

Co-working, co-learning and culture – co-creation of future tech lab in Namibia

Future tech lab
in Namibia

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Abstract

Purpose – Future places for learning and working are digitally and physically integrated hybrid environments. The purpose of this paper is to analyse the co-creation process of the remote presence-based digital and physical co-working and co-learning place. The context is cross-cultural when Finnish space approach is applied and further developed in Namibia.

Design/methodology/approach – A qualitative case study is conducted of the Future Tech Lab (FT Lab) in the University of Namibia's main campus. The case study of the FT Lab is about 200m² space with three different zones in the University of Namibia's main campus. The physical solution encourages collaboration and technical solutions interlink the place overseas by using the remote presence. The data are gathered by using document analysis, observations, participatory workshops and interviews including structured questionnaire.

Findings – The action design research approach is a functional framework to co-create hybrid environments in two ways. It helps to design digital and physical solutions as integrated entity. Additionally, it provides a tool to analyse decision-making processes as well as design initiatives, also from the cultural perspective. Both Finnish and Namibian cultures are normative and feminine, which helped the realisation of the project based on mutual trust. However, the differences in power distance were affecting the process fluency and decision-making processes.

Research limitations/implications – The findings indicate that the co-design of the hybrid-learning environment sets requirements for the physical solution such as surface materials for premises and retrofitting of technology, which need to be considered by co-creation from the shared vision to realisation of the space. The co-creation involves many stakeholders, and cultural differences have a different impact on various stages of the co-creation process.

Originality/value – The cultural context in the case study provides an interesting comparison between the Finnish and Namibian approach. The remote presence and its requirements provide new knowledge and guidelines for co-creation of hybrid environments.

Keywords Culture, Co-creation, Learning, Environment, Digital, Global south, Hybrid

Paper type Research paper

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1. Introduction

Culture is the hidden dimension of human space, states [Hall \(1966\)](#). The manifestations of culture classified into practices and values by [Hofstede \(1997\)](#) provide an understanding of the various layers of culture. Having this in mind, this paper describes the co-creation of both the co-working and co-learning environments in Finnish–Namibian collaboration, focussing on both the co-creation process and user experiences of the hybrid place.

The University of Turku (UTU), Finland, established their satellite campus inside the University of Namibia's campus, Africa, in April 2019. The concept includes a state-of-the-art remote presence learning and working environment for international collaboration in the creation of future technologies with industry and through distance education. It is a home base for software engineering education and research as well as for university–industry collaboration. This paper aims to understand the physical and digital integration of hybrid environments in co-creation processes. Additionally, the aim is to identify differences in the cross-cultural context. More specifically, how the Finnish space approach is applied and further developed in Namibia. Further, the purpose of this paper is to analyse the co-creation process of remote presence based digital and physical co-working and co-learning place and understand the iterative process of it.

2. Cultural Context

The two major identified factors that influence the success of technology transfer are: cultural variations across nations and organisational culture-based differences ([Kedia and Bhagat, 1988](#)). However, there are other individual-related factors like age, skills and education affecting the adoption of technology ([Lee and Coughlin, 2015](#)). [Riratanaphong \(2014\)](#) studied the performance measurement of workplace change in two different cultural contexts. He pointed out the importance to understand both the national and organisational culture by stating that a general concept of national culture enables to understand fundamental aspects that all societies encounter. Different strategies (holistic, metaphorical and quantitative approaches) were mentioned to measure the organisational culture, e.g. the competing values framework identifies different organisational cultures ([Cameron and Quinn, 2005](#)).

When building up a common digital and physical platform for developing future technologies in collaboration with Finnish and Namibian students, researchers and practitioners, it is hard to understand some of the differences – and fruitful similarities. It is even harder than it is to try and take at least some of these into consideration when designing and implementing the co-working and co-learning environments.

[Hofstede \(1983\)](#) defined culture as the collective mental programming (beliefs and values) of the mind that distinguishes one group or category of people from another. Later, [Hofstede et al. \(2010\)](#) distinguished between the five dimensions of national culture ([Table 1](#)). One can also see cultural differences within nations or even tribes and clans, which is an essential fabric in the Namibian society.

The amount of research into the relationship between facilities and organisational culture that has been conducted earlier is very limited. The late 1990s [De Jonge and Rutte's \(1999\)](#) study discussed about the transformation of a traditional cellular office into more open setting with modern furniture and shared workspaces. [Van Meel \(2000\)](#) concluded in his research that the national culture is one of the factors that influence office design. This conclusion was based on comparing floorplans of offices in several European countries. Later, [van der Voordt et al. \(2003\)](#) conducted several case studies that pointed out how modern Web designers try to express a culture of being young, creative and innovative by

Dimensions	Content
Small versus large power distance (PDI)	The extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally
Collectivism versus individualism (IND)	Individualism pertains to societies in which the ties between individuals are loose; everyone is expected to look after himself or herself and his or her immediate family. Collectivism is the opposite, pertaining to societies in which people from birth onward are integrated into strong, cohesive in-groups, which continue to protect people throughout their lifetimes in exchange for unquestioning loyalty
Femininity versus masculinity (MAS)	A society is called masculine when emotional gender roles are clearly distinct; men are supposed to be assertive, tough, and focussed on material success, whereas women are supposed to be more modest, tender and concerned with the quality of life. A society is called feminine when emotional gender roles overlap
Weak versus strong uncertainty avoidance (UAI)	The extent to which the members of a culture feel threatened by ambiguous or unknown situations. This feeling is, among other things, expressed through a need for predictability and clear rules
Long-term versus short-term orientation (LTO)	Long-term orientation stands for the fostering of virtues oriented towards future rewards, whereas short-term orientation stands for the fostering of virtues related to the past and present

Table 1.
Key dimensions of
national culture
according to
Hofstede *et al.* (2010)

colourful materials, luxurious facilities like lounge areas and gyms and specialties such as pool tables and jukebox.

Further, the study of [Rothe *et al.* \(2011\)](#) found that both Finnish and Dutch respondents shared the same five most frequently chosen attributes: opportunities to concentrate, accessibility of the building, indoor climate, comfort and functionality and communication opportunities. The findings pointed out that the Finnish prefer different aspects than the Dutch. For instance, 55% of the Finnish considered the opportunity to concentrate as the three most important aspect versus 37% of the Dutch. [Riratanaphong and Van Der Voordt \(2012\)](#) compared data from [Rothe *et al.* \(2011\)](#) with the Thai office users. In that study, it was noted how hierarchical culture, masculinity and individualism are influencing, for instance choosing single tenant building to control expanding responsibilities. In addition, typical workplaces' layouts provide less variety in the spaces for socialising. While limiting opportunities to share ideas about the working environment can be reflected in the hierarchical culture as well.

Multinational companies have also shown how to use the real estate as a means to brand values like transparency, sustainability, trust and being people-oriented ([Khanna *et al.*, 2013](#)). Also, the European study by [Plijter *et al.* \(2014\)](#) found indication, how the different national cultures partly reflected in different workplaces. [Bach \(2015\)](#) concluded that Information Communication Technology (ICT), which allowed the independence of time and place to do the work, affects the organisational culture as well. This will eventually lead to an increase in employee autonomy and decrease in organisational attachment because of being less present in the organisation.

The Finnish and Namibian cultures have similarities by being both feminine and normative. Both cultures value equality, solidarity and quality. [Stump and Gong \(2020\)](#) illustrated the statistical similarities and differences between Finland and Namibia as mentioned previously. One important consideration is also that the orientation of the society of both the countries is more towards short-term orientation rather than long-term orientation. This indicates that they are more conducive to the adoption of social trends

because they value the current social hierarchy and tradition. They are also likely to emphasise the achievement of rapid results. One major social trend is different social media platforms and their usage (Hofstede, 2011; Stump and Gong, 2020; Yoon, 2009; Zhang *et al.*, 2018). Traditional African values, although in congruence with many universal values, place more emphasis on collectivism, collaboration, caring, dignity and respect (Poovan *et al.*, 2006). Normative culture includes great respect for traditions (Schwartz, 2009). Finland and Namibia have exceptionally good and long relations (150 years in 2020). Around 150 years ago, the first Finnish missionaries came to Namibia to spread Christianity. Namibia is the only country in Africa with whom Finland has such a special bond (Kaartinen *et al.*, 2019).

However, there are also differences. Namibia is a relatively hierarchical society, whereas Finland uses hierarchy for convenience only. Kluge *et al.* (2008) pointed out that “the existence of many parallel independently acting decision-makers to be enforced rather than reduced” by the central hierarchical principle of the Namibian administration.” In Finland, control is disliked and communication is direct and participative. Namibia is considered as a collectivist society, whereas Finland is considered as an individualist society in which individuals are expected to take care of themselves and their immediate families only. In addition to this, Finland seems to be more of an innovative country (Stump and Gong, 2020) that is related to the cultural dimension that is called as power distance index. All this might have consequences to experience spatial experiences. Therefore, it is essential to take inter-cultural implications into account when co-designing and co-creating the Future Tech Lab (FT Lab) to Namibia with a Finnish twist.

3. Physical and digital places for co-working and co-learning

Co-working places are researched by several scholars. Orel and Almeida (2019) defined the co-working space ambience as the look and feel of a work environment that can arouse certain moods towards a particular place and its users. Co-working spaces may impose various approaches that not only attract potential workspace users and form initial ties between them but also produce a certain ambience that leads to collaborative action between users. Kojo and Nenonen (2016) identified a typology of six types: public offices, third places, collaboration hubs, co-working hotels, incubators and shared studios. The categorisation was made by using two axes: business model (for profit and non-profit) and level of user access (public, semi-private and private).

The pedagogic performance of the spaces, physical and virtual accommodates the experience of learning (Harrison and Hutton, 2013). Harrison and Hutton (2013) stated that the rise of distributed space set challenges for the creation and design of learning-centered communities. Co-learning, also known as collaborative learning, is a method of learning and teaching, where learning is carried out as a team exploring a significant question or co-creating a project. Co-learning can be physically learning in the same place or through the internet (Aramo-Immonen *et al.*, 2015). Everett and Hummell (2013) noted about “shared workspace” of inter-cultural interaction and learning that engage students’ imaginations, encourage dissonant voices and generate narratives. An inter-cultural encounter creates new possibilities for reflexivity and opportunities for co-learning.

Universities and higher education institutions both old and new pay increasing attention to the need to design facilities that are activity-based and flexible (Den Heijer, 2011). Li *et al.* (2014) structured a basic framework for a co-working platform, which can be divided into four levels: physical workspace, basic collaboration, management and resource environment levels. Recently, they have also described the service level. According to Sankari *et al.* (2018), the benefits of co-working spaces for academic space users are in attractiveness and community appreciation. Further, Ondia *et al.* (2018) pointed out that the users attach a

symbolic value to physical characteristics of co-working spaces. The place experience both in physical and digital environment can be analysed by six characteristics of the experience: atmosphere, time rhythm, functionality, ease of use, narrative and meaning of the place (Nenonen and Kojo, 2013; Tähtinen *et al.*, 2016). Orel and Almeida (2019) stated that the factors of spatial design need to be adapted, and engagement strategies need to be constructed to maximise the preferential output in co-working places. The factors of spatial comfortability are an essential predisposition for workspace users to engage in cooperation with each other.

Hybrid environments for co-working and co-learning are increasing. According to Ninnemann *et al.* (2020), there is a need for more hybrid environments, combining the traditional campus with an e-campus. They define the term hybrid environment as an approach to merge physical and virtual spaces as well as to integrate formal and informal spaces to stress on the need to overcome disciplinary and organisational boundaries. Additionally, immersive environments are digitally mediated learning environments designed to engage users in an artificially created make-believe world. Recent study lists some of the affordances of the remote presence technology for engineering education and brings a few examples about those affordances (Pope *et al.*, 2020). Previous work of Microsoft Research “Holoportation” project best reflects the remote presence technology intended to be used in this study (Orts-Escolano *et al.*, 2016). Most recently in VR Together EU Horizon 2020 project (VRTogether), Microsoft with partners have been focussing on consumer friendly version, specifically capturing individuals, and to promote social presence and enhance the feeling of co-presence (Gunkel *et al.*, 2019).

The immersive environment in this case study is a 3D-captured space, which gives the impression or illusion that the remote user is working with local users physically in the same space, even though operating in a virtually created environment. This experience is intended to be implemented with the remote presence technology. The remote presence technology allows for an experience of a shared working or learning space in a physically distributed setting. The remote presence is designed and implemented under University of Turku (Pope *et al.*, 2020).

The remote presence technology is based on several camera pairs surrounding the space to form 3D live feed of the space and of the people and objects in the space. Thus, the remote presence technology significantly outperforms the affordances of conventional video-conferencing facilities, for example, by allowing participants of the shared session to mingle freely in another physical context, for example behind, not only in front of the peers in another context. This means that one could communicate with other and move freely in their physical location. This is happening virtually, but the illusion is so immersive that one can feel the sense of presence. In addition, it allows the participants to collaborate as themselves and not as avatars. The space and co-worker(s) are 3D-constructed in the virtual environment, where one can collaborate with real people on live. Typically, when collaborating virtually, each one has their own avatar; however, in this case, real space and people in it are constructed, and it allows one to join the space naturally just like communicating with people face-to-face (Pope *et al.*, 2020). This would be beneficial especially in the cross-cultural environment, where one can embrace culturally different values and use it for advantage while doing multi-cultural research.

4. Future tech lab concept

The FT Lab is a 200m² metre space, which consists of three zones, welcoming, co-working and co-learning zone. Plate 1 is about the co-working zone. This zone includes two phone booths, co-working area with flexible furniture on floor level or located to two different heights.

The co-learning zone shown in [Plate 2](#) can be easily customised according to the participants and the need. This area also has different floor levels. On opposite of the green wall, there is a white wall for display.

The technical solution will support co-learning and co-working and set the requirements for spatial and interior design solutions. The remote presence technique allows virtual participation to another location in a way that the virtual environment is a live 3D video feed and one can see, hear and feel the situation and presence almost the similar way as if the participants were locally present. This is possible by setting up a certain amount of camera pairs around the room, which will gather the video feed from every direction. When these video feeds are merged together, one can get a 3D-constructed video feed from the room, with objects, people and anything you have in that environment. While participants' use head mounted displays on both the ends, they could see each other in the same environment. One example of augmented reality glasses that could be used with this technology is Nreal light (NReal). These glasses are state-of-the-art augmented reality glasses, which are light to wear and the quality of the screen is relatively good, considering the size of the glasses. One can use these glasses to view the 3D-constructed space located elsewhere. This will enrich the co-learning experience in many ways. It will improve the sense of social, spatial, cognitive and teacher presence. The same technology also allows other ways to see the other end, for example, participants could look through the "window" while they are looking at the video wall and see the participants from the other side. The implementation of this requires video walls in both sites and in this case limits the connection between the two locations, whereas users use head mounted display does not limit number of locations.

The realisation of the concept was completed in terms of physical place during 2019, but the final set up of technology will be completed in the next few years. However, the collaborative activities have begun by using more traditional digital collaboration tools. This provides the possibility to investigate both the co-creation process of hybrid

Plate 1.
Co-working zone



Plate 2.
Co-learning zone



collaboration environments and the very first user experiences. The remote presence technology has been already tested locally in Finland between an elementary School and the University of Turku. The local school was chosen because technical experts needed to test the novel technology. The test group was selected because the FT Lab should be available for different age groups. The feedback from the local testing was a part of the technology development.

5. Method

The case study method as a qualitative approach was chosen because it involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence (Yin, 2009). The data is gathered by document analysis, observations, participatory workshops and interviews, including structured questionnaire. In addition, half of the structured interviews were made to gather more details. Data gathering methods are illustrated in Table 2.

The process analysis is based on five workshops with five stakeholders, three from Namibia and two from Finland. The workshops were attended by employees from both the universities in Namibia and Finland. They presented administration, management and personnel. Additionally, the Namibian project management and designers and Finnish real estate development representatives participated in the workshops. The workshops began with co-creation of the vision and proceeded step-by-step towards concrete design and planning topics.

The analysis process has been done by adapting the action design research (ADR) model. Sein *et al.* (2011) provided an insightful structured process model that combines both action research (AR; Susman and Evered, 1978) and design science research (DSR; Hevner *et al.*, 2004). They described seven guidelines for DSR. The applied guidelines are listed in Table 3.

Features	Workshops	Observations	Questionnaires	Interviews
Amount	5	4	1	1
Structure	Response to questions and open discussion	Observation sheet	Semi-structured questionnaire with open questions	Semi-structured questions with open comments
Topics	Regulations, joint goals, intended use, benefits and other possibilities	Usability of zones, co-learning and co-working	User experience, development proposals and background information	User experiences and cultural aspects
Participants	UNAM and UTU management and employees, architect, two digital designers, facilitator with co-design expertise, consulting company and constructor	Mostly Namibian and Nordic users	Event organisers	Event organisers
Participants in average	7	8-20	6	2
Time schedule	2019-2020	2019-2020	2019-2020	2021
Data	Process descriptions, Layout plans, minutes and other notes	Notes	Notes	Notes

Table 2.
Data gathering methods

Table 3.
Applied design
science research
guidelines to the co-
creation of the hybrid
environments
(Hevner *et al.*, 2004)

Guideline	Description
Guideline 1: Design as an hybrid environment	Intended to produce a model, method, tool or space solution for a hybrid environment by using the design research
Guideline 2: Problem relevance	The aim of DSR in the real estate field is to develop technology-based solutions to important, innovative and relevant sustainable development, business and functional problems
Guideline 3: Design evaluation	The quality, utility and functionality of a hybrid environment model, tool, method or spatial solution must be able to be demonstrated using evaluation methods
Guideline 4: Research contributions	Relevant DSR in the real estate field should make a clear contribution to hybrid models, design methods, design tools or spatial solutions
Guideline 5: Research rigor	Design science in the real estate field must be based on the application of rigorous methods in both the design of the hybrid environment and its evaluation
Guideline 6: Design as a Search process	Searching a significant or efficient hybrid environment design requires leveraging existing means while complying with laws of the problem environment
Guideline 7: Communication of Research	DSR in the real estate field must be presented effectively to real estate technology and management-oriented public

The selected framework is an ADR process model by Mullarkey and Hevner (2019). The ADR approach was selected because it encapsulates the processes of designing an artefact, shared space with its technology and continuous improvement into an iterative and integrated unity. The hybrid co-working and co-learning environments are the artefact. The model is described in Figure 1.

The model illustrates multiple iterations in ADR intervention cycles in every ADR stage. The four stages are diagnosis, design, implementation and evolution. Each phase includes iterations, which are Planning (P), Artefact Creation (A), Evaluation (E), Reflection (R) and Formalisation of Learning (L) (Mullarkey and Hevner, 2019). Table 4 presents the applied ADR entry points, which are a part of the ADR process model.

User experiences were collected in two phases. The first feedback was received from a semi-structured questionnaire with open comments a few months after the facilities were

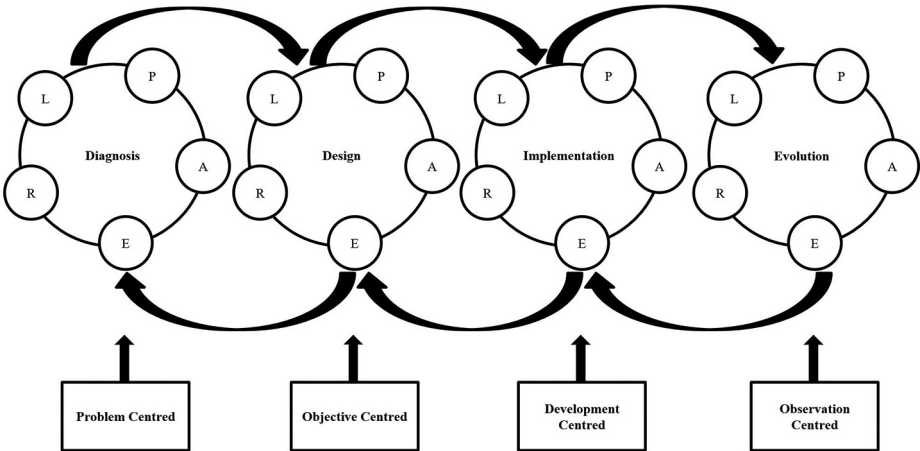


Figure 1.
Action design
research process
model with research
entry points
(Mullarkey and
Hevner, 2019)

Entry points	Descriptions	Activities	Questions
Problem-centred	Understand and define the specific research problem; understand and define the solution space	Problem Identification; motivations and goals for ADR project	What is the problem to be solved in practice? What are the research goals of the project? Why do existing solution fall short?
Objective-centred	Explore the design options based project objectives; generate design knowledge of what is feasible in the solution space	Solution Design; development of design principles	What would a better hybrid environment accomplish? What are its critical design principles and features? What is possible? What is feasible?
Development-centred	Implementation of the solution for the hybrid environment e.g., novel technology to address research problem; demonstrate satisfactory solution for the hybrid environment problem	Solution implementation; proofing of solution	How does the instantiated hybrid environment solve the problem? How to evaluate the goodness of the solution?
Observation-centred	Observe existing solution in context; identify possible evolution opportunities for the current solution	Improvement goals; evolution possibilities for existing solution	How has the solution continued to solve the problem? How has the problem changed and demanded changes or improvements to the solution?

Table 4.
Applied ADR entry
points (Mullarkey
and Hevner, 2019).

taken into use. The questionnaire was sent by an online survey tool to six event organisers from Namibia and Finland who had held the event at the FT Lab. The questionnaire had three main themes: user experience, feedback and development ideas and background questions. In addition, two event organisers were interviewed about a year after the facilities were taken into use. Semi-structured interviews were about experiences and cultural perspectives.

The observation was conducted by focussing on the activities of users in each zone. More precisely, the intention was in gathering data about the usability of different zones. To gather the data from the usability of the solutions, the observer used an observation sheet to make notes. The notes were gathered from both individual task performance and collaborative activities. Additionally, document analysis provided data from the layout drafts and the workshop documents. All data was analysed individually by three researchers, and the outcome was compared to validate findings.

6. Results

In this chapter, we introduce outcomes of every stage of the co-creation process at first. Then we go through the findings of the co-working and co-learning experiences. Finally, we bring out the cultural considerations. Overall, our applied process analysis framework was the one that obtained the most robust results.

6.1 Outcomes of the co-creation process

The results are presented based on the analysis of different phases of the ADR process stage-by-stage. The focus is on the development of the physical and digital environments, in collaboration with different phases by co-creation methods.

The stage 1 (Table 5) aimed to share vision about the campus in the Global South. The location of the FT Lab was elaborated from the existing empty building. This made the

Table 5.
Action design
research process
Stage 1

Stage 1. Diagnosis vision of satellite campus in the Global South			
Iterations	Physical environment	Co-creation methods	Digital environment
Planning	Sharing the vision of remote presence platform	Co-creation workshops between university representatives	Sharing the vision of remote presence platform
Artefact Creation	Identifying the physical locations in both campus in Namibia and Finland	Local representatives visiting campus	Identifying the ICT-architecture and infrastructure to equipment and tools
Evaluation	Understanding real estate markets in Namibia	Formal meetings for institutional agreements	Understanding academic year for realising the software engineering education
Reflection	More specified requirements	Formal meetings for Industry collaboration	More specified requirements
Formalisation of learning	Understanding e.g. the differences of built infrastructure in both countries e.g. indoor environment, energy	Understanding the maturity of physical and digital infrastructure and markets	Understanding the different cultural orientations for technology

design process focus on the retrofitting. The decision of location has turned out to be a success factor because of the fact that traditionally foreign campuses are located outside the local university campus. In this phase, managerial issues to establish the agreements between different stakeholders played a key role, and the shared vision was brought to the management level in both the universities. The use of technology for collaboration is more typical to an individual in the Finnish culture than in the community-based culture in Namibia.

The vision of the hybrid environment was introduced with some use cases. The uses cases simulated different ways to use the hybrid environment in various learning and working situations, both *in situ* or remotely. The location of the environment in the campus was decided. The first version of the novel technology was introduced at the theoretical level with the technical requirements. This information provided a starting point for co-designing the physical space.

The cultural differences in basic structures in built environment, markets and action environment in the university were important to understand in this phase. During this stage, trust was created between the various stakeholders. One notable difference was in the meeting culture where the Namibian stakeholders invited more employers, whereas the Finnish stakeholders included fewer employers for the current meeting. The Finnish participants were chosen based on their connections to the topics discussed. This difference caused some problems in the expectation of the management, while the Namibian stakeholders were expecting more people to join the meeting. They were wondering how Finnish counterparts had shared responsibility in the organisation. The collaboration was not performed according to hierarchical structures but was performed more according to the Finnish hands-on way. This was experienced as a disappointment as well as an underestimating appreciation by Namibian counterparts. However, the inspiring vision with in-built trust between stakeholders was a key driver for successful progress. The tension and scepticism at the beginning had turned into trust, respect and often a happy and humorous interaction. All in all, this provided an excellent starting point for the next stage.

From the first stage, key findings emerge as follows:

- Decision-making process was based on mutual trust. The vision of hybrid environment was formed and location of the environment was decided.
- The use cases were simulated to share understanding of functionality of the artefact as a physical and digital entity.
- One of the major cultural differences can be found in meeting practices and how the Namibians emphasise the position in the organisation.
- The trust created by the negotiations and the shared vision between the Global South and Global North stakeholders enabled the transition to the second stage.

The stage 2 (Table 6) aimed to co-create a vision of the FT Lab. This was made by understanding that the collaborative activities enhanced with the remote presence technology. The process for defining the use cases and transcribing them to functional zones in existing buildings was a rewarding learning process for all stakeholders. The use cases require movable furniture, which supports the use of co-learning zone for multiple purposes. The acoustic environment was designed to provide excellent circumstances both for local and remote interactions. It was important to consider the distance between different working groups, and the floor levels were used to increase the distance. Additionally, the sound absorbing materials were chosen. At the end of this stage, the local facility managers pointed out that they like the way the Finnish approach to describe the places. It was also discussed in interior design choices by including colours; the colour scheme of the space and the furniture was chosen to highlight both the Namibian and Finnish cultures.

During the second stage, the structural and technical implementations of physical environment were clarified. Simultaneously, a more advanced version of the novel technology was introduced in the theoretical level and some of the new technical

Stage 2. Design concept of FT Lab			
Iterations	Physical environment	Co-creation methods	Digital environment
Planning	Identifying the structural elements of the place	In-Space Design with users	Identifying the current knowledge of telepresence, potential and challenges of the technology while using state-of-the-art technology; identifying remote presence technology for multipurpose collaboration
Artefact creation	Drafting the concept with three zones: Co-learning, Co-working and Welcoming zone -drafting the first layout solutions	Co-creation workshop with users and concept developers	Identifying most suitable hardware and setup for enabling remote presence technology; specifying the passive variables for digital environment like acoustic
Evaluation	Stakeholders evaluate drafted layout	Co-creation workshop with users and concept developers	Evaluating a hardware setup for supporting remote collaboration and suitability to the physical environment
Reflection	Specifying the layout solutions	Design dialogues with professionals	Noted its impacts to physical environment
Formalisation of learning	Sharing the physical transcripts of with digital design experts	Sharing the Nordic design thinking with local stakeholders	Sharing the requirements of use cases with physical design experts

Table 6.
Action design
research process
Stage 2

requirements were pointed out. It was crucial to share the information often between designers and technical experts to make sure that the usability of the hybrid environment is good. It was also important to take care that there is flexibility for conducting potential technical changes later. After this stage, the design for the hybrid space was ready for implementation.

The cultural differences in this phase were visible in the built environment. The structural solutions of the building are based on the weather circumstances in Namibia. Warm and sunny weather make Namibians to cover the windows so that the view is closed, and the sunlight is prevented to heat the space. The Finnish approach was to reinforce the possibility to look at the view and use movable shades to restrict the sunlight when needed. The Finnish people were impressed by the high mountains and impressive colours and found out different ways to take the best out of the view. The shared vision encouraged us to co-design an environment that would combine the experience of the Namibian nature and the feeling of warmth while creating an environment that reflects both the Namibian and Finnish culture.

There were also technical issues in terms of cultural differences. Even though Namibians use the same voltage level as Finnish, they use different kinds of electrical sockets. Even the weather conditions in Namibia are clearly hotter than in Finland, one cannot assume that the premises have air conditioning. One reason for this could be the price of electricity. The cooling system and electrical sockets were chosen carefully to fit with Finnish standards because the technology was meant to be exported from Finland.

From the second stage, key findings emerge as follows:

- Decision-making process in terms of the artefact continued by defining the design of the hybrid environment on the specifications of the novel remote presence technology and its technical requirements. Before moving to the next stage, local Namibian regulations concerning renovation and the possibilities for technical implementation are taken into account.
- The project management culture indicated some cultural differences: both cultures share the responsibilities and tasks to the staff, but in Namibian organisation, the top management makes even the minor decisions, whereas in Finnish organisation, decision-making is shared. This clarifies the differences in power structures. It was notable to take this into account depending on the time schedule of the project. Additionally, the connection to the nature is experienced in a different way; this created an interesting design dialogue about the meaning of the windows. For Namibians, it is mostly light source from outside to inside, whereas for Finnish, it is also a view to the nature from inside to outside.

The Stage 3 (Table 7) aimed to realise the physical renovation in the place. The remote presence technology pilots conducted indicate that the experience of presence by technology is possible. The limitations of minor visual quality issues and the missing 3D audio need to be fixed to enhance the feeling of presence. The place is supporting the remote presence experience by dividing the group areas correctly and enabling multiple uses for the remote presence technology used. Already, at this stage in technological development, the space implemented allowed the high-quality 3D video capture. In order there should be multiple users participating in created 3D environment by using head mounted displays in different locations simultaneously.

The cultural similarities in the project management procedures made the process smooth; however, there were some differences too. The trust between different actors in the renovation project is different in the Finnish and Namibian cultures and that needs to be considered, e.g. in the selection of the project group and flow of invoices during the process.

Stage 3. Implementation realisation of FT Lab				Future tech lab in Namibia
Iterations	Physical environment	Co-creation methods	Digital environment	
Planning	Sharing the design with the chosen local partners	Sharing the design with the chosen local partners and in-space design with local planning team in Namibia	Sharing the design with the chosen local partners	Table 7. Action design research process, Stage 3
Artefact creation	Renovation of the space and decoration	Renovation process collaboration	Specifying the requirements for physical infrastructure supporting fixed technical solutions and implementing technical solutions	
Evaluation	Following the process	Collection of photo gallery Continuous updating communication	Testing current technical setup with remote presence software	
Reflection	Visiting the place	Walkthroughs and meetings	Technical infrastructure adjustment	
Formalisation of Learning	Starting to use the place	Learning to use the space in local context	Guidelines to modify technical solutions more suitable for sense of presence	

From the third stage, key findings emerge as follows:

- Decision-making process in the handover phase was influenced by cultural differences in the business behaviour. The handover phase was connected to realised account transfers – the Finnish trust to the contracts and invoices to be paid was not the case; one had to see the evidence of paid invoices straight in the bank account.
- The design of the hybrid environment was implemented except for the novel remote presence technology because of the fact that setting the connections was a slow process.
- The experiences of the physical environment were positive: impressive for the renovation team, for the users and visitors accordingly.

The Stage 4 (Table 8) aimed to use the FT Lab and because of the delay in the technology setting, the results about user experiences were based on the evaluation of the physical solution and partly of the existing digital solution. Structured interviews were conducted with six users who had organised an event in the FT Lab.

From the final stage, key findings emerge as follows:

- The user experience of the space is indicating the success in realising the cross-cultural hybrid environment: Local users feel to be outside of their home country when using the space; the Finnish solutions made the indoor environment feeling different and digital communication connected different cultures.
- The use of space is fluent; even the technology is not yet established. The intention to have future proof hybrid environment has been achieved.

Based on Stump and Gong's (2020) study, Table 9 illustrates substantive variable differences and similarities between Finland and Namibia. It also describes all the variables that were observed during the study.

Table 8.
Action design
research process
Stage 4

Stage 4. Evolution Using the FT Lab				
Iterations	Physical environment	Co-creation methods	Digital environment	
Planning	Creating the house rules for the use of place	Workshop with the main users	Preparing ready-to-use settings for different uses	
Artefact creation	Using the place for different kind of events	Meetings, seminars, workshops, individual working and summer schools	Bringing in the technology	
Evaluation	Collecting user and organiser experience feedback	Interviews, surveys	Collecting user experience feedback	
Reflection	Identifying the needs for fixing and optimising the place	Meetings with local services providers	Ensuring the usability	
Formalisation of learning	Sharing the cross-cultural experiences of place as a collaborative affordance	Learning to maintain the place in local context	Strengthening the experience with remote presence connectivity	

Table 9.
Differences and
similarities between
Finland and Namibia

Country	PDI	IND*	MAS*	UAI*	LTO*
Finland	33	63	26	59	38
Namibia	65	30	40	45	35

Notes: *These variables were also observed in this study

6.2 Co-working and co-learning experience

Based on the results of the user experiences, the FT Lab’s atmosphere is comfortable for co-working and co-learning. The current space is usable and functional for different kinds of activities. People feel the place like home. It supports different identities, and it is democratic. They wish to share the meaning of the place with others: “The room engages participants to collaborate somehow naturally. It affords soul matchmaking.” Some discussions concerned the furniture; one suggestion was that the furniture could be more African; however, from the Finnish perspective, the space feels neutral; wooden or brown material used in the furniture is more typical for African culture and could change the feeling.

Interviewed people identified the hindrances and enablers for the collaboration; the positive factors were based on the structure of the co-working zone with different levels of the floor formulating group work areas. However, the solution has some functional weaknesses; there is danger of falling from the upper to lower level. Additionally, there was a lack of space for back bags. Moreover, when asking, why you would recommend the co-learning zone to others, one participant first noted that “the environment is amazing and encouraging” and secondly “it’s interesting that the co-learning zone yield great results”. The other participant noted to the same question that co-learning zone has “Innovative and flexible arrangement”. When asked about the expectations of the connectivity between University of Namibia (UNAM) and campus in Finland multiple participants were excited about the opportunity. One participant added “I would like people in Finland and people at UNAM communicate virtually with each other in a way that they would think they are all physically present in one room”. The cultural differences were not identified in the interview

results so much even though the sample represented both Finnish and Namibians. One informant noted that white as one colour on walls may illustrate Finnish cultural value. However, the observations in space indicated that the Finnish approach to daylight differs from the local approach. Before retrofitting, the large windows were dedicated for the storage space – now, they are opening the view to the mountains for all users of space, and the curtains can be used to protect the room from the hot sun when needed. The Finnish turned out to work next to windows more often than the local users.

The interviews provided even more important information on the use of the facilities. According to the interviews, the main reasons for using the facilities were related to good connections, flexibility of the facilities and ease of use. In addition, the space is well located in the premises of the UNAM campus. It was noted that space is fitting for many purposes like, group working, demonstrations, individual work, dining and several other tasks.

When we asked, “How would you improve the usability of that space?” the response focussed on details in the physical spaces. Although the facilities are already flexible, there is a need to improve the flexibility and comfort of chairs and especially tables. Additionally, the wall with the white colour only was felt cold. One of the respondents stated that the colour of the carpet brought a warm feeling to the room. The usability of electrical outlets could be better as well as the quality of the projector used. Although the space was considered to serve many different purposes, one of the improvements was to enable catering on the premises. In addition, it was mentioned that there could be sauna facilities in connection with the premises. There were also suggestions to develop a welcoming zone, which is in the middle of two other zones, in a way that it supports the feeling of togetherness, cross-cultural atmosphere and feeling of warm welcoming more than now.

The interviews also produced feedback from other issues related to the use of the space that are affecting the usability indirectly like the location of toilets. These facilities are not well located, and the use of these facilities needs own key, which makes the usability even harder while one has bigger event and one cannot be sure is the toilet in use or who has the key at the moment.

7. Discussion

The purpose of this paper was to analyse the co-creation process of remote presence based digital and physical co-working and co-learning place in cross-cultural context when Finnish space approach is applied and developed in Namibia. The cultural differences and similarities were aligned with the general descriptions of Hofstede *et al.* (2010). The similarity of the cultures, namely, feminine and normative characteristics, can be realised from the data gathered about the case study. The co-created vision and inspire to make the collaboration platform, both digital and physical real was a social clue during the process. The trust within the process was also based on the good relationship between the countries in many different levels. The case demonstrated the importance of trust in carrying out the joint process. The Finnish design tradition in the co-creation process was based on the Finnish way to describe the activities and spaces as integrated entity and it created genuine respect and appreciation on each other.

The short-term orientation within both cultures made organisations to start the co-creation process even when the novel technical solutions were not yet fully completed. The physical space has been taken into use as it is, and the remote presence solutions will be set up later. The sense of place was experienced and described with very emotional way and the feeling of belonging was emphasised. The facilities reflect the design that is not too technical or complicated, which might be a surprise if the future technology expression rises up expectations of high-tech solutions and technology driven environments.

However, the cultural difference in hierarchy and power distance were found out mostly in communication and meeting the behaviour during the process. Additionally, the decision-making culture and some construction project practices can be identified as reflections of these cultural differences. The impact of climate on the physical and technical solutions of the built environment was also an identified root factor behind some of the differences in cultural collaboration.

The co-working and co-learning space has been successful even if it does not have the novel technology available yet. The space differs from typical Namibian workspaces in terms of interior design and furniture. The implemented environment emphasises collaboration among the more traditional emphasise of the independent, individual work in university campus. Even though the results and feedback are mostly positive and encouraging, evolutions phase continues, and suggested changes need to be made before gathering new valuable data from the environment.

Importantly, our results provide evidence for applied ADR process models' theoretical and practical usefulness as an analysis framework. Each of the four stages was divided into five iterations, which clarifies the handling of matters, and made it consistent. This is beneficial when there are multiple factors to be taken account while co-designing the space. Because each stage has a certain purpose, it clarifies requirements and implementation planning. Moreover, it illustrated the process of returning to a previous stage in addition to repeating each step until the artefact meets its intended goal. In practice, this was reflected in e.g. bringing back the challenge identified in the implementation stage back to the design stage.

8. Conclusion

The main methodological conclusion that can be drawn is that ADR model is more than suitable when co-designing hybrid environments as integrated physical and digital solution. This study applied DSR guidelines to focus on the co-design process of hybrid environments. The hybrid co-working and co-learning environment is primary the digital environment that sets the requirement for the physical environment. However, the most important requirements are set by the collaboration activities with different intensities of presence among participants. The work processes in this case were cross-cultural; the digital and physical layers were based on Finnish traditions. The shared vision of collaboration transformed to practical solution.

The practical contribution of this study enhances the significance of co-creation process with different stakeholders. The shared vision, concept and plans are important when operational construction process practices might differ both in organisational and national culture. The concept of co-working and co-learning is the concept that can be developed further to respond to the needs of digital and physical collaboration among university stakeholders. The iterative process approach is suitable for understanding the integration of digital and physical elements of the environments.

The limitation of this study is still the lack of remote presence experiences. The data is collected only in one case study, and generalisation is not possible. However, the different methods provide a source for triangulation even the amount of the responses from user experience is not very high. The cultural differences on meeting and project management as well as decision-making processes are aligned with the general descriptions of Hofstede *et al.* (2010). This also concerns the identified similarities.

Additionally, future studies focussing on learning outcomes with large groups is needed to indicate the success of the environment. It would be also interesting to see whether the similar setup in Finland produces the result alike in Namibia. Despite the limitations, the results are valuable, considering successfully applied ADR process model and as a

cross-cultural co-creation experience. In future research, the interest should focus on investigating more the impact of ADR process model for co-creation of usable hybrid environments is needed. The digital and physical layers of hybrid environments are both equally important and need to be integrated more from the early phase of the co-creation process.

Future tech lab
in Namibia

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