Article

Co-creation workshops for developing local community networks during a pandemic

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Abstract

During co-creation workshops, three communities in Lomé, Togo, developed their own alternative technology – do-it-yourself networks that were adapted to their specific local needs. Usually, these collaborative formats require physical proximity, not only between participants, but also between participants and their local environments. Due to the COVID-19 pandemic, all physical meetings were cancelled or restricted, and the project team had to transfer their methodologies to digital formats accommodating geographical distance. Their endeavours revealed challenges regarding both local community networking in general and the adaptation of co-creation methodologies during a global pandemic. A major lesson learned was the importance of trust among participants in such an interdisciplinary and diverse consortium. This article offers insights into the collaborative development

of local community networks, providing new perspectives on co-design in the restrictive settings caused by the global COVID-19 pandemic.

> **Key messages**
> - Co-creation workshops are useful to develop individualised, alternative technology in communities, such as do-it-yourself networks.
> - Continuous and user-centred adjustments are needed to transfer collaborative formats into digital form.
> - Trust between project stakeholders is key to strengthening the impact of local networks.

Introduction

In March 2020, the World Health Organization announced the outbreak of the COVID-19 pandemic (WHO, 2020). This was followed by travel and contact restrictions, and borders were closed. Our initial planned project, to begin in April 2020, consisted of doing on-site co-creation workshops with a mixed European/Togolese team to develop needs-oriented content and local do-it-yourself (DIY) networks for Togolese communities. Due to the restrictions caused by the pandemic, the planned activities were not feasible. However, the goal of providing communities with local wireless networks gained in relevance. Since only parts of Togolese society have access to internet connections, this important function is filled by social infrastructures, such as schools and neighbourhood centres. Local restrictions, including closing schools and restricting in-person meetings, meant that many people were excluded from accessing information.

The objective of our project was to achieve sustainable community building, and to increase the participation of marginalised groups through information and communication technology (ICT) and digitisation. The aim was to strengthen their digital competences, provide access to education about existing digital tools and resources, and build a digital infrastructure for marginalised groups, especially women and children. Social disparities and inequalities have vastly increased since the outbreak of the COVID-19 pandemic, and the urgency of the project to build an ICT infrastructure for digital participation has become even more apparent. Given this urgency, and the need for rapid adaptation of the project, our research examined various issues that were established or that surfaced:

- How has the original project changed due to the COVID-19 pandemic? What are the challenges, findings and lessons? What are the needs and challenges for the communities due to these circumstances?
- Can a trusting collaboration between the project consortium and the communities be achieved in these circumstances? Which forms of communication are necessary for this?
- How can a participatory and tangible co-creation approach be transferred to digital or hybrid formats without proximity between the users? Can we create (digital) accessible and tangible approaches for the communities?

Digital education and digital skills are an overarching challenge due to the lack of structural approaches. Digital skills are not anchored in Togolese curricula, and they are not included in formal education. Bridges are needed between digital and analogue, between high and low technology, between generations, and between local cultures and contexts. The goal must be to establish more crossing points for participation, so that not only a digital elite takes part, but that interfaces between local and global are also generated.

Recalibrating the Miadé project

Digitisation can become the fuel for sustainable development, provided that the potentials of decentralisation, open access to knowledge, collaborative progress and transparency are used appropriately (BMZ, 2016). To achieve this, the digital inequalities in a population have to be overcome to ensure the participation of all members of society. This was the starting point of the Miadé project, which was impacted by the new global circumstances resulting from the pandemic. Within the project consortium, we decided to name the project Miadé. The term 'Miadé' originates from Éwé, and can roughly be translated as 'at home' or 'with us'. After French, which is the administrative language, Éwé is the most commonly spoken language in the south of Togo (Blench, 2006). Éwé is also the language that project partners use when approaches need to be explained to participants: it is a more intuitive language than French, and it makes content accessible.

The aim of the project was to strengthen community members' digital skills, and to educate them about, and provide access to, digital tools and resources. It was hoped that this would support the stabilisation of the region, and promote economic and social development in collaboration with local stakeholders. The on-site co-creation workshops were designed to develop the network of local people and communities, promote communal learning, and generate and share knowledge. The Miadé project consortium initially consisted of a development agency and a research centre. As the consortium could not be on site in Togo, we decided to strengthen our collaborations with local people. This resulted in cooperation with three local experts based in Lomé, the capital of Togo. We focus on these experts in detail in a later section.

In addition, the original plan was to implement our project in Sokodé, a city in the north of Togo. Due to the restrictions intended to contain the pandemic, some roads in Togo were completely closed. We had to deviate from the idea of reaching out to badly marginalised communities in the north of Togo. Not wanting to withdraw from the project completely, we thus adapted to the sole feasible compromise: implementing our project only in the capital, Lomé. We consider this project as a pilot, which will hopefully be adapted to other, even more marginalised, communities in the future.

Since the beginning of the pandemic, various initiatives to handle the new circumstances have also arisen. Two of these involved a German development agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in Togo, and various German and Togolese research and governance institutions.

In mid-April 2020, a Togolese civil society movement, supported by the Togolese government in alliance with GIZ, launched #TousContreCorona (Together Against Corona). This was a hackathon to establish new digital and analogue concepts, innovations and deeper collaboration regarding COVID-related economic, health and social challenges confronting Togolese society (République Togolaise, 2020). In May 2020, Africa Open Science & Hardware, the Berlin University of the Arts (Weizenbaum Institute) and the Technische Universität Berlin (Einstein Center Digital Future) established a digital round table in dialogue with GIZ in Togo and GIZ in Ghana (Adzaho et al., 2020). The aim was to promote bottom-up solutions and do-it-together prototypes throughout the continent to enable personal safety and medical equipment. Within the digital round table, methodologies, inventions, potentials and challenges were discussed related to six projects in Ghana, Togo, Senegal, Nigeria and Cameroon. The accomplishments of these projects included: the production and delivery of face masks, which produced new jobs; the creation of educational programmes; and initiatives to develop and produce parts for respirators.

The aim of the current project became to follow up on those initiatives and to learn from them: How could the notion of agency be used and transposed to our project? How could we draw upon the positive energy that was being released in these community-driven set-ups, and use it in the co-creation of our local community networks? Could we, in turn, reinforce and sustain the existing community dynamics?

Background

This type of initiative is a so-called ICT for development (ICT4D) project. Communication technology, low-cost hardware and free/libre/open-source software (FLOSS) applications are used to create local

community wireless networks. Within co-creation workshops, these networks were adapted to the users' needs. Here, we provide a brief introduction to the concept of local community networks and the research methodology for co-creation workshops.

Local community networks

Local community networks may be defined in many ways. For the purposes of this article, the term describes a DIY WiFi networking technology platform (Smyth and Helgason, 2019). These networks are created, constructed, owned and operated by the communities; popular networks of this kind include freifunk.net in Germany and guifi.net in Spain.

These networks have seen extensive developments in recent years. Bidwell (2021) provides insights about, and a critical reflection on, observations of rural community networks in the Global South to understand various aspects of their complexity. Local community networks can offer access to digital infrastructure, participation and exchange of knowledge (Antoniadis, 2016; Unteidig et al., 2016). They consist of simple technology – cheap computer systems that use technology to support, improve and expand existing social connections. Since such local community networks are independent of the internet, they can be used in cases of connection failure or natural disaster.

Inspiring and promoting communication within local communities and facilitating a feeling of independence are only two of the reasons for deploying such networks, which are created and customised by and for communities. The installation of local wireless networks provides marginalised communities with the possibility of access to digital participation. Nevertheless, accessibility is not only a question of the availability of technology; it also depends on education, physical access, awareness, social structures, access to electricity and technical knowledge. The purpose is to strengthen collective learning and knowledge in a community. Users learn how to develop content, and thus intuitively to understand how media content is developed (Lotz et al., 2019); they thus develop a more critical perspective on media and, for example, are more likely to detect disinformation. During the design process, participants are empowered to independently spread and develop that knowledge, providing autonomy and ownership of the contributed information.

DIY networking toolkit

The Miadé project uses a DIY networking toolkit for location-based collective awareness, MAZI (MAZI, n.d.; Smyth and Helgason, 2019). The infrastructure used by the project is one example of a DIY community networking technology. It is embedded in various local networking experiments, such as DietPi. DietPi is a free and open-source software which offers an easy start for individuals without significant development knowledge (https://dietpi.com/). For example, the Digital Markers project, which aims to test and embed a digital DIY networking tool for an archiving platform, also started with the MAZI platform, but emigrated to the DietPi baseline for development (UAL, 2022).

The MAZI network uses the single-board computer Raspberry Pi as low-cost hardware; the network's software is an open-source operating system. This toolkit has been used in various projects, such as: FabLab La Campana, which is focused on empowering a marginalised community in Monterrey, Mexico (Lotz et al., 2019); ZEST – Teacher Education in Zambia, which is designed to enhance the quality of educational experiences for primary school children (Gaved et al., 2020; The Open University, n.d.-b); and ARCLIGHT – Community Mental Health Education in Guyana (Berardi et al., 2019; The Open University, n.d.-a).

Methodology of the workshops

In our initial design of the project, the plan was to base all development activities on on-site participatory design methodologies (Saad-Sulonen et al., 2018). This approach focuses on the involvement of users, stakeholders and diverse interest groups throughout the development process for a better understanding

of the specific contexts of a domain. Adapted to community networks, this means that the design, service, structure and content of the community network is a collaborative and participatory common good. Through an iterative process, experimental and exploratory design games and prototyping activities lead the design of the artefact (Brandt, 2006). Since its origin, participatory design has expanded to become a human-centred approach that involves everyday experts in development processes by applying design methodologies (Björgvinsson et al., 2012). With the help of participatory design methodology, interdisciplinary teams that collaborate with potential users can build design decisions together based on user requirements, and hence argue for their designs (Redström, 2008). This approach allows the needs of the community members to steer the design process. Based on the specific needs and backgrounds of the community, individual communication applications for a community network's structures can be conceptualised.

Specific project application

Including the participants in the development process using participatory design allows social, ecological and economic sustainability to be included in the process of creation and implementation. The workshop conception for the Miadé project was initially adapted from an approach developed during the MAZI project (Unteidig et al., 2016). This approach is based on the principle of locality, meaning that the specific local settings steer the qualitative methods and the delivery of formats within the co-design workshops. Clement and Van den Besselaar (1993) conclude that, for project participants, there are no programmatic solutions, so holistic understanding of local conditions is frequently necessary. Especially at the beginning of a project, it is important to comprehend these local settings to understand the needs of the participants; the methodology of cultural probes is often used (Gaver et al., 1999). Furthermore, the methodology for this approach is usually based on tactile materials, such as craft materials. These are important focal points for working in participatory design workshops with communities, creating a more trustful and familiar atmosphere. The initial MAZI project also included pilots in different countries, domains and contexts, so the various activities and practices were adapted to local, social and cultural conditions (Smyth and Helgason, 2019).

The communities involved are often communities of practice: they are formed of people who practise something together, working in collaboration, or share a passion or concern about a topic (Wenger et al., 2002; Wenger-Trayner and Wenger-Trayner, 2015). Such collective-learning groups may be the common interest which draws a group together, or they may be an incidental outcome. The domain implies a common scope of interest on various levels. Interactions characterise the community, such as joint activities, events, and discussions between the members of a community. Members often also meet at a social meeting place, their community space.

This description of applying collective learning and participatory methodologies in a community could not be followed in our case because of COVID-19 restrictions. The heart of a community consists of 'much more than their calendar of events' (Wenger et al., 2002: 6). The constitutive activities are small and everyday (informal) interactions, discussions and conversations. The methodologies and approach described require close proximity and exchange between designers and users. To develop common understanding, a physical presence is also necessary, as when livelihoods, spaces and human interactions are shared. The planning of co-creation workshops with close proximity, physical props to engage with communities, and a strong local contextualisation was not possible in our case. The transformation from a local, physical co-creation approach to a digital one presented the biggest challenge to the project, and may eventually be its most important learning experience. How can methodologies that require proximity to participants and their environment be substituted and applied in distance or digital formats? With these challenges in mind, we now elaborate on the concrete implementation of our project. Lupton (2021) also addresses this issue in her crowdsourced document, *Doing Fieldwork in a Pandemic*, which we discuss later.

The start of the project: solving a digital communication challenge

To establish intercontinental communication within the project consortium, we used a range of digital tools, such as weekly video conferences for regular exchanges and cloud services for exchanging documents. For collaborative conception and planning, we used video conferences, clouds, online documents, digital whiteboards, and instant messaging services for short-term communication.

Local leads

The local experts were selected by GIZ and the research centre at the beginning of the project. The choice was made based on the development agency's existing working relationships: their pre-existing network and experiences in knowledge sharing were decisive. Given their specific role as local anchors and leaders of project implementation, the three experts became local leads in our project – the term 'local leads' highlights the importance of these project members. We selected the team with a focus on achieving an interdisciplinary competence level: an innovator and founder of a mobile STEAM (science, technology, engineering, the arts and mathematics) education laboratory, a female tech entrepreneur and an application developer. It became apparent that the intercultural, local and social knowledge of the local leads was the most important competence. Without these competences, we would not have been able to implement the project.

Reaching the communities

In a pandemic that restricts contact, the locating and choosing of communities also presented a challenge. Reaching marginalised groups that already had difficulties accessing technologies and digitisation became even more challenging. Consequently, the project gained immense benefits from the existing networks and knowledge of the local leads, and their working relationships with the development agency.

A short introductory video was produced, allowing all parties involved in the project to address the communities visually and aurally. This made the objectives more accessible and tangible for the communities, as the objectives were not presented in text form alone. This broad access to information is highly relevant for illiterate participants.

To choose the communities, the local leads sent an online survey to preselected community contacts via an instant messaging service. Through the survey, we aimed to build interest in the project, to find suitable participants, and to ask respondents about their prior knowledge of ICT and literacy. The survey could be completed via text or voice messaging. After reviewing the responses, three communities were chosen. These are introduced in the next section. We chose communities with contrasting needs and backgrounds, so as to provide a better and broader understanding of the people of Lomé and Togo.

We initially developed the primary and specific goals of the three co-creation workshops in collaboration with all members of the consortium. This is framed by the knowledge described in the 'Background' section above, the local and cultural knowledge, and on-site experiences. For the co-creation workshops, it was also necessary to determine what kind of knowledge was important and specific for each community, how it could be generated by them, and in what way we could use local community networks to accomplish these goals.

The pilot communities

The three communities chosen had distinct social, economic and cultural backgrounds, and different crucial needs. The selected communities may be described as communities of practice, as previously defined. Their characteristics are summarised in Table 1.

Hälsa International is a non-governmental organisation that works with adolescents and children who live on the streets in Lomé. A specific group among these youth was chosen. They were participating in a project that was intended to support them to discover their skills, access training, and integrate into social and working life.

Table 1: Characteristics of the communities (Source: Data based on Wenger et al., 2002)

Name of the community	Domain or topics of the community	Social meeting place/ community space	Person group/ community members
Hälsa International	Surviving on the street, accessing health support and building perspectives for a future integration into society	Hälsa International community centre	Adolescents and children living on the street
Kantata	Creating various art forms, such as painting, narratives, dance and music	Case des Daltons	Artists of any kind
Africa Coworkers	Fostering entrepreneurship through innovation and collaboration	Co-working space	Young entrepreneurs

Kantata includes a large variety of artists. The members, who are dancers, writers, actors, painters, storytellers and so on, meet at the cultural centre Case des Daltons, where they promote their artwork. Exhibitions, concerts and readings are examples of activities to promote and preserve Togolese culture.

The community that calls themselves Africa Coworkers is a group of young entrepreneurs whose vision is to change entrepreneurship through innovation and collaboration. Among other activities, in their co-working space (a physical workplace), they bring together young entrepreneurs and entrepreneurship candidates from various sectors of activity, such as agriculture, e-commerce, technology and crafts.

The project in progress: co-creation workshops

Within the chosen communities, three primary workshops were conducted to establish the three respective local networks. Table 2 provides an overview of the workshops, the objectives and the methodologies they used. The first workshop was designed to identify the individual needs of the communities. The second workshop used co-design methods to develop a local network with: (1) content; and (2) applications based on the requirements of each pilot community. Each local network was adjusted according to the community's individual needs.

Once we had established how each community wanted to use their network, the installation began. This was implemented by one of our local leads, as it was only feasible with local proximity to the community. The installation process and content development were planned for the third workshop. The workshops were conducted by the local leads – the first completely online, the second and third face to face, with the support of the project members from GIZ. The project members from the research centre could not be on site in Togo during the project. The methodologies were determined jointly by all members of the project consortium.

The second and third workshops were launched with ice-breaking activities to prepare the participants to engage in the workshop content, to remove stress from conversations, and to provide us with a broad overview of the general mood and needs of the communities. These activities were various short games.

Table 2: Objectives and methodologies of the co-creation workshops (Source: Authors, 2022)

	Objective	Methodologies
First workshop	Become aware of the communities and their needs	Voice elicitation
Second workshop	Collecting community needs and knowledge, and combining them with local networks	Quick and dirty prototyping, back-to-the-future storyboard
Third workshop	Gaining insight into the technology, developing the project approach, introducing Raspberry Pi and finding equipment	Unboxing

First workshop

The objective of the first workshop was to learn more about the communities we had chosen, to determine their needs, to identify their differences and uniqueness, and to gain a holistic understanding of local conditions. Under normal circumstances, we would have worked with cultural probes (Gaver et al., 1999). Given COVID-19-restrictions, the first workshop was conducted in digital form, and it was not possible for it to be a collaborative activity. In the project consortium, we had previously discussed various co-creation methodologies that could be adapted. The voice elicitation method (Lupton, 2021) was selected for the participants to share everyday practices and interactions, choosing questions via an instant-messaging service in writing, as voice messages or as drawings. The local leads were responsible for the practical implementation, and they collected the results. We asked the community members to respond to the following items:

- Describe your community and the location of your community.
- Describe your favourite place in the community.
- Identify what you like in the community and what you would like to change.
- Describe community activities.

The responses underlined the vast diversity of the communities in terms of their members, needs, levels of education, skills and interests. Changes and challenges due to pandemic-related restrictions were also thus identified, to determine how the communities could be supported in this regard.

The daily lives of Hälsa International members are filled with insecurity, violence, theft and lack of food, which brings the quest for necessity into their perspective on everyday life. COVID-19 made their situation even more complicated, because of the lack of a point of contact. Nevertheless, members communicated needs that can be met by a local network in the areas of education, training, communication and building a community safety net.

What Kantata members appreciate most is the creativity of their cultural centre, where members usually gather and conduct their activities. They were particularly affected by COVID-19, as cultural events and exchanges were cancelled, and tourists and other international visitors stopped visiting Togo. They want to promote Togolese culture internationally, establish studios for artists, organise national and international fairs, create similar centres in other regions or localities, and increase their educational opportunities.

The members of the Africa Coworkers community see themselves as servants of Africa and its entrepreneurial youth. For them, progress means having autonomy and financial security, launching their projects across the country, and achieving their goals and dreams. COVID-19 exposed the community to additional challenges, as economic activity slowed down in the whole country, increasing the difficulty of developing new ventures.

The methodology of voice elicitation proved to be suitable. To expand the results, an extension with video or photographs would be possible. Further methods for *Doing Fieldwork in a Pandemic* have been collected by Deborah Lupton (2021) in an online document.

Second workshop

The results of the first workshop clearly demonstrated that the project's methods and goals had to be adapted to each community to address and react to their individual needs. In the second workshop, we aimed to identify what knowledge should and could be gathered for the networks to solve their present challenges. We also wished to determine how this knowledge could be collected and prepared for uploading to the networks, and therefore which specific applications would be suitable. We used a free online collaborative whiteboard platform to develop a structured plan, and to design the explicit workshop methodologies for each community in between the project consortium. We decided against an online workshop, and ensured that all hygiene requirements were met. The regulations permitted

small workshops, and, in our opinion, an all-online format of suitable co-creation methods was difficult to realise, simply because many participants were unfamiliar with the digital world. Therefore, an all-online format would have excluded some members. The second workshop was thus conducted offline and on site in all communities.

We decided to work with a quick and dirty prototyping method that can be used to evaluate a concept (Hudson and Mankoff, 2006). This method is particularly suitable when the use of a product or service must be examined, but when limited materials are available. The back-to-the-future storyboard method can be used to explore the desires and dreams of users. This visioning method asks users where they see themselves at predefined intervals, so that their needs can be identified (Elsen et al., 2012). The storyboard represents an idea, concept or interaction over a period of time. This method can be applied at different stages of the design process. A story can be told using simple means to promote the free generation of ideas. The method also helps in evaluating processes and interactions.

In the second workshop, we further explored Hälsa International's needs. Eight trades in primary services (such as teaching and hairdressing) were identified as wishes for the future. Their vision and attitudes also indicated a need for the children and young people of Hälsa to have a regular daily routine and access to education. This is necessary as they wish to develop, for example, excellence and expertise in a profession, but also soft skills, such as organisation and punctuality. Furthermore, they see themselves helping other children in similar situations in the future. Seeing these clear visions encouraged us to continue, as there was impetus from the community that we wanted to transpose into a network.

As their technical and methodological skills were already pronounced, our goal for the Kantata community was to provide them with an overview of a local community network's technology, potentials and establishment. Furthermore, we wanted to provide them with the knowledge that they would need to create a quick and dirty prototype of the proposed contents. The members of Kantata already had a clear idea of their needs, and of the applications and content that would be shared on the network. A structure to manage the platform was created. The community was extremely motivated from the beginning: an ambitious vision already existed, which was motivated by every member. Dynamic motivation for the network came from within the community; we saw our task as helping to structure their many ideas.

Since Africa Coworkers also already had some basic knowledge of technology, we were able to immediately present an overview of the hardware and software, and to discuss possible content for their network. Different types of content were to be uploaded to the network – such as articles, podcasts and blogs – to allow the entrepreneurs to advocate for themselves. They also wanted to be able to collect and share products that needed to be exhibited for sale, and to have space for personal development and entrepreneurial leadership. The close link between the network and their day-to-day-business revealed sustainable perspectives for the local network.

Third workshop

Plans for the third workshop were conceptualised by the project consortium after determining the needs of the communities and how those needs could be met through local community networks. The use of a collaborative online whiteboard and a parallel video conference proved to be an efficient method. The results of the second workshop were collected in the same way. In addition, for each community, we chose one or two members to be responsible for all technical details and enquiries, to ensure the sustainability of the network after the project ended. The third workshop was also held locally on site in the communities.

Using the 'unboxing' methodology enabled participants to become familiar with the network's hardware and software, and with the applications which had been identified for the communities (Unteidig et al., 2016). The aim of this methodology is to diminish fears and reservations about the technologies.

The adolescents and children of Hälsa International were very curious about, and interested in, the technology. In addition to the unboxing, the local leads delivered presentations about the hardware,

Table 3: How the communities are applying their local community networks, and which applications they are using (Source: Authors, 2022)

Community	Applications	Use to …
Hälsa International	Nextcloud, Lime Survey, Guestbook	Provide first contact with technology, provide digital and technical education, use educational applications, offer social participation
Kantata	Nextcloud, WordPress, Guestbook, Lime Survey	Increase the visibility of the centre (projects and events), develop digital exhibitions, advertise events, such as concerts or poetry slams, organise events
Africa Coworkers	Nextcloud, Etherpad, Lime Survey, WordPress	Work collaboratively, create a larger variety of educational programmes, communicate between different actors, exchange information about entrepreneurship

Raspberry Pi, the equipment, the local network and MAZI's potential. In this community, the local network will be used to support the young people, particularly in social participation.

The Kantata community wanted to use their local network to create a platform where they could develop digital exhibitions and advertise and organise events, such as concerts and poetry slams. The community was highly motivated, which resulted in a new-found uplift within their initiative. They have already planned and organised workshops with their local community network outside this project.

Africa Coworkers also responded with openness to the introduced technologies. For the members of this community, it plays an important role in the entrepreneurial ecosystem in Togo. It can create synergies between the various actors, such as investors, public and private providers of business advisory services, incubators, accelerators, research centres, networks and other companies. Table 3 illustrates the applications, and how the communities are using them for their local community networks.

Findings

The project revealed significant challenges in creating local networks and adapting to a pandemic. The main lesson learned was the importance of trust among participants in such an interdisciplinary and diverse consortium: not only within the project consortium, but also in the communities and at all levels of collaboration. The following section addresses the issues considered in the Introduction.

Communication and trust

Thanks to our local leads in Lomé, and the existing work relationships of the development agency, we were able to build and maintain the needed confidence. This was because GIZ was already in contact with the communities and parts of the team in Germany. As a result of this credibility and trust, and the long-standing working relationships, it was possible to determine and realise the project goals on a macro level, while granting the local leads and participants sufficient freedom on a micro level. This was ensured by exchanges with the partners during weekly video conferences, and collaborative work using online whiteboards.

Although we concluded that such a project is realisable, even when consultation and exchange are almost exclusively virtual, meeting in person would have been much more efficient. In the domain of digital communication, meta levels of communication – such as informal discussions or small, everyday interactions – are often missing. New, digital, methods of communication create new potentials and approaches for future project work, but they should be seen as complements rather than as substitutes.

With the aid of local community networks, the communities were able to pave the way to achieving higher goals. While pursuing their goals – such as employment, reintegration into society, cultural preservation or cultural development – they evolved digital literacy incidentally. Therefore, a local network

can be seen as a method to support a community in their vision, which is accompanied by digitisation and the acquisition of technical knowledge. The communities' willingness to become involved from the beginning demonstrated impressive motivation; this allowed all participants to maximise their potential.

Co-creation workshops

After the second workshop, advancements in skills and attitudes towards digital technology and knowledge were evident. This was seen in all three communities.

Some members of the Kantata community, and especially of Hälsa International, had little or no previous knowledge about the hardware and software. Through the workshops, the participants gained a better understanding in these areas, and they were introduced to the use of design methods as tools to clarify needs and ideas, and to create their own content on the local network. Through the participatory and collaborative approach of the workshops, the communities were involved in the design and development of their network from the beginning. They were motivated to gain even more knowledge and expertise for the next phase of the project, and to make the network sustainable and long-lasting.

In contrast, the members of Africa Coworkers were already familiar with some of these subjects. They were able to deepen their knowledge and explore more aspects of working with local networks and Raspberry Pi. Based on our observations and participant feedback, a new and better understanding, and a greater interest in technology and digitisation, evolved. To assess the scalability of these results, the participants were surveyed before and after the third workshop regarding their knowledge and experience.

Sustainability

Sustainability is one of the most important aspects of co-developed local community networks. Here, especially longevity and sustainability are intended. Our aim was that once the project was completed, the communities would be able to continue their work independently of the project consortium. To ensure this, technical representatives were selected in each community. The project strengthened community cohesion and created new motivations, and follow-up workshops have been planned and conducted. In addition, the communities were able to build synergies between networks in Togo. For example, the Africa Coworkers community is now able to reach actors from other parts of the country, who can join them in fostering local entrepreneurship, thus strengthening the Togolese economic ecosystem.

In summary, the project successfully initiated work on the positive visions and objectives of the respective communities. This will provide long-term motivation to all actors. Analysing their common vision at the individual level allowed each stakeholder to develop the needed agency to create sustainable engagement.

Conclusion

Within the co-creation workshops, a significant change in all communities was generated. As the communities themselves organised further workshops independently of the project, sustainability was established, and the goals of community empowerment and maintaining motivation were achieved.

The great benefit of the adaptation of the project was the collaboration with the local leads, and this applies at all levels: the co-creation methodology, the technical knowledge, the workshop moderation and our intercultural competence. The pandemic seems to have been a catalyst for digitisation, but the responses to the pandemic depended on cultural, social and geographical contexts. Communication and trust, in the context of the intercultural dialogue presented here, were the most important factors.

Digital work at the macro level, such as project management and organisation, is helpful, and complements other methods. However, at the micro level – the practical work – digital working was quite challenging. One of the most positive results of the digital adaptation of the project was the recordings

collected from the first workshops. This is a direct outcome of working digitally. We may not have made these recordings if we had been working face to face and on site. In addition, the documentation of the conception and evaluation of the workshops was automatically accomplished digitally with the digital whiteboard. Nevertheless, co-creation workshops should only be digitally adapted if there is no alternative.

A holistic understanding of local and technical conditions is particularly important in the context of co-creation workshops. The technical conditions and competences of the users, such as their use of smartphones and which messenger services they use, must be considered in advance.

Summarising our results for larger-scale application in a wider context demonstrates how the use of these networks in other sectors could also be considered. The existing approach could be adapted to organisations such as agricultural cooperatives, which need to exchange information and good practice, and training centres and schools could use this approach to provide access to online courses. Local networks are powerful tools to raise awareness of digital access and the educational potential of the digital world, entrepreneurs and the cultural world. A local community network can be used wherever people want to exchange information, and to create and share content. The three communities developed digital skills, and a sustainable and endogenous dynamic, so they can now continue to feed and maintain their networks independently. Andragogical, pedagogical and technical methods were developed; guidelines are being developed to enable scale-up.

Following the project, the local leads worked with three further communities to create and install local community networks. These were not part of the project, and they resulted from intrinsic motivation. This success validated our approach, as did the expressions of interest from different levels of the Togolese government, of Togolese society and of the scientific community.

Declarations and conflicts of interest

Research ethics statement

The authors declare that research ethics approval for this article was provided by the German Research Centre for Artificial Intelligence (DFKI GmbH) ethics board.

Consent for publication statement

The authors declare that research participants' informed consent to publication of findings – including photos, videos and any personal or identifiable information – was secured prior to publication.

Conflicts of interest statement

The authors declare no conflicts of interest with this work. All efforts to sufficiently anonymise the authors during peer review of this article have been made. The authors declare no further conflicts with this article.

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