusters within the groups. The students making the decisions were either from the predominant nationality in the group (ex. German-German) or from the minority's nationalities in the groups (ex. Italian-Rumanian). But there was rarely a group where the "leaders" were from the majority nationality and one of the minority nationalities (ex. German-Italian). In most cases, one of these subgroups would take the leading role, being its members the most talkative during the meetings and the ones making the decisions about development and research. As a result, the students with more knowledge about the project within the group were the ones within the dominant subgroup cluster, making most of the design decisions.

Canney Davison (1996) mentions this type of model in his research about multicultural teams, where there is subgroup dominance of one faction of the members. This situation could make that some opinions or suggestions may not be mentioned due to the dominant perspective of one nationality subgroup (Crotty & Brett, 2012). Furthermore, the students in the leading clusters tended to score high on the Deciding scale, indicating a preference for making top-down decisions. However, rather than being a nationality pattern, these scores were present in all the dominant clusters of each group. These results suggest that although some nationalities are more inclined toward making top-down decisions. Personality traits play an important role, in addition to the group clustering between majority and minority nationalities, and can determine the decision and direction of the groups. Therefore, when working with users, there should be a group of either one nationality group or a complete mix group without majority nationalities.

Adaptability vs creativity

There was a tendency for those groups delivering the project on time to be less creative than those failing to reach the deadline. The less creative groups prioritize adapting to the time frame to design their environment while the creative ones prioritize the task, in most cases losing themselves in the process. Thus, the lack of adaptability was linked to unconscious struggle and

assumptions about time management. The results suggest that the lack of technical background from the students led them to overestimate their capacities in creating ambitious projects.

Furthermore, the East south Asian group had a completely diverse approach to the research, being their idea the most creative of all. The finding contradicts the literature as some authors mention that Asian societies are conservative, prioritising collective social well-being above individual autonomy, consequently restraining creativity (Schwartz, 1999). The result suggests that personality traits influence the decision taking. Thus, the cultural traits are not relevant in this case.

6 Implications

Based on the discussed results, the theoretical implications for academia are explained in this section. Followed by the practical implications for co-designing with users and the influence culture has on them.

6.1 Theoretical implications

The theoretical framework presented at the beginning of the paper shows a clear distinction between the literature about cross-cultural management (Ali & Lai, 2021; Crotty & Brett, 2012; Distefano & Maznevski, 2000; Meyer, 2014a) and the one about the obstacles multidisciplinary teams face (Abelein & Paech, 2014; Bucciarelli, 1996; Kleinsmann & Valkenburg, 2008). Our results, however, show that both categories are closely related and must be considered together when facing challenges in an international context. Furthermore, the challenges the participants faced were not originated exclusively because of culture. Personal traits and context also influenced the interactions. Therefore, in some cases, the miscommunications were not related to culture.

These findings reinforce the urge of some authors (Boussebaa, 2020; Jackson & Primecz, 2019; Söderberg & Holden, 2002) to swift from the traditional conception of project management toward a more dynamic conceptualization of culture that takes into account the organizational setting and interaction of the globalize companies. Furthermore, these findings provide a starting point into the “new” era of cross-cultural management. Therefore, further studies within the dynamic conception of culture should also focus on context and personal traits to overcome the challenges multicultural teams face and understand the interrelations resulting from a globalized organizational setting.

Moreover, this research shows that culture plays a role in miscommunication between users and developers. Even if this role is not predominant, it is fundamental to understand the flaws in the interaction between both parties. Culture has proved essential to understanding and solving disagreements, dealing with the absence of communication and partly influencing the adequate reasoning of technical concepts. Therefore, further studies about co-designing with users should focus on these challenges and study the influence that culture might have or not on them in diverse situations.

6.2 Practical implications

The findings of this study underline the necessity to acknowledge the role culture, among other factors, plays in the interactions between users and developers. Considering the growth of co-designing with users as a development method, this research could help cross-cultural, multi-disciplinary teams enhance their performance.

Based on the results, the different views on confrontation (direct vs indirect) influence the misunderstanding among both parties. Therefore, it's advisable to evaluate the disagree preferences of the users and developers before the start of the development process to prevent possible misunderstandings, consequence of these different views. Furthermore, power distance was another source of miscommunication. Therefore, defining the roles and hierarchical position of every team member should avoid misunderstandings and enhance the work and interactions among the team members. Besides, it could also help individuals from different professional backgrounds better understand their role in the team.

The dominance of specific clusters within the groups could have prevented the interaction of some of the members. When working with several users, there should not be a predominant nationality, as their members will probably dominate the group, preventing others from expressing ideas. Or the opposite situation may happen, the minority groups could cluster together, preventing some opinions from arising. Therefore, the users selected should be from different nationalities

Furthermore, although the advice presented are culture related, it must not be forgotten when dealing with people from different cultures that each individual is unique and personal traits or other external factors may play a role in these miscommunications. Culture matters but is not the only thing that matters.

7 Limitations and future research

This research had some limitations regarding the design of the study. Although intended to analyse the interaction among users and developers, the research was conducted in an academic environment. The students represented the users whom the developers assisted in finalising the project. The dynamics among these two groups were similar but not as faithful as in an actual company. The same research should be carried out on a company with co-designing strategies to improve and extend the findings.

Regarding data collection, the interviews were not conducted with all the group members due to the lack of time. Although the sample was relatively large, interviewing all the group members would have allowed for more information and perhaps findings on user-developers interaction. Furthermore, the interviews were conducted in public spaces. Therefore, the background noise sometimes did not allow us to understand parts of the conversations. This was the case, especially with the recording of the meetings. Furthermore, the participants' demographics were not considered for elaborating the cultural analysis. Therefore, variables such as gender were not taken into account. However, considering that the findings suggested context and individual traits are relevant for explaining miscommunications, demographics should be considered in future research.

Furthermore, Meyer's work (2014a) results from the author's research and experience as a cross-cultural consultant. His study does not answer the standard scientific route, but that does not mean it is less accurate. The book explains that the data collection was done through interviews with managers worldwide. The resulting position of each country on the scale is the average of these results. The reason behind the limited methodology explanation may be that its audience is business people rather than scientific experts. Therefore, the aim of the book is divulgation. That explains that it mainly contains examples and personal experiences rather than references to other authors or empirical data. Although we rely on the results about cultural traits provided by the survey. The reduced empirical data provided by Meyer about the model is a limitation, and further research or information about the scales should be provided.

Although the BMSLab was suitable for the data collection due to the presence of employees with international backgrounds. Because of that, the participants were used to dealing with different nationalities before the research, as the University of Twente is an international university with mainly English programmes. This fact may have prevented miscommunications from happening between the users and developers as both parties are used to dealing with them. Moreover, the developers involved did not participate equally with all the groups, which could have limited the findings. The same level of involvement of several developers from different nationalities should be considered for future analysis.

Finally, some nationalities exceeded others considerably in the research population, making it difficult to find patterns among the minority nationalities. For future research, selecting specific nationality groups will improve the communication flaws. Following the findings of this research, focusing on the flaws found between users and developers and research further about them in specific nationality groups will allow to understand better the origin of the flaws linked to culture and apply the findings to other cases.

Regarding the results, the miscommunications arose due to cultural traits, context and individual traits. The cultural traits responsible for the miscommunication were already discussed in this paper. However, although the influence of individual traits on IT teams had been research in the literature (Brathwaite et al., 2019). Further research should be done to analyse together the influence of individual traits, context and culture, and identify when they are determinants to

understanding and preventing miscommunications in the framework of cross-cultural management research.

Moreover, due to the absence of holistic thinking reasoning in the course. One of the sources of miscommunication was the lack of understanding of the project from the East south Asian students. However, on the scales, the preference for inductive was clear. Therefore, further research should be done to understand the interrelations between holistic thinking and inductive reasoning and their role in the educational setting. Furthermore, the Dutch students demanded more evaluation to improve their project management, which is an intrinsic part of their educational process and was missing in the course. However, none of the remaining nationalities (besides one German student) mentioned this problem. Therefore, it would be interesting to research the role of evaluation and how it influences education and working methodology in different countries.

8 Conclusions

This study aimed to analyse the influence culture had on the miscommunication among users and developers and which cultural traits influence understanding and solving these communication flaws. Through qualitative and quantitative methods, the results prove the important role culture plays in leadership, disagreement and reasoning during the development process. However, context and individual traits were also identified as valuable factors in understanding the challenges the participants faced.

We argued that these findings suggest that cross-cultural management should also consider external factors to understand the interactions in international organizations. Furthermore, we discuss that the results of this study are the starting point for the new dynamic cross-cultural management field. We presented cultural traits, context and individual traits as the three significant factors user-developer interaction should focus on addressing the miscommunications that may occur. Among the cultural traits, we consider disagreement, leadership and understanding significant factors that should be considered when dealing with international teams. Furthermore, context and individual traits should be analysed in further research to understand better the nature of user developers' interactions. Moreover, practical advice was provided for future user-developer interactions and future research guidelines to understand and enrich those interactions.

This study has shown the relations between cultural traits and other external factors usually considered separately in the literature. Proving that user developer communication should be considered a richer field rather than only culturally based and that context and individual traits also play an essential role. Furthermore, culture has proven essential; especially leadership, disagreement and persuading are relevant traits that should not be overlooked. However, to understand the complex and often challenging interactions of users and developers, culture, personality, and context should be considered as a whole. Becoming, therefore, essential factors of the new globalize technology development era.

9 References

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Appendix A: Codebook

	Code	Comment	Grounded	
Dynamics within a group	Positive	<ul style="list-style-type: none"> Acknowledge strength and limitations 	10	
		<ul style="list-style-type: none"> Adaptability 	15	
		<ul style="list-style-type: none"> Ask for help 	6	
		<ul style="list-style-type: none"> Clear communication 	26	
		<ul style="list-style-type: none"> Conceptual understanding 	15	
		<ul style="list-style-type: none"> Confidence in team members 	4	
		<ul style="list-style-type: none"> Creative 	The idea of the group is good, original, creative.	13
		<ul style="list-style-type: none"> Effective work 		2
		<ul style="list-style-type: none"> Good project management 		17
		<ul style="list-style-type: none"> Good team communication 		29
		<ul style="list-style-type: none"> Good time management 		6
		<ul style="list-style-type: none"> Prepare for meeting 	Prepared the information in advance or questions for the meeting	10
		<ul style="list-style-type: none"> Realization of struggling 		5
		<ul style="list-style-type: none"> Straightforward communication 		21
		<ul style="list-style-type: none"> Test 	Test the idea or feature and see how it goes. Get hands on with the project.	9
		<ul style="list-style-type: none"> Theoretical and practical balance 	Liking the actual structure of the course and the balance between the examples, practice and the link with the theory	3
		<ul style="list-style-type: none"> Value Teams 	Consider teams as a good option for groups management and communication.	4
		Negative	<ul style="list-style-type: none"> Absence of team communication 	There is no communication, or something was not communicated, between the members of the team or between the groups and the developers.
	<ul style="list-style-type: none"> Absent of communication 		There is no communication, or something was not communicated, between the group and the developers.	10
	<ul style="list-style-type: none"> Assumptions 		Make assumptions about how much time a certain task takes to make	6
	<ul style="list-style-type: none"> Bad project management 			28
	<ul style="list-style-type: none"> Bad time management 		Not finish a task in time due to bad management.	25
	<ul style="list-style-type: none"> Design flaws 		The design idea did not make sense which what they wanted to measure.	8
	<ul style="list-style-type: none"> External blame for errors 			7
	<ul style="list-style-type: none"> Incomplete work 			10
	<ul style="list-style-type: none"> Lack of adaptability 			3
	<ul style="list-style-type: none"> Loose focus 			2
	<ul style="list-style-type: none"> Misscommunication 		Percieveid misunderstanding between two parties. They communicate (a problem and idea) to the wrong person. Or communicate the wrong information.	11
	<ul style="list-style-type: none"> No clear communication 			19
	<ul style="list-style-type: none"> No conceptual understanding 		Perception that the students do not understand the task or the concept of the course, they are not able to set well the design and the requirements and consequently write the user stories.	12
	<ul style="list-style-type: none"> No creative 			3
	<ul style="list-style-type: none"> No test 		Not demo the enviroment enough or at all.	7
	<ul style="list-style-type: none"> Not asking for help 		Not asking for help when needed.	22
	<ul style="list-style-type: none"> Stressfull communication 			3
	<ul style="list-style-type: none"> Too ambitious 			9
	<ul style="list-style-type: none"> Unconcius struggle 	Not realizing that they were struggling.	12	
Neutral	<ul style="list-style-type: none"> Comparing with other groups 		7	
	<ul style="list-style-type: none"> Confusing working methods 	Do not know how to temas work and/or being confused about which channel use for communication.	9	
	<ul style="list-style-type: none"> Consensual agreement 	Want to reach an agreement together later, not in the meeting.	2	
	<ul style="list-style-type: none"> Demand external guidance 	Feeling of need having more guidance from the developers during the course.	18	
	<ul style="list-style-type: none"> Early stage 	The groups is in the design process setting up the idea.	7	
	<ul style="list-style-type: none"> Feasibility 	Wonders or mention about the fesibility of an action.	31	
	<ul style="list-style-type: none"> Independent 	The fact that they are more idependent in terms of work and they have to take the initiative. They have a path to follow but there is freedom within this path.	16	
	<ul style="list-style-type: none"> Metaphor 		2	
	<ul style="list-style-type: none"> Project management 		10	
	<ul style="list-style-type: none"> Project setting 	Talk about the requirements needed and the users stories.	4	
<ul style="list-style-type: none"> Technical skills 	Mentioned the actiones realted to the Unity enviroment and the gain of skills to work with it.	23		
<ul style="list-style-type: none"> Time management 	Wonders considerations about how to manage time.	22		

Attitudes/actions of developers	Positive	● Be approachable	Approachable attitude towards the students.	3
		● Feel impressed		3
		● Feel happy		8
	Negative	● Perceived support	Feel understood and help from the developers trough the process.	27
		● Confusion	Feel confusion in others or feel confused yourself about something.	12
		● Frustration		17
		● Insufficient information		5
		● Online issues	Technical issues during online meetings.	6
		● Mismatch between expectations and outcome		14
	Neutral	● Watch videos	Mentioned the students should watc the videos because questions ask or struggles they had were answer there, and they clearly haven't watch them or find the videos usefull.	9
		● Alternative implementation	Do things in a different way.	11
		● Collaboration between groups	Suggest to work with other teams and share ideas.	3
		● External project management	Provide guidance to the students in term of project management.	14
		● High context communication	Communicating wiht underlying message instead of directly.	2
● Inductive reasoning			6	
● Strict but fair			9	

Attitudes/actions of users	Positive	● Empathy		5
		● Enthusiastic		12
		● Feel happy		8
		● Motivation		4
		● Patience		4
		● Perceived comfortability		1
		● Respectfull		1
	● Self-reflection	Considereing that they should have seen that the project was not going to be feasible at the end.	13	
	Negative	● Bad technical skills		5
		● Commintment		1
		● Confusion	Feel confusion in others or feel confused yourself about something.	12
		● Disrespectfull		3
		● Fear of reaction	Fear of the reaction of the developer to the questions asked, because she may find them stupid or get angry at them.	3
		● Feel overwhelm		5
		● Incomplete documentation		11
		● Language barrier	Percived or actually having language barrier problems	2
		● Perceived arrogance	Perceived arrogance in the students	7
		● Perceived functional stupidity		3
		● Perceived negativity		2
		● Perceived shyness		4
		● Perceived stubbornness		9
		● Percieved absence of reflection	After the final meeting they kept making the same mistakes	3
	Neutral	● Scared		8
		● Mismatch between expectations and outcome		14
		● Scatter information	Considering that having several channels of communicaiton or to get information is confusing.	6
		● Paternalistic leadership	Perception of the boss as a paternalistic figure.	1
		● Practical learning	Learn by doing	3

Appendix B: Reliability analysis

CITATION	R1	R2	REVISED CODE	Kappa= 0,8
1:1	Perceived support	Perceived support		
1:2	Perceived support	Perceived support		
1:3	Prepare for meeting	Prepare for meeting		
1:4	Feasibility	Feasibility		
1:5	Confusion	Confusion		
1:6	Theoretical and practical balance	Theoretical and practical balance		
1:7	Scatter information	Scatter information		
1:8	Value Teams	Scatter information	Value Teams	
1:9	Scatter information	Scatter information		
1:10	Confusing working methods	Confusing working methods		
1:11	Scatter information	Scatter information		
1:12	Confusing working methods	Confusion	Confusing working methods	
1:13	Alternative implementation	Alternative implementation		
CITATION	R1	R2 MODIFIED	REVISED CODE	Kappa=0,788
7:14	Early stage	Early stage		
7:15	Bad technical skills	Bad technical skills		
7:15	Conceptual understanding	Conceptual understanding		
7:16	Conceptual understanding	Conceptual understanding		
7:17	Straightforward communication	Straightforward communication		
7:18	Early stage	Prepare for meeting	Early stage	
7:19	Good project management	Good project management		
7:19	Good time management	Good time management		
7:19	Prepare for meeting	Prepare for meeting		
7:21	Prepare for meeting	Prepare for meeting		
CITATION	R1	R2	REVISED CODE	Kappa=0,657
9:1	Incomplete work	Bad project management	Incomplete work	
	No test		No test	
9:2	Frustration	Frustration		
	Perceived negativity			
9:3	Incomplete work	Incomplete work		
9:5	Frustration	Frustration		
	Mismatch between expectations and outcome	Mismatch between expectations and outcome		
9:6	Bad time management	Bad project management	Bad time management	
	Frustration	Frustration		
		Confusing working methods		
9:8	Incomplete documentation	Incomplete documentation		
9:9	Too ambitious	Too ambitious		
9:10	Bad time management	Bad project management	Bad project management	
	Mismatch between expectations and outcome	Mismatch between expectations and outcome		
9:11	Too ambitious	Too ambitious		
9:12	Frustration	Alternative implementation	Frustration	
	Perceived stubbornness		Perceived stubbornness	
9:13	Perceived functional stupidity	Perceived functional stupidity		
9:14	Perceived arrogance	Perceived arrogance		
		Frustration		
9:15	Perceived stubbornness	Acknowledge strength and limitations		
9:16	Bad project management	Bad project management		
9:17	Creative		Creative	
9:18	Not asking for help			
9:19	Time management	Bad time management	Bad time management	
	Feasibility			
9:20	No clear communication	No clear communication		
9:21	Assumptions	Assumptions		
	Feasibility	Feasibility		
9:22	Perceived arrogance	Perceived arrogance		
	Bad time management	Bad time management		
	Bad project management	Bad project management		
9:23	Loose focus	Loose focus		
9:24	Bad time management	Bad time management		
9:25	Creative	Creative		
9:26	Absence of team communication	Absence of team communication		
		Self-reflection		
9:27	Bad project management	Bad project management		
9:28	Design flaws	Design flaws		
9:29	Design flaws	Design flaws		
9:30	Incomplete work	Incomplete work		
9:31	Perceived absence of reflection	Design flaws		
9:32	Incomplete work	Incomplete work		
9:33	Incomplete work	Incomplete work		
9:34	COM_Bad communication	COM_Bad communication		
9:35	Strict but fair	Strict but fair		

9:36	Acknowledge strength and limitations	Acknowledge strength and limitations		
9:37	Bad project management	Bad project management		
	Perceived arrogance	Perceived arrogance		
9:38	Absence of team communication	Absence of team communication		
9:39	Self-reflection	Self-reflection		
9:40	Alternative implementation	Alternative implementation		
CITATION	R1	R2	REVISED CODE	Kappa=0,74
11:1	Enthusiastic	Enthusiastic		
11:2	Demand external guidance			
	Feasibility	Feasibility		
11:3	Feasibility	Feasibility		
11:4	Not asking for help	Mismatch between expectations and outcome	Not asking for help	
	Unconscious struggle		Unconscious struggle	
11:5	Demand external guidance	Demand external guidance		
	Feasibility	Feasibility		
11:6	Unconscious struggle	Mismatch between expectations and outcome	Unconscious struggle	
11:7	No test	No test		
	Unconscious struggle	Unconscious struggle		
11:8	Bad time management	Bad time management		
	Demand external guidance			
11:9	Absent of communication	Absent of communication		
	Unconscious struggle	Misscommunication		
11:10	External blame for errors	External blame for errors		
	Feasibility	Feasibility		
11:11	Assumptions	Assumptions		
	Bad time management	Bad time management		
	Unconscious struggle	Unconscious struggle		
11:12	Not asking for help	Not asking for help		
	Unconscious struggle		Unconscious struggle	
11:13	Self-reflection			
11:14	Not asking for help	Not asking for help		
	Unconscious struggle	Unconscious struggle		
11:15	Value Teams	Value Teams		
11:16	Clear communication	Clear communication		
11:17	Perceived support	Perceived support		
11:18	Adaptability	Adaptability		
	Good team communication	Good team communication		
11:19	Self-reflection	Project management	Self-reflection	
11:20	Demand external guidance	Demand external guidance		
11:21	External blame for errors	External blame for errors		
11:22	Demand external guidance	Demand external guidance		
11:23	Comparing with other groups	Comparing with other groups		
11:24	Project management	Project management		
11:25	Mismatch between expectations and outcome	Mismatch between expectations and outcome		
CITATION	Codes	R1	REVISED CODE	Kappa=0,74
10:1	Feel overwhelm	Feel overwhelm		
10:2	Creative	Creative		
10:3	Frustration	Frustration		
10:4	Demand external guidance	Bad project management	Demand external guidance	
	Perceived stubbornness	Perceived stubbornness	Perceived stubbornness	
10:5	Misscommunication	Misscommunication		
10:6	Feasibility	Feasibility		
10:7	Feasibility	Feasibility		
	Time management		Time management	
10:8	Demand external guidance	Demand external guidance		
	Project management		Project management	
10:9	Unconscious struggle	Mismatch between expectations and outcome	Unconscious struggle	
10:10	Bad project management	Bad project management		
	Unconscious struggle	Unconscious struggle		
10:12	Feasibility	Feasibility		
	Project setting	Project setting		
	Time management	Time management		
10:13	Technical skills	Technical skills		
10:14	Demand external guidance	Demand external guidance		
	Time management	Time management		
10:15	Perceived support	Perceived support		
10:16	Feasibility	Feasibility		
	Project management	Project management		
	Time management	Time management		
10:17	Feasibility	Feasibility		
	Good time management	Good time management		
	Project management	Project management		

Total kappa= 0,74

Detailed explanation of The Culture Map

Communicating scale

The styles of communication vary from one individual to another. The communication styles are determined by the individual's characteristics and the cultural norms raised by the individual. The differences in individuals' communication styles could add a handicap to the technical knowledge gap between users and developers. Furthermore, the translation of meaning can be mistaken due to the different perceptions of communication. The communication style in terms of cultural traits is divided between low- and high-context cultures.

- Low-context: Effective communication is considered precise, simple and straightforward, and in the case that clarifies the message, repetition is appreciated. There is a low level of shared context.
- High-context: Effective communication is considered sophisticated, subtle and layered. Listeners are often required to read between the lines to understand the real meaning of the message. Therefore, there is a lot of share context.

A low context communication style characterises Anglo Saxon cultures; clear communication is the primary goal. At the same time, Asian cultures have a high context communication style, where “reading the air” is a requirement to understand the message. African cultures also fit in this category. Latin American and Latin European cultures are between both categories, with a tendency towards high context communication.



Figure 1: Communicating scale (Meyer, 2014a, p. 39)

Evaluation scale

In any project development, the evaluation performance of their member is a central part of the process. Whether the performance is adequate or insufficient, the project members expect to receive feedback, generally in a constructive manner. However, the perception of constructive criticism varies from one culture to another. The evaluation scale brings to light these differences distributing countries in function of the directness of their negative feedback.

- Direct negative feedback: negative feedback is frank and honest. Negative messages are not softened with positive ones and are characterised by definite descriptions. The negative feedback may be given in front of a group to an individual.
- Indirect negative feedback: negative feedback is soft and diplomatic. Negative messages are softened with positive ones and are characterised by qualifying descriptions. The negative feedback is given generally in private.

On the side of direct negative feedback, most European countries are placed. In between both extremes is placed the US, other countries from Central and South America have a slight tendency to the indirect side. Asian cultures, in general, indirectly give feedback and so are placed on the right side of the scale.



Figure 2: Evaluating scale (Meyer, 2014a, p. 69)

Persuading scale

Persuading is an essential quality in the relationship between developers and users. In order to develop an IT system, both parties have their point of view and would like this opinion to be heard and understood. To do so, the reasoning styles of the individuals play an essential role in the acceptance of the ideas. The persuading scales distinguish between two types of reasonings.

- Principle-first or deductive reasoning: Individuals start understanding the general principle or complex concept to later move on to a specific example or practical conclusion. The core information is the conceptual principle that back up each situation presented.
- Application-first or inductive reasoning: Individuals understand first the practical application of a concept to later move on to the theory that backs up these conclusions. Discussion is practical, avoiding the theoretical part of the concept.



Figure 3: Persuading scale (Meyer, 2014a, p. 96)

However, on this scale, Asian cultures are not represented. The reason is that its classification towards persuasion obeys a different approach. Asian cultures are characterised by holistic thinking in contrast to the specific thinking of Western cultures. Asian cultures influenced by the Chinese religions and philosophers tend to focus on the interconnectedness of elements. In other words, when deciding, they emphasise the big picture. On the other hand, Western cultures insolate elements when making decisions studying the consequences of their actions regardless of what surrounds them.

Leading scale

Leading goes beyond the relationship boss-subordinate. People look up to the most experienced ones, looking for answers. In the case of the user developer relationship, depending on the user participation, the developer could be considered the “boss” in charge. Based on Hofstede’s “power distance” dimension (2001), the leading scale applies to leadership management in the business world. There are two types of leading depending on how a culture perceives power.

- Egalitarian: The power distance between boss and subordinate is small. The boss is seen as an equal, a facilitating figure among the organisation. Therefore, communication can skip hierarchical lines favoured by a flat structure of the organisation.

- Hierarchical: The power distance between boss and subordinate is significant. The boss's status is essential, consciously above his superiors, and reflects its power. Communication rarely skips hierarchical lines in organisations that are fixed and layered.

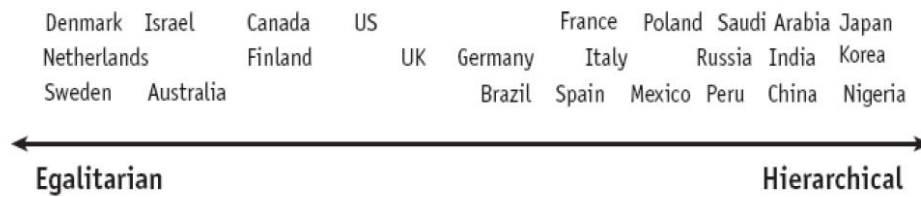


Figure 4: Leading scale (Meyer, 2014a, p. 125)

Deciding scale

When developing new technology, decisions come along the way, especially in the early stages of the process. Therefore, it is helpful that the user and the developer agree when making decisions. However, this is not always the case; across cultures deciding is an action that some societies overcome in a consensual or rather in a top-down manner:

- Consensual: decision requires de agreement of the group part of it. The decision takes a long time, but when it is made, it is inflexible. Implementation, therefore, is fast.
- Top-down: Decisions are taken by the person in charge. Responsibility is on an individual. However, decisions are handled quickly and subject to change and discussion afterwards. Therefore, implementation takes a long time.



Figure 5: Deciding scale (Meyer, 2014a, p. 150)

Trusting scale

Working in a team means trusting each other. In the user developer relationship, gaining this trust is more important because it has to be acquired quickly and in a short period. Trust, however, comes from different routes depending on which culture the individual belongs to. There are two types of gained trust:

- Task-based: Trust is based on another person's skills and reliability. Work relationships are built quickly, and so are drop. Trust is cognitive and based on the reliability of the work done.
- Relationship-based: Trust is based on emotional closeness to another person. Work relationships take time to build but last long. Trust is based on affection and is developed through personal connections.

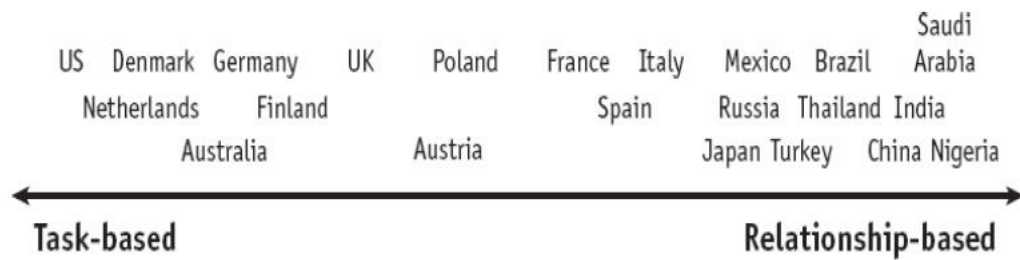


Figure 6: Trusting scale (Meyer, 2014a, p. 171)

Disagreeing scale

Disagreeing about something is standard in every IT project, often happens between team members, but it could also occur between users and developers when discussing a new product or system. Moreover, having different perceptions of disagreement could threaten the success of the process. There are two ways of disagreeing.

- **Confrontational:** Disagreement is acceptable and encouraged across the organisation. Open confrontation favours new ideas and will not negatively affect members of the organisation and their relationship.
- **Avoids confrontation:** Disagreement is harmful for the organisation. If a conflict occurs is handled in private. Doing it in public will negatively impact the individual and the group.



Figure 7: Disagreeing scale (Meyer, 2014a, p. 201)

Scheduling scale

Time is essential in any project for meeting deadlines and organisation. However, the perception of “on time” changes from one culture to another. Hall (1983) was one of the first to classify cultures in the function of time. Hall distinguishes between monochronic and polychronic cultures. The first take a fixed perception of time, while the second is more flexible and dynamic. In line with this, the scheduling scale presents two opposite perceptions of time.

- **Linear-time:** The main focus is the deadline and organisation over flexibility. Issues are addressed one step at a time.
- **Flexible-time:** The main focus is on flexibility and adaptability rather than organisation and deadlines. Several issues are managed simultaneously and fluidly, seeing changes as potential opportunities.

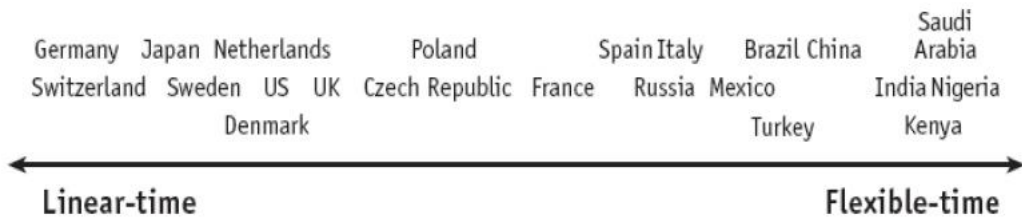


Figure 8: Scheduling scale (Meyer, 2014a, p. 227)

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