Assessing existing practices in ICT4D against the Principles for Digital Development to bridge the Digital Divide in Amsterdam

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Abstract. The field of information and communication technology for development (ICT4D) has grown rapidly. ICT4D aims to empower disadvantaged communities by providing them with ICT solutions to issues they may have. The international development community has reassessed the mainstream practices in ICT4D programs and projects by examining and understanding the successes and failures in digital development. It has formulated nine principles to make ICT4D projects and programs more user-centered, scalable and sustainable. However, the question remains as to what extent the principles are realistic to implement by practitioners and if they will eventually lead to more successful outcomes.

Keywords: Digital Divide · Principles for Digital Development · ICT4D · Disadvantaged Communities.

1 Introduction

In recent years, the field of information and communication technology for development (ICT4D) has grown rapidly [21]. ICT4D aims to empower disadvantaged communities by providing them with ICT solutions to issues they may have [5]. Furthermore, ICTs can play a role in leveraging social and economic growth in developing regions [1,14]. However, as can be seen from the high rate of unsuccessful projects, designing, building and deploying ICTs for people in low resource environments is challenging [5,13]. The occurrence of unsuccessful projects is mainly attributed to the lack of sustainability, evaluation and scalability [15]. Most projects turn out unsustainable which means that at some point, the project is unable to continue growing with just local resources as planned [15]. Moreover, poor evaluation of the project outcomes causes mistakes to be repeated and ignored, which leads to a lower quality of the project [15]. Finally, most projects turn out unscalable as they are often designed for a specific small community, whereas, focusing on a potential bigger community would mean bigger chances for a project to expand its reach and thrive [15].

1.1 Relevance: The Digital Divide in Amsterdam

Although the notion of marginalized communities is prevalent in development countries, first world countries such as Amsterdam also deal with the concept

of digital divide. The digital divide is defined as the gap between those who have access to the internet and those who do not, or the gap between those who use digital technologies and those who do not [11]. Particularly elderly people, people with a migrant background, minimums and mentally disabled people are groups that have difficulty keeping up digitally [16]. As a result, they do not feel as fully-fledged citizens of the society [16]

In Amsterdam, 24 percent of the population live below the poverty line, 26 percent are low-educated and 16 percent are low-literate [20]. The participatory research between the Vrije Universiteit Amsterdam and OostWest shows that Amsterdam minimums only see the need to become more digitally skilled when there is a need for it in their daily life [20]. For example, they are able to watch instructional videos via YouTube, as it requires little language skills and it is also free to use. In this way they develop so-called digital splinter skills: a limited number of digital skills that are highly developed, while other skills lag behind such as arranging government affairs online or finding directions [20]. In conclusion, to make the target group more digitally skilled, their needs and their environment should be well accounted for [20].

1.2 Problem Statement: Assessing The Principles for Digital Development

Recently the international development community has reassessed the mainstream practices in ICT4D programs and projects by examining and understanding the successes and failures in digital development [22]. It has formulated nine principles to make ICT4D projects and programs more user-centered, scalable and sustainable [22]. In addition, it provides recommendations for Development Actors, Donor and Multilateral Organisations and Development Implementers to move from the principles to practice [22]. However, are these principles adequate in practice?

Following the integration of the 2009 UNICEF Innovation Principles and the Greentree Principles, a group of international development donors and multilateral organizations have gathered at several meetings to deliberate the principles specifically, with the Principles for Digital Development as outcome [22]. In order to move from the Principles to Practice, practitioners were also part of the aforementioned meetings and discussions [22]. For every principle, the report presented insights and common obstacles/barriers that practitioners discussed about. According to Waugaman, the principles are nine high-level concepts that should be considered, ideally before funding, designing or implementing any technology supported development work [22].

The principles are formulated as [22]:

1. *Design With the User*
   This principle is concerned with user-centered design in which the information gathered, leads to building, testing and redesigning tools until they effectively meet the users needs, by continuously gathering and incorporating users feedback. Through this approach, digital tools can be built to better

address the specific context, culture, behaviors and expectations of the people who will directly interact with the technology.

2. *Understand the Existing Ecosystem*
   Analyzing the ecosystem, helps to ensure that selected technology tools will be relevant and sustainable and will not duplicate existing efforts. Moreover, by analyzing the ecosystem, factors that can affect an individuals ability to access and use a technology or to participate in an initiative are being considered

3. *Design for Scale*
   Designing for scale, aims to deal with the scalability issue of initiatives not moving beyond the pilot stage. It means thinking beyond the pilot and making choices that will enable widespread adoption later, as well as determining what will be affordable and usable by a whole country or region, rather than by a few pilot communities.

4. *Build for Sustainability*
   Building sustainable programs ensures users and stakeholder support and that their contributions are not minimized due to interruptions, such as a loss of funding. Such program is more likely to be embedded into policies, daily practices and user work-flow.

5. *Be Data Driven*
   A data driven initiative ensures that quality information is available to the right people when they need it and that they are using the data to take action. No amount of data will lead to accelerated impact if it is not used to inform decision making.

6. *Use Open Standards, Open Data, Open Source, and Open Innovation*
   An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done. Hence, programs can maximize their resources and ultimately their impact.

7. *Reuse and Improve*
   By reusing and improving, programs can adapt and enhance existing products, resources and approaches. While an existing tool or approach may not exactly fit all the needs for reuse, improving and building on it, rather than creating something entirely new should be considered. Furthermore, the time needed for development, testing and costs can be significantly reduced.

8. *Address Privacy & Security*
   This principle involves careful consideration of which data are collected and how data are acquired, used, stored and shared. Measures must be taken to minimize collection and to protect confidential information and identities of individuals represented in data sets from unauthorized access and manipulation by third parties.

9. *Be Collaborative*
   Being collaborative means sharing information, insights, strategies and resources across projects, organizations and sectors, leading to increased efficiency and impact. By collaborating, those working in digital development and beyond can pool their resources and expertise not only to benefit each initiative but also to strengthen the global community [22].

Although, the work and effort from the international development community seems thorough and well-thought, the question remains as to what extent the principles are realistic to implement by practitioners and if they will eventually lead to more successful outcomes. Therefore, the research question of this study is: How useful are the Principles for Digital Development according to Digital Divide practitioners?

This paper aims to assess the nine design principles by offering answers to how practitioners view them in practice. Furthermore, the results of this research are intended at providing a reference point to other practitioners who are implementing ICT4D projects in practice and to inform policy about the implications of the principles in practice.

2 Related Literature

Currently, there are different sets of existing principles and frameworks to guide digital development projects. The nine Principles for Digital Development, for instance, were mainly established from the 2009 UNICEF Innovation Principles and the Greentree Principles created by 40 mHealth practitioners in 2010 [22]. Moreover, there is the BID initiative principles, the UKs Government Design Services Digital Principles and the World Banks Open Development Principles, which have all used the nine principles as reference point [2,19,23].

Additionally, W4RA researchers have developed the ICT4D Service Development framework for ICT services in low-resource development contexts, covering the full lifecycle of ICT service innovation [3]. The framework focuses on a collaborative, adaptive, and iterative methodology [3]. Moreover, the DistRibuted Agile Methodology Addressing Technical Ictd in Commercial Settings (DRAMATICS), has been developed through various projects in the retail and agricultural supply chain sectors in Africa [7]. DRAMATICS is displayed as a repeatable software development methodology enabling the creation of sustainable, scalable and reusable ICTD solutions [7]. Another framework, Speedplay, combines agile iterative development with principles drawn from action research and participatory design [8]. Hansson et al, derived a design and implementation framework for ICT4D named the Nordic Model, which incorporates agile design methods with elements such as demand driven approach, non-hierarchical management, inclusion of diverse target groups and formative evaluation [10]. Furthermore, Haikin and Duncombe produced an analytical framework that incorporates a project design approach using iterative development that could help practitioners in the field incorporate empowerment objectives for the marginalised participants to participate [9]. Finally, a theoretical framework for Ethical Practice in ICT4D Programmes has been proposed which highlights four ethical themes; collaboration and participation, socio-economic context, cost and benefits and underlying stakeholder interests that should be considered in ICT4D initiatives [18].

Noteworthy is the presence of iterative methodologies in above mentioned frameworks. According to Joost Dijkers et al., agile improves ICT4D projects by facilitating user collaboration, improving team communication, enhancing

organizational learning, and by frequently delivering software [6]. Additionally, the concepts discussed in the frameworks, appeared in some form as part of the nine Principles for Digital Development discussed in chapter 1.

3 Research Methodology

3.1 Research Design

The research question will be answered by performing an action research in combination with a multiple case study. Action research has been defined by action researcher Hilary Bradbury as a: "democratic and participative orientation to knowledge creation. It brings together action and reflection, theory and practice, in the pursuit of practical solutions to issues of pressing concern. Action research is a pragmatic co-creation of knowing with, not on, people" [4]. Action research will be essential in answering the research question as it aims to not solely understand, but also improve [4]. In addition, a multiple-case study will be performed where different practitioners who are engaged in bridging the Digital Divide will be consulted, to discover how they view the nine principles with regard to their own practices and projects. Thus, the unit of analysis of this research will be Digital Divide practitioners/projects. This research method is applicable for this study since several cases will be examined to understand the similarities and differences between the cases. Finally, this study is exploratory since the intention is to gain insight into existing Digital Divide practices and analyze to what extent they coincide with the nine design principles [24].

3.2 Data collection

In order to answer the research question, data will be collected in two different ways. Firstly, research data will be collected through interviews with Digital Divide practitioners. Eventually, users could also be interviewed to acquire the user perspective on the current state of Digital Divide projects. For feasibility reasons, the Digital Divide practitioners will be based in the Netherlands. Organisations such as Instruct[1], SeniorWeb[2], Stichting Expertisecentrum Oefenen.nl[3], Stichting Lezen & Schrijven[4] and Stichting Digisterker[5] will be interviewed. The interviews will be conducted in a semi-structured way, in order to thoroughly obtain valuable qualitative data [12]. The interview question can be found in Appendix A. Secondly, if applicable, a document-analysis of existing project reports will be conducted to gather more qualitative data. If there are other relevant documents to gather data from, these could also be analyzed.

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[1] https://www.instruct.nl/methoden/digit/
[2] https://www.seniorweb.nl/
[3] https://oefenen.nl/
[4] https://www.lezenenschrijven.nl/
[5] https://www.digisterker.nl/

3.3   Data Analysis

The data will be analyzed using an inductive approach and by following the iterative method of First and Second Cycle coding proposed by Miles (2014) [17]. The intention is to first code the data collected by using elemental methods such as In Vivo and Process coding. Moreover, a set of provisional codes will also be generated based on the Principles for Digital Development. Thereafter, pattern coding, as a Second Cycle method will be applied to group the First Cycle codes into a smaller number of themes relating to the nine principles to determine the extent to which the data conforms with the theory. The idea is to analyse each case separately, and then explore patterns of similarity or difference with regard to the theory. The data analysis will be performed by following these steps:

1. Transcribe data
   In order to obtain verbatim record from the conducted interviews, the interview recordings will have to be transcribed. For the transcription task, software like ATLAS.ti[6] could be used to save time, however, if automatic transcription fails it will have to be done manually.
2. Organize data
   In this step, the data will be organized to familiarize with the data and structure the data. The data will be organized according to the themes of the nine design principles. If ATLAS.ti could simplify the organisation process, it will also be used in this step. During this process the data will also be cleaned to eliminate information that may not be important.
3. Code data
   The data has to be coded in order to more efficiently categorize the data into themes, categories, constructs or relationships. The codes will be derived from the data collected and the nine design principles. To interpret the data, primary and secondary data comparison will be utilized. Which means that the findings of the interviews will be compared to the theory of the nine design principles and the difference between them discussed.
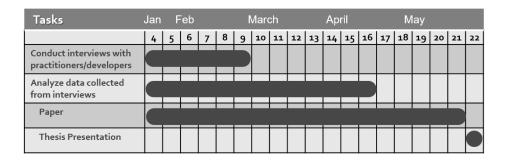4. Summarize data
   In this final step, the research findings and outcomes will be linked to the research objectives, in order to finally answer the research question.

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[6] https://atlasti.com/

Project Plan and Time Frame

Below an overall planning with regards to the completion of the paper is presented. This planning is dependent on the availability of the representatives of the companies to be interviewed and is therefore prone to changing.

Tasks	Jan	Feb				March				April			May					
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Conduct interviews with practitioners/developers																			
Analyze data collected from interviews																			
Paper																			
Thesis Presentation																			

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Appendix A Interview Questions

Context

1. Please briefly explain what your company does in the field of Digital Divide
2. Please briefly explain what your role is and what you do.
3. What for methodology do you use/What for process do you follow to develop Digivaardigheden projects?
    a. Do you think it can be improved? In what way?
    b. Do you have this methodology/process in detail somewhere?
4. Which constraint do you experience in reaching/contacting serving the marginalized community?
5. Describe your most successful projects.
    a. Are they still running?
6. Do you offer a live trainer/facilitator/face-to-face interaction?
7. Do you offer (pre/post) tests to measure impact or the retention of materials?
8. Do you plan for maintenance, such as periodic content updates, hardware and software improvements?

The Principles for Digital Development

1. Do you know what the Principles for digital development are?
    a. Principle 1 - Design with the User
    b. Principle 2 - Understand the Ecosystem
    c. Principle 3 - Design for scale
    d. Principle 4 - Build for Sustainability
    e. Principle 5 - Be Data Driven
    f. Principle 6 - Use Open Standards, Open Data, Open Source, and Open Innovation
    g. Principle 7 - Reuse and Improve
    h. Principle 8 - Address Privacy and Security
    i. Principle 9 - Be collaborative
2. Can you identify points from the list which you are not using?
   For every point identified:
    a. Why are you not applying it?
    b. Are you considering applying it after reading what "From Principle to Practice" suggests/recommends?
    c. Do you think the suggestions/recommendations are useful? Why or Why not?
    d. Do you think the suggestions/recommendations are feasible? Are there constraints to implement them? Why or Why not?
3. Can you identify points from the list which are challenging?
   For every point identified:
    a. Which aspect is a challenge?
    b. Do you think you applying/practicing what "From Principle to Practice" suggests/recommends will lead to better outcomes?

c. Do you think the suggestions/recommendations are useful? Why or Why not?
   d. Do you think the suggestions/recommendations are feasible? Are there constraints to implement them? Why or Why not?
4. Can you identify points from the list which are not challenging?
   For every point identified:
   a. Why isn't it a challenge?
   b. Can you provide a detail process of how you do it?
   c. Do you think you will have more success after reading what "From Principle to Practice" suggests/recommends?
   d. Do you think the suggestions/recommendations are useful? Why or Why not?
   e. Do you think the suggestions/recommendations are feasible? Are there constraints to implement them? Why or Why not?
5. Which principle(s) is/are in your opinion the most important to project success? And why?

Reflections

1. What are your thoughts of the Principles for Digital Development?
2. In which way do you think they can be improved?
3. Are you open to implement the Principles for Digital Development as part of your methodology? Why or Why not?
4. From 1 to 5, where 1 is Not at all and 5 is Fully Applying. With which number would you rate your application of the Principles for Digital Development? And why?
5. Especially any recommendations on what you think would enable you/someone else to overcome barriers to successful development of Digivaardigheden projects?
6. Are there any other interesting reflections or lessons-learned that you'd like to share that we haven't covered?