

# Children, ICT and Development

Capturing the potential,  
meeting the challenges

DOROTHEA KLEINE, DAVID HOLLOW AND SAMMIA POVEDA





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DOROTHEA KLEINE, DAVID HOLLOW AND SAMMIA POVEDA

A Report for the UNICEF Office of Research – Innocenti,  
by the ICT4D Centre at Royal Holloway, University of London  
and Jigsaw Consult

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## About the Authors

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**Sammia Poveda** is a PhD Student at Royal Holloway, University of London. Her doctoral research evaluates different approaches to basic ICT training offered in Brazil, aiming to find out what elements may improve critical ICT usage. Sammia is also a coordinator of the Technology and Design Working Group of the Human Development and Capability Association (HDCA), and runs a Latin American ICT4D discussion group using Facebook as a platform. Before her PhD, Sammia worked in international development for four years with the German Development Agency (GIZ) and the Amazon Cooperation Treaty Organization (ACTO), which worked with the eight Amazon Basin Countries: Brazil, Colombia, Venezuela, Guyana, Suriname, Ecuador, Bolivia and Peru. This work also involved liaising with other international organizations such as the United Nations Conference on Trade and Development (UNCTAD), United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD). Sammia also served two years pro bono as the Institutional Development Director of the Centre for Digital Inclusion (CDI) in Brasilia.

## Foreword

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Information and communication technologies (ICTs) – such as mobile phones, computers and the internet – are often seen as accelerators of development processes. In certain circumstances they can play a critical role in achieving results for the most marginalized communities and the most vulnerable children, mothers, and families. The use of mobile phones to promote effective birth registration systems in Nigeria and Uganda are such examples.

By supporting positive gains in human development, ICTs can ultimately contribute to meeting MDG targets and goals. However, rising inequalities in a large number of countries have also meant that ICT innovations do not always benefit populations equally, often leaving behind the most marginalized members of society. While ICTs could, for instance, help overcome the lack of information and communication access, the slower diffusion of mobile phones often observed in rural and remote areas and the privileged access of technologies to men over women, may have impeded their potential benefits and could even have exacerbated pre-existing inequalities.

The UNICEF Office of Research – Innocenti initiated a study in collaboration with the ICT4D Centre at Royal Holloway, University of London to explore further the manner in which ICTs can strengthen development interventions for children. The study also examines the interaction between ICTs and existing inequalities in different dimensions including gender, ethnicity, age, education and the rural/urban divide.

This review of recent literature and expert opinion expands the dialogue on key challenges, opportunities and best practices in assessing the role of ICTs in furthering the development agenda for children. Previous successes and indeed mistakes and failures – a common outcome in the brief history of technology diffusion for development – are also important learning opportunities to support UNICEF programmes and goals for children in a growing number of countries.

The report serves as a reminder that innovation efforts should not be thought of as magic bullets. But introduced with the requisite regard for local mores and conditions, they can be important catalysts for development affecting all areas of children's lives.

This brief study represents a contribution towards a culture of openness and learning in identifying and scaling technology for development to support UNICEF programmes and goals for children.

Marie-Claude Martin



Director, UNICEF Office of Research – Innocenti

## Preface

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This report is, to our knowledge, the most comprehensive mapping to date of the work that has been published documenting child-related ICT for Development (ICT4D) projects and programmes. But it is more than that: by interviewing 35 experts in this area asking for their practical wisdom and experience while offering optional anonymity, the report also gathers extensive expertise which has so far not been published. What emerges are differing views, but also an emerging consensus on more participatory practice, more reflection on context, more attention to intermediaries, and a burning need to continue the uphill struggle to focus publicly-funded innovation work on marginalized groups which are much less likely to become the beneficiaries of market-driven innovation.

Many other key messages emerge from this report, which reflects the depth of expertise gained after decades of experience in technology and development, and over a decade of digital ICTs for development work for children. Policy rhetoric, actual practice and scholarly commentary can often be seen to diverge, but at their best initiatives such as these interweave the virtues of practitioner experience, academic rigour and the power of policy. Our hope is that this report will serve as a cornerstone for an ongoing, fruitful and dynamic debate on rapidly evolving technological trends and good practice in leveraging ICTs to innovate for child-focused development.

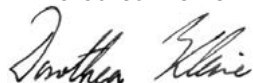
For those new to the field of ICT4D we hope to offer sufficient background to contextualise the findings, while even experienced ICT4D scholars and practitioners will find new aspects. In particular, they will discover a refreshing newly emerging “common sense” in ICT4D which is far less top-down and much more attentive to user-centred design of projects, programmes and technologies. Colleagues from the field of child-focused development will find much information on technology-related innovation in their field. Building these bridges across different areas and forms of knowledge is vital if we are to make rapid progress towards better life chances for marginalized children.

We would like to thank the 35 respondents who offered up their time pro bono to give us their views on child-related ICTs, to the 26 participants in the ICT4kids Open Session at the ICTD2013 conference in Cape Town, South Africa, who commented on some early findings, and to the four formal reviewers of the report. We thank members of the ICT4D community, and the children and development community for their generous contributions to the joint effort which is at the heart of this report.

On our extended research team we would like to thank Oliver Parsons and Lindsey Evans who contributed transcriptions, and Andrea Jimenez Cisneros who conducted the second round of coding once codes had been agreed between researchers. Further, we'd like to thank our partners at UNICEF, Patrizia Faustini and James Elder for the excellent collaboration on this report. Their commitment to supporting us in ensuring the highest standards in scholarly rigour and academic freedom for this report, as well as their genuine interest in the outcomes, whatever they might be, meant that we could combine the strength of academic research with the powerful network and dissemination opportunities that UNICEF has.

Finally, since this is intended to be a cornerstone in an ongoing debate, we invite colleagues to check the resource website that accompanies this report (accessible via the website [www.ict4dc.org](http://www.ict4dc.org)) to contribute further resources to be made available there. The opportunities are truly exciting, the collective learning continues.

Dr Dorothea Kleine



Director, ICT4D Centre, Royal Holloway, University of London

# Executive Summary

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This report explores the ways in which information and communication technologies (ICTs) can contribute to efforts towards meeting child-focused development goals. The diffusion of ICTs has been highly uneven, and it is clear that digital divides not only trace but can also further deepen existing social divides, between income-rich and income-poor, between urban and rural dwellers, between women and men, and girls and boys. The report therefore supports UNICEF in efforts to further develop and disseminate good practice regarding ICT4D and children. UNICEF is committed to work for the most marginalized children in society and a focus on equity and technology runs throughout the research.

The pioneering research process consisted of a review of relevant literature and in-depth interviews with 35 experts in the field connecting ICT4D with child-focused development, thus providing one of the most comprehensive overviews of the subject to date. The literature review focuses on the topics of extreme poverty, maternal and child health, nutrition, access to education, governance and accountability, and eParticipation, children and the internet. This provides a foundation for the eight analytical themes, which are grounded in the expert interviews with practitioners, policy makers and academics.

The first theme, access and equity, explores the complex socio-political factors which dictate availability and affordability of ICTs for children. It highlights the importance of focusing on children in the most disadvantaged city districts and remote regions and shows how ICT can both exacerbate and reduce pre-existing inequalities for children. The second theme, gender, emphasizes the specific challenges for girls in accessing and utilizing ICT. It explores some of the initiatives that are working to reduce the gender divide in ICT and identifies technology-related risks that are particularly likely to affect girls. The third theme focuses on the important role that intermediaries play, assessing who controls access to and use of ICTs and the implications that this has for e-health and e-learning. Alongside this, the discussion of intermediaries also emphasizes the role of commercial interests affecting the distribution patterns of ICTs.

The fourth issue the analysis engages with is local demand and appropriate design. It documents interviewee perspectives regarding appropriate responses to local demand and emphasizes the importance of contextualised, user-centred approaches to design. The fifth theme brings together as focal areas: accountability, open data, voice and participation. The interviewees repeatedly identified the interplay between these four aspects and explained the potential for advances in data collection to lead to more responsive, adaptive and participatory policy making and programming. The sixth topic engages with pilots, scale and sustainability: these provoked diverse perspectives from the interviewees as they are closely linked to the complex question of what constitutes a successful child-focused ICT for development programmes. The analysis examines the way in which pilot programmes are often overly-optimistic and explores the diverging views of how important the scaling-up of initiatives should be.

The seventh theme concentrates on the private sector, partnerships, entrepreneurship and Free and Open Source Software (FOSS). The interviewees expressed various perspectives on private sector involvement in child-focused ICT initiatives, disagreeing as to whether this influence is generally positive or negative. There was significant, though not universal, commitment to promoting FOSS, with interviewees explaining the benefits for scalability and sustainability. The final issue engages with innovation, evaluation and failure. Interviewees noted the complexity inherent in the terms. The analysis explains that from an equity perspective innovative use of ICT needs to focus on reaching more marginalized groups first and emphasizes the ongoing need for evidence building and learning through evaluation.

Experts noted that in many initiatives related to ICT4D, children should be considered as a specific, though not homogenous, category and special attention should be given to their needs.



The report concludes by returning to the seven overarching questions which guided the research process. It considers how ICTs can help with reducing inequality, explores the risk that they can increase inequality, and notes where they might offer quick wins for child-focused development objectives. It then explains how ICTs can contribute to the future of child-focused development efforts, how they can be integrated more effectively in other child-focused development efforts, and how ICT projects can assist the most vulnerable children. Finally, it proposes how the work of UNICEF and the field of ICT4D can contribute to one another and offers a reflection from the perspective of the report authors.

ICTs are not a technical sphere detached from the complex realities of children's lives. They are increasingly woven into the very fabric of life, in income-rich and increasingly in income-poor countries. It is clear that if there is no targeted engagement with these socio-technical innovations, they are likely to reinforce existing inequalities. It follows that a focus on children and on greater equity leads to an active and reflective engagement with the potential and challenges of ICT for development, targeting in particular marginalized children. This report serves as a key contribution on which to build informed dialogue and decision making, developed jointly between research, policy and practice.



## Introduction

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There are few certainties in development work but two facts are indisputable. First, children merit attention because they represent the present and the future of the societies we live in. Second, in future immediate humanitarian and longer-term development assistance work will be increasingly supported by technological innovation. This report brings the two together and explores what a specific set of technologies – information and communication technologies (ICTs) – can contribute to efforts towards meeting child-focused development goals.

The work is broadly situated in the interdisciplinary research field described with the acronym ICT4D – ICTs for development. In this field there is as of yet no specific sub-field which focuses specifically on children: in other words ‘ICT for child-focused development’ is a new concept.

The UNICEF Office of Research commissioned the study from the ICT4D Centre at Royal Holloway and Jigsaw Consult, and all three subsequently became partners in overseeing the research process and fine-tuning the aims. The priority objective was to undertake research which

will support UNICEF in further articulating their position on ICT4D and children. An important aspect of this is the clear emphasis that UNICEF places on working for equity, based on the insight that this can maximise impact towards and beyond the Millennium Development Goals (UNICEF 2010).

The diffusion of ICTs has been highly uneven, and there are real dangers that digital divides (Warschauer 2003) not only trace, but also further deepen existing social divides, between income-rich and income-poor, between urban and rural dwellers, between women and men, and girls and boys. UNICEF is committed to focus on the most marginalized children in society and so the equity perspective runs throughout the entire report.

The following seven questions guided our research:

- Considering children, where and how can ICTs help with reducing inequality?
- Considering children, where is there a risk that ICTs will increase inequality?
- Where might ICTs offer quick wins for child-focused development objectives?
- How can ICTs contribute to the future of child-focused development efforts?
- How can ICTs be integrated in other child-focused development efforts, especially in regard to innovation and collaboration?
- How have ICT projects been successful or not in assisting the most vulnerable and disadvantaged children?
- What do UNICEF's work and the field of ICT4D have to contribute to one another?

These questions informed our methodological approach and first analysis, but the report is structured according to the key themes and insights that arose during the research. The study had two methodological components: a literature review and an interview process which brought together knowledge from 35 experts in this area. These were practitioners, policy makers and academics, each approaching the subject from different organizations (NGOs, multilateral agencies, businesses and academia), different disciplines and from different country contexts. We gave experts the opportunity to have statements attributed or to speak off the record. The report collates this body of expert knowledge, much of which has not previously been collected and disseminated. We adopted an approach which defined ICTs broadly as any technology serving the purpose of gathering, processing and disseminating information, or supporting the process of communication. We recognise that in the ICT4D literature, ICTs tends to mean digital technologies, particularly internet and mobile phones. However, important impacts have been achieved with previous technologies, such as textbooks and blackboards in schools, and health information radio. Remaining technology-agnostic ourselves and focusing instead on the child-related impacts, we also left it to our expert interview partners to choose which information or communication technologies they wanted to highlight as appropriate or inappropriate for achieving child-focused development outcomes in given specific contexts.

We took the decision to allow our interview partners to choose the precise definition of 'child'. Within our pool of experts some focused on childbirth and early years while, at the other end of the scale, some focused on employment opportunities for youths and young adults. Our research was exploratory, and it soon became apparent that experts in child-focused NGOs often viewed technology as a cross-cutting theme, while in turn experts in ICT4D organizations often saw children as a cross-cutting theme. This meant that there were few who considered themselves to be experts specifically on 'ICT for child-focused development'. In light of this, it was necessary to allow interviewees to make explicit in what way their work linked with the topic of this research.

As a summary of the diversity of approaches to children and ICT that we encountered, we offer the following overview to categorise different perspectives:

- 1) Children as intuitive users – perspectives and initiatives that consider children as naturally innovative and capable with technology, more so than adults. This logic suggests that children only need to be given access to ICTs for them to start deriving benefit from them.
- 2) Children as direct participants in an intervention – these perspectives and initiatives see children not as leading their own development through use of ICTs, but see them as participating in a directed way via use of ICTs in an intervention, e.g. online participation.
- 3) Children as direct beneficiaries of an intervention – these initiatives use ICTs as a tool and target children as the beneficiary group, e.g. vaccinations.
- 4) Children as indirect beneficiaries of an intervention – these initiatives often focus on the mother or the household, with children as the secondary beneficiaries, e.g. mobile birth registration projects.
- 5) Approaches which seek systemic change through ICTs, which indirectly affects children as well, e.g. using mobile money for conditional cash transfers.

Alongside the clear potential for positive benefits, each of these approaches also has the potential for negative or unintended consequences of ICTs.

This overview taxonomy should be read as a framing tool to communicate to the reader the variety of the often non-explicit vantage points respondents were coming from. Recognising the extensive and complex theoretical literature on children and technology, these categories are used descriptively and not as analytical concepts. What they show, however, is the complexity of initiating meaningful conversations about children and ICTs, and the need of making such vantage points explicit.

The field of ICT4D is only now in a process of maturation after hyperbolic beginnings at the UN Summit of the Information Society in Geneva (2003) and Tunis (2005). Despite the recognised power of the technologies, commentators have noted that many early ICT4D interventions have failed to live up to the initially anticipated levels of success (Heeks 2006). In light of this we asked experts also for their reflections on the mistakes that have been made and what lessons had been learned. However, ICTs are contributing to profound changes in everyday life in the global North and many parts of the global South. The ongoing challenge is to harness their power by applying some of the best practices learned both in ICT4D and from decades of development work in other sectors. Consequently, we asked the interviewed experts about good practices of successful projects. In addition to these reflections on both good and problematic approaches, we constantly enquired after examples, case studies and other concrete information which readers of this report will find useful.

For the first time, thanks to the authors of the publications reviewed and the generosity of the 35 experts interviewed, this report can offer an extensive body of knowledge from scholarly material and tacit practitioner experience on the subject of ICTs and child-focused development. Chapter 2 explains the methodology of the literature review and the interview process respectively. Chapter 3 summarises key findings from the literature review. Chapter 4 offers a thematic presentation and analysis of the interview materials. In Chapter 5 we offer conclusions and recommendations. UNICEF encouraged the authors to comment on the findings from their specific vantage points as academic and practitioner in ICT4D and these reflections can be found at the end of the report, as well as an extensive bibliography and list of interviewees.





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## Methodological Approach

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### 2.1 Approach to the literature review

A literature review was conducted at the outset of the research process.<sup>1</sup> This provided opportunity to engage with the current debates and themes in the relevant literatures and identify significant gaps. The review of the literature informed the research strategy and provided a foundation for the subsequent methodological step, the interviews.

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<sup>1</sup> The literature review was rigorous and systematic and laid the foundation for the central element of the study, the expert interviews. It did not follow the standard format of a stand-alone formal protocol-led systematic review which is a more extensive independent project in and of itself. For a related DFID-funded systematic review on the key lessons from ICT4D partnerships for poverty reduction, which one of our authors co-wrote, see [http://r4d.dfid.gov.uk/PDF/Outputs/SystematicReviews/DFID\\_ICT\\_SR\\_Final\\_Report\\_r5.pdf](http://r4d.dfid.gov.uk/PDF/Outputs/SystematicReviews/DFID_ICT_SR_Final_Report_r5.pdf). This report also reflects on the potential and the limitations of protocol-led systematic reviews for the field of ICT4D.

The role of ICT within child-focused development is a rapidly expanding area of study that engages with a wide range of well-established bodies of research. As a result, an almost inexhaustible supply of loosely related literatures could have been included in the review. It was therefore necessary to provide clear parameters for the purpose of this study from the outset. In light of this, the literature review began with a comprehensive search of eight key academic journals relevant to the field of ICT4D, the websites of key organizations working in ICT4D, and a search of Google Scholar (see appendix 6.6 for a list of the journals and websites that were reviewed in building the body of relevant literature). The initial screening of literature identified more than 250 relevant academic papers and policy reports. This was followed by a detailed review which reduced the list to 133 resources that were closely related to the key research themes.

Five criteria were used for determining inclusion in this second list. The first of these was 'date', with priority given to resources from 2008 onwards. The second was 'child relevance', with priority given to resources relating directly to children throughout. The third was 'type of technology', with priority given to resources that engaged with a specific technology (such as mobile phones, radio, internet, computer, cloud computing). The fourth was 'region', with priority given to resources focusing on countries from the global South. The fifth was 'degree of saturation', with priority given to particularly ground-breaking research that contributes something different from previously reviewed sources. Following this exercise, the 133 resources were then classified according to the following five categories: geographical continent and country, sector, type of ICTs, research methodology employed, and type of intervention.

These processes allowed the resources to subsequently be grouped into seven major themes: extreme poverty, maternal health, child health, nutrition, access to quality education, governance and accountability, and e-participation, children and the internet. These themes provided the parameters to the study and were decided in discussion between the research team and UNICEF partners. As with any categorisation, there was some overlap between the different themes (most notably between maternal health and child health). The research body is larger for some themes and less extensive for others: the implications of this are returned to in the analysis of the research. Similarly, it is noteworthy that only a relatively small minority of the literature is primarily child specific: some of the references that only engage indirectly with children are actually more important for the study. In order to maintain the parameters of the research it was necessary to exclude many studies of tangential relevance – such as the large number of studies on health and ICT regarding children in countries in the global North. Finally, a selection of additional literature relating specifically to Latin America is found in the appendix.

## 2.2 Approach to the interviews

At the heart of this report is a set of interviews with a range of experts in ICT4D who each had their own perspective on ICTs for child-focused development. The ICT4D Centre identified key organizations in the field of ICT4D to ask for an interview partner with expertise in child-focused development. In parallel to this we asked key organizations in the field of children's development to offer a contact with expertise in ICT-enabled projects to be interviewed. The authors used their existing professional contacts to gain access to these organizations and then asked to be linked with the relevant person within the organization.

The review of the literature provided some additional names of experts, and we also asked interviewees for further suggestions (snow-balling). All authors, as well as UNICEF, suggested names of recognised experts. Active efforts were made to achieve a diversity of backgrounds, areas of expertise, regional representation, and gender balance. Attempts were made to mix views from front-line practitioners with those of designers, programme leaders, chief executive directors and other leading observers.

An original long list consisted of approximately 60 names. After consultation among the team, this was reduced to a short list of first 25 and later 35 names. Interviews took place between April and October 2013. Interviewees were sent an invitation via email. If there was no response, one more attempt was made. Some of the potential interview partners and organizations declined, with reasons given including perceived lack of appropriate expertise, no time, or no response. Colleagues were very willing to help but as ever with expert interviews, scheduling was often a challenge, and we are very grateful for the efforts colleagues made to fit the interviews into their activities.

The 10 guiding questions (see appendix 6.4) were sent to interviewees in advance but the interviews retained a semi-structured approach. The objective of the interviews was to enable leading experts to contribute their perspective on the specific research issues. Not every expert had experience on every aspect and so the interviews were shaped accordingly, in dialogue with the interview partner.

A total of 32 interviews were conducted on Skype and recorded, with permission from interviewees. One additional interview was not recorded at the request of the interviewee. Respondents were assured that their views would either be anonymised or permission to attribute would be sought. Interviews lasted between 30 and 80 minutes, with an average length of approximately 50 minutes. For logistical reasons the final two interviews were changed, allowing the interview partner to send answers via email. All interviews were transcribed in full and all text inserted into the qualitative data software Atlas.ti. The two main authors independently produced code lists in a process of open coding. These lists were compared, 30 codes were agreed (see appendix 6.5) and all 385 pages of transcript coded against those lists.<sup>2</sup>

The most significant and relevant codes were clustered into the seven themes of Chapter 4 of the report. Several interview partners singled out specific projects to illustrate their views on what to do and what not to do in 'ICT for child-focused development' and these are found in boxed text in Chapter 4.

## 2.3 Limitations of the methodology

Both the literature review and the expert interview process had to be limited in their scope. In the case of the literature review this meant that ICT4D and ICTD journals were sifted systematically, while child development, education or public health journals, for example, did not receive the same treatment. Thus articles published within the newly established field of ICT4D were more likely to come to our attention than articles in sector-specific publications. The intention of the study is to be as inclusive of good quality research output as possible, wherever it has been published.

In the case of expert interviews, a limiting factor was the fixed number and availability of interview partners. In only two cases did selected interview partners decline to be interviewed, citing insufficient expertise on the subject. In most cases interview partners simply needed to find time for the interviews, requiring multiple attempts at scheduling. In one case an interview partner stopped corresponding and in another (ID 34) we eventually accepted interview responses via email since nobody was available for a phone/Skype interview. The number of interview partners was originally limited to 25, then extended to 35. Further, we expanded the possibilities for expert input by submitting the study to peer review by four experts (two practitioners and two academics) and conducting a feedback workshop with 26 experts at ICTD2013 in Cape Town, one of the leading conferences in ICT4D.

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<sup>2</sup> Our thanks to research assistants Olly Parsons, Lindsey Evans and Andrea Jimenez Cisneros for their excellent teamwork with us on this.





## Summary of Literature

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We have maintained the structure for the literature review as established in the original set of six themes. However, it should be noted that the literature review included significantly more references to some themes than others (as demonstrated in appendix 6.7).

### 3.1 Extreme poverty

ICT can provide powerful tools in the fight against extreme poverty, including in emergency situations. In emergency response, one of the vital questions is how to make sure the right help reaches the right people who are most in need. In this context, ICTs can be used to trace and monitor supply chains to improve accountability and reduce corruption. Deliveries of emergency aid can be digitally tagged with an RFID chip (radio-frequency identification) and read/inventoried via chip readers.



In disaster relief operations, mobiles can help generate a large amount of crowd-sourced data to inform the emergency response. Twitter outperformed other media in providing timely information in the 2008 Sichuan Earthquake in China (Li and Rao 2010). Mobile phones can also play a role in building preparedness and improved collaboration between different relief organizations (Hollow 2013). In addition, after the Haiti earthquake, for example, UNDP successfully used mobile money to send cash transfers to families for reconstructing their homes (Oxfam 2007).

Sahu (2011) offers many examples of how ICTs can support social protection assistance to targeted beneficiaries. Cash transfers to vulnerable groups reduce vulnerability and chronic poverty but delivering cash to remote and hard-to-reach rural areas can be expensive and insecure (Vincent and Devereux 2010). Now cash transfers to households can be based on existing mobile money infrastructures which are widely diffused in parts of Africa such as Uganda, Kenya (Mwanguzi and Musambira 2011) and Somalia. However, it is worth noting that many households are characterised by uneven power relations between men, women and children, with men often controlling the mobile phone if there is only one. Sending mobile money directly to households does not guarantee that women and children will receive the benefits.

In order to claim social benefits in the form of cash transfers, mothers normally need to have the birth of their children registered. This can be difficult in rural areas where government offices are far away. In such cases, SMS-assisted birth registration can be introduced in combination with child-focused social transfers (Samson and Cherrier 2009).

## 3.2 Maternal and child health

Maternal and child health are two of the leading areas in which children are direct and indirect beneficiaries through the effective use of ICT.

There are noteworthy examples emerging of how mobile phones are being used at a national scale to promote effective birth registration systems, including in Nigeria and Uganda (Wassago 2012). A well-documented and common challenge in maternal health is the time delay between the decision to seek care and arrival at a clinic because of the challenge of travel. If the time between deciding to seek care and receiving useful information related to that care can be reduced through the use of ICT then there is the potential to save mothers' lives (Noordam 2012). Linked to this is the way in which ICTs can be used to help health care workers to operate more effectively in their roles, especially in rural areas, with examples of the way in which videos on smartphones can be used to facilitate dialogue with and between health workers (Cuttrell and Ramahandran 2010). This links to ongoing debate regarding different forms of ICT access and the implications for healthcare workers if they have reliable access in their home as well as work environment (Bukachi 2007).

Mosoke (2009) explores the way in which multiple technologies (such as SMS, radio and solar power) are often used in combination to advance maternal health objectives, especially through the distribution of pre- and post-natal information. It is worth noting here that more information is a useful step towards, but no guarantee of, active behavioural uptake. In addition, ICTs are also being used to promote maternal health at a system level through the introduction of improved medical information systems and subsequent improved referral systems.

ICTs can also play an important role in directly enhancing child health in a wide range of different ways. These range from the use of technology to raise awareness on water, sanitation and hygiene (WASH) issues (Butterworth 2009) through to the potential for using technologies (mobile phones, internet and community radio) as effective tools for campaigning on female genital mutilation (FGM) (Thioune 2013). Throughout the literature there are repeated calls to recognise the need for contextualised approaches to using ICT for child health – with an appropriate blend of old and new technologies.

In Zambia and Malawi the UNICEF project Mwana<sup>3</sup> is using mobile phones to improve early diagnosis of HIV in infants and provide post-natal follow-up and care. Research conducted suggested that the programme had contributed to a 50 per cent reduction in waiting time for child test results (Lambo 2011).

### 3.3 Nutrition

The literature review revealed a notable lack of studies that engage explicitly with ICT and child nutrition within the global South.<sup>4</sup> Subsequently, a peer reviewer of this study highlighted an interesting pilot project (Blaschke et al. 2009) which successfully used Rapid SMS to facilitate the monitoring of child malnutrition in three district monitoring clinics in Malawi. There is increasingly widespread use of technologies to facilitate effective response to emergency situations where there is the threat or the reality of food insecurity and famine. This may involve using information management systems to process information from vulnerable populations and develop intelligent mapping solutions that can help to direct humanitarian efforts (Food Insecurity and Vulnerability Information and Mapping Systems – FIVIMS). Also, the increased access to mobile phones among communities at risk of food insecurity has facilitated a rapid rise of ‘mobile cash transfer’ as a safe and cost efficient means by which to enhance capacity to buy necessary food in fragile and emergency environments. Finally, there is a well-established understanding of the importance and role of ICTs more broadly in networking and training personnel for relief work (Bertolini et al 2004).

### 3.4 Quality of education

The question of how ICTs can be used to facilitate access to good quality education in the global South has been the focus of considerable study. Of particular interest is the wide range of backgrounds, pedagogical approaches and visions for education that co-habit in the emerging sector of ‘ICT for education’ (Mitra 2003, Selinger 2009, Isaacs and Hollow 2012). It is now widely recognised that the previous emphasis on simply placing hardware in schools is unlikely to lead to a substantial improvement in learning outcomes for children.

Many debates within ICT for education parallel those of the wider education community. An example is the important distinction between interventions that improve access to education and interventions that improve the quality of educational outcomes (Hollow et al 2012). Similarly, ICTs can play different roles in facilitating both formal and non-formal education, and can have a particular role in helping girls to continue learning in school (Plan, 2012). There are also important ongoing research agendas regarding the ways in which ICTs can be used to help improve education for children with disabilities, noting the importance of inclusive design processes (Bomal Nkansah 2010, Larsson et al 2010), and the way in which ICTs can be used in promoting indigenous languages through bespoke, easy-to-use educational software for children (Azi, 2006).

Much attention has been paid to the benefits of ‘one per child’ in the use of ICT for children in education (Negroponte 2009) and often this has been associated with constructivist approaches to education (Dangwal and Gope 2011). However, alongside this are those who emphasize the potential for shared access to devices, rather than simply assuming that, whatever their circumstances, each child requires individual access (Wintz 2009). Regardless of pedagogy, research demonstrates that, if working with teachers, the approach adopted when introducing technology is of central importance. The major obstacles faced by teachers in utilizing new technology are: lack of time available, lack of appropriate course content, and technical malfunction (Wan Zah Wan Ali 2009).

<sup>3</sup> <http://unicefinnovation.org/projects/project-mwana>

<sup>4</sup> There are numerous interesting studies regarding nutrition and ICTs in the global North, such as the MyFood project at Wageningen university (Korthals et al 2005).

### 3.5 Governance and accountability

The literature review showed that one of the most powerful uses of ICTs was to make children visible and countable, consequently making adults and government accountable for their welfare. This is an important component in the process of strengthening the social contract between government and citizens.

Birth registration via mobiles in rural areas (Mattila 2011) can be the first step in securing a child's rights and entitlements. Birth registration can reduce risk of trafficking, child labour and child marriage.

In the case of India, however, Ramakumar (2010) stresses how government drives towards technology-based unique IDs do not get to the deeper roots of inefficient public welfare schemes and can have unforeseen consequences.

In the children's health section above we explored examples of how ICTs can help record health interventions for a child. In acute emergencies, systems such as RapidFTR can help with family tracing (Mattila 2011).

However, privacy issues can emerge, for example around who should have access to a person's health records, which are much less discussed in the ICT4D literature than in the global North literature on ICTs. Other general child protection issues related to online risks have been catalogued and discussed, for example in the Child Protection Online work of ITU (2013) and by the UNICEF Office of Research (2011). Buxarrais and Martinez (2004) call for an updated children's bill of rights which includes ICT and media-related rights. Cook et al (2012) describe how participatory action research with children, youth and adults in Thailand by the Child Protection Partnership led to the co-creation of strategies for ICT and child protection.

Making information and advice more available and creating child helplines have the potential to at least record, and at best reduce, violence against children (Pinheiro 2006). Frontline SMS and Ushahidi can be used for violence reporting. Widening the scope of expression from reporting abuse to stating political and other views, U-Report in Uganda has pioneered ways of giving young people a voice through text-based surveys (see box 3).

The literature shows in diverse ways that ICTs can be used to 'take children into account'; however, firstly there are concerns for privacy and secondly, that simply counting, recording and measuring will not be enough. Accountability and good governance will depend on the quality of institutions, policy and implementation systems to deliver better results for children.

### 3.6 E-Participation, children and internet

Our literature search found a large number of studies relating to income-rich countries. For example, Jenkins et al. (2009) note that more than 50 per cent of US teenagers have created media content and a third of teenagers who had internet access had shared such content online.

While we do not propose a crude binary between 'developed countries' and 'developing countries' (see Kleine 2013 – by the paradigm of e.g. sustainable development, all countries remain developing), we did concentrate on the much more limited number of studies focusing on children in the global South.<sup>5</sup>

5 For an excellent overview of research on children's online behaviour and rights in the digital age, see Livingstone, S. and Bulger, M. (2013) 'A Global Agenda for Children's Rights in the Digital Age', UNICEF Office of Research, Florence. It is worth noting their conclusion that, 'Most knowledge [on children's use of digital technologies] has been obtained in the global North, and its relevance to the global South is largely untested' (p.4).

Porter et al (2012) conducted an extensive three-country study across Ghana, Malawi and South Africa, finding that mobile phones play a central role in children's lives, especially as a communication tool strengthening family ties between dispersed family members. Chigona and Chigona (2008) analysed media discourses about youth's use of the Mxit mobile messaging system in South Africa, stating that these descriptions have been mostly negative, almost resembling a form of 'moral panic' by adults. Beger and Sinha (2012) review secondary data and state that South African youth are enthusiastic users of Mxit and Twitter via their phones, but face cyberbullying, sexting, privacy violations and exposure to sexually explicit images. Reviewing secondary data on Indonesian youth, Beger et al. (2011) find that internet users are most likely to be male and urban, and that use of Facebook and Twitter is exceedingly popular among young users.

Risks online include child pornography, grooming by strangers, trafficking, software piracy, exposure to extremist content and cyber-bullying. This is echoed in further papers in the series, on Ukraine (Beger et al. 2011a) and on Turkey (Beger et al 2011b), with similar risks mentioned, as well as exposure to malicious software. Turkish youth are described as facing risks from cyberbullying, oversharing of personal information online and exposure to malicious software and adult content, while Ukrainian children face exposure to adult content and grooming online. Further work by the same team on Russia (Beger et al. 2011c) shows cyberbullying, exposure to indecent content and grooming as risks. Key work reviewing the global evidence available on child online protection includes the report *Child Safety Online* (UNICEF Office of Research, 2011), with a focus on child sex abuse recorded in images, and the grooming of young people for sex.

UNICEF published a report (UNICEF 2012a) in which there is also a section on ICT and media use by teenagers (between 15 and 19 years old) globally, stressing that only a minority of boys and girls in developing countries do not watch television, listen to radio or read a newspaper at least once a week. An additional body of research focuses on the diverse ways in which young people proactively engage with shaping media (Dunkels et al 2011, Tufte et al 2013).

A landmark report from UNICEF Tech Innovation (2012b) offers case studies of innovations, as well as guidance, partnerships and processes. One of the best-known initiatives for youth participation is U-Report by UNICEF Uganda (Dralega 2010; Shanker 2012) which invites young Ugandans to register by texting via mobile phone and then be included in country-wide opinion surveys which may be taken into account in policy making. Registration includes capturing age, gender, district and village, so answer data can be disaggregated (see box 3).

De Lima et al. (2012) offer examples of how ICTs can support migrant children. A particularly innovative initiative is the global teenager project (GTP) by the International Institute for Communication and Development (2009) which used ICTs to connect secondary school students in classrooms in Europe with their peers in Ghana and Ecuador to discuss key global topical issues with each other.

The body of literature points to still limited understanding of the context of children's use of new ICTs in the global South, and to the reality that simply giving children access to the internet is not enough, there will need to be some guidance to help them over time to maximise the benefits while avoiding the risks of ICT use.





## Interview Analysis by Key Themes

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The following analysis is organized into seven themes. Each of them focuses on the content of the interviews and structures them to be accessible and of practical relevance for readers. At the outset it is worth stating six foundational principles that cut across the research and were emphasized repeatedly by the interviewees:

- There is a wide range of diverse activity covered under the topic of ICT and child-focused development (ID 06).
- Technology for children is a means by which to reach a desired end, technology is not the end in and of itself. This was most often referenced in relation to equity, and the recognition that ICT *'can contribute both to equity and inequity depending on how it's used and how it's being positioned'* (ID 15).

- ICT has both a direct and an indirect impact on children and this resulted in a wide range of emphases from the interviews. Tellingly, one interviewee expressed simply the belief that, *'The most transformative indirect way in which ICTs can support kids is by providing an income for their parents'* (ID 22).
- In considering the way in which technology can be used to enhance child-focused development it is important to recognise the lack of 'silver bullets' (ID 02, 29) and retain this awareness in the midst of often inspiring innovation.
- There are many unintended consequences that occur within the field of ICT for development – it is important to recognise this and accept that this will remain the case (ID 16).
- Technology is not always the appropriate option for child-focused development and requires holistic cost benefit analysis (ID 22) with assessment of what will bring most benefit to children in a given context: if you have the option of buying one piece of equipment *'or 100 paper books to populate a classroom in a developing country village ... I would argue you might just be better off buying a bunch of paper books'* (ID 24).

Ultimately this research is focused on positive change for children, whether via technology or without it.

## 4.1 Access and equity

### a) Access

Gerster and Zimmermann (2003) contend that access to ICTs can be conceptualised in the dimensions availability, affordability and the skills needed to use them. Kleine (2007, 2013) added the dimension of (often gendered) social norms which control the use of time and the use of space. All of these dimensions are important to understand issues of access and equity.

The ability to access relevant information, especially in remote and marginalized locations, can have a significant positive impact on equity for children (ID 01, ID 13). The experts were keen to explain the ways in which they had seen positive effects on children:

*The capacity of young people to be in places where they can't physically get to is revolutionary – for girls who aren't allowed to be in a school ... to be in an environment where they can get the same access to information and opportunity as their peers who would be in higher resource environments is absolutely opening up new frontiers* (ID 04).

Similarly, regarding working with refugee populations, it was noted that ICTs have the potential to break down barriers for children and connect previously isolated communities in a way which provides both social and economic benefits (ID 05).

However, alongside the simple benefits is another more complex story regarding ICTs and equitable access. A combination of infrastructural, logistical and political factors means that the majority of child-focused ICT for development programmes undertaken thus far have not been with children in the most remote and marginalized areas. Some experts emphasized the way in which ICTs very often currently serve to exacerbate pre-existing inequalities between communities: *'I think we are in a period at the moment, hopefully we will come out of it soon, in which access to ICTs because it is unequal, tends to promote inequality ... it tends to distort differences that may exist naturally'* (ID 22).

Others emphasized the futility of viewing access as a single, standalone solution, seeing it rather as a potential problem. They noted that as soon as a child has 'access', it becomes necessary very quickly to consider the issue of effective content – the substance of what is being accessed (ID 28). This was encapsulated by the director of an innovative child- and youth-focused media network operating in Kenya.

*One of the real challenges facing young people in Africa I think is they're all excited to go online, they're all excited to be on the internet. They're faced by a browser for the first time and the only place that they can go on the internet where they know they can have a good experience is Facebook – because there is no content online made for them, almost nothing. The most popular websites in Kenya by a mile are Facebook followed by job search websites, but they are almost the only valuable local online content in a language and in a context that people find relevant. Everything else comes from the U.S. or Europe or the so-called Western world. So one of the big challenges now, as we get millions of young people to engage with the internet for the first time, is to give them an experience that is relevant and helpful to them, so that they can say yes the internet isn't just a place I go to exchange news about Arsenal or Manchester United, although that's valuable, but I can go beyond that and actually accrue value for myself (ID 29).*

Various experts identified the challenges of ensuring reliable access – noting that all the common challenges are often exacerbated for children living in the most marginalized areas (ID 11). Building on this, the challenge of inequitable access was recognised by many, and an mHealth expert explained that effective programme design to benefit marginalized children needs to account for the disparity in access and therefore cannot be solely dependent on technology-based solutions (ID 15). The particular importance of equitable access to the internet<sup>6</sup> was a recurring theme among the experts (ID 01). One Chief Executive Officer explained:

*I don't believe in silver bullets. But if you want one then ensuring ubiquitous cheap internet access for the poorest and most marginalized is important – and that is something we should be striving for collectively ... ubiquitous, good value broadband ... The first thing that should happen is ensuring ubiquitous, cheap, broadband as an enabler. If we get that right and can link it to solutions across that to deliver on the varying needs of young people – that would be wonderful (ID 23).*

One UNICEF staff member noted that 'Today the digital highway is what would make the difference, you know once you bring in connectivity there are so many possibilities of what can happen using that connectivity'. The interviewee then went on to note the challenge of ensuring equity, explaining that where broadband is being introduced:

*These cables will only reach those areas where it makes business sense ... there are populations that live without besides these areas who are marginalized and if you're looking at inequity they are the ones who actually need connectivity the most to be a part of the mainstream.*

This underlines the importance that such areas '...don't remain marginalized just because the fibre optic cable doesn't reach there' (ID 21). Several experts stressed that market-based solutions needed to be complemented with a state-led commitment to universal connectivity and access. They noted that without this there would be a risk that where there was an insufficiently attractive business case to be made, for example in remote and sparsely populated areas, populations were at risk of being further excluded and marginalized.

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<sup>6</sup> The Alliance for the Affordable Internet is undertaking valuable work on this issue – [www.a4ai.org](http://www.a4ai.org)

## Box 1: **Appropriate technology, designed in Africa: The BRCK**

The BRCK is a backup device designed to support access to the internet on a variety of devices through electricity blackouts or in situations of limited network coverage.

It is 'made in Africa' and 'designed for anywhere' by the team of software designers, engineers and technologists from Ushahidi, a Kenya-based company. The BRCK is built for environments with unreliable electricity and features a large battery allowing it to offer backup power to a variety of devices. As the Director of Business Operations for the BRCK explained (ID 13):

*[The BRCK] can charge on anything between 3 and 17 volts, which means it can be charged on a solar panel or a car battery ... In a lot of areas the electricity from the grid is really bad, it gets a lot of sharp spikes, it can fry a lot of consumer electronics, so this [BRCK] can consume this type of electricity, it is meant to work in a rural or rugged environment ... When the electricity goes down the BRCK switches over to battery and when the Wi-Fi goes down it has a simcard in it so it can decide between accessing the internet via Wi-Fi or through a mobile network.*

According to its designers, like mobile phones that can be used to tether mobile internet, the BRCK uses the same logic but is built to use integrated smart software to switch between and optimise mobile, wired and wireless connection potentials and to deliver the best connectivity to up to 20 devices, with a maximum 8-hour battery life.

The design is developed to withstand dust and water and was stress tested in November 2013 in rural areas near Lake Turkana. 4Gb of inbuilt storage is standard but can be upgraded. A cloud connection means that users can contact a specific BRCK remotely and view its statistics such as its data transfer speeds. BRCKs can be combined with sensors and applied for Remote Systems Monitoring, for example monitoring whether water pumps in remote locations are functioning.

Featured in a TED talk and in *Wired* magazine in 2013, the BRCK is receiving significant attention within the ICT4D community. The first 2000 devices, each priced at USD 199, are due to be launched in Nairobi in early 2014. At this point, users will be able to test whether the BRCK can deliver what it promises to be: an appropriate technology, designed in Africa. See the website and blog at [brck.com](http://brck.com) for more information.



## Box 2: Radio for child-focused development

Several interviewees emphasized the ongoing importance of radio as a tool for effective child-focused development. They highlighted the way in which radio-based interventions have the potential to access large numbers of children across a wide geographical area, and with a diverse set of needs, at much lower cost than computer-based interventions. As expressed by the Chief Executive Officer of Lifeline Energy, the case for radio is particularly strong in regard to primary education provision where there is ‘evidence of the success of radio in pretty much all subjects that get taught’ (ID 10).

A Senior Technology Specialist at the Education Development Center (ID 31) expressed a similar sentiment, explaining that Interactive Radio Instruction, as a well-established approach, is the tool with the strongest pedagogical evidence base within ICT4D. She went on to note the ways in which radio:

*...narrows the equity gap between urban kids and rural kids, between girls and boys, you can get radio- or audio-based instruction into refugees camps, into war-torn areas, and our own studies on radio have shown that kids that used radio exhibit greater gains than kids who don't, show greater gains in terms of language and cognitive development (ID 31).*

In addition, in some cases, radio can be enhanced through listener participation via SMS.

Despite this, there is a notable lack of focus on radio within the ICT4D community. For the Chief Executive Officer of Lifeline Energy this is because, despite the pedagogical evidence base, there is a lack of corporate involvement or interest in radio. She explained that this is in contrast to:

*...mobile phones and computers and e-books and all that [where] you've got some of the biggest corporations behind them ... software companies can make money so they're going to be pushing it ... it's a real economy boosting, economic generating thing much greater than radio is (ID 10).*

Looking to the future of radio for child-focused development, interviewees identified the need for strong radio stations with national broadcasting capability, increased reliable rural electrification, and more educationally-focused open source radio content that can be distributed without the need for expensive licences (ID 34, ID 10).

It is clear that the issues of access and affordability are closely joined. The pace of technological change means solutions that were prohibitively expensive five years ago are now accessible for an increasing number of communities, with subsequent implications for children. As one example of this, the director of a well-known ICT for development initiative emphasized the major significance for children of the decreasing price of smart phones (ID 09).

## b) Equity

The issue of equity was emphasized implicitly throughout the whole research process and has implications for all other sections (ID 02, 03), but is also worthy of explicit focus here. As previously noted, an important recurring theme from the experts was the way in which ICTs often serve to exacerbate pre-existing areas of inequity for children, rather than reduce them (ID 06). In light of this, it was noted that equitable use of ICTs for children is not something that will occur inevitably – and that it needs to be programmed intentionally. *‘There is a prominent risk in looking at ICTs [with people seeing them as] being neutral and assuming that there will be equitable spread’* (ID 05). Indeed, some went further, noting that the default is for technology to increase the divide between the poor and the rich: *‘the rich get richer, based on the technology tools available to them’* (ID 12). This was encapsulated by a Knowledge and Information Officer who expressed his belief that:

*When groups are already marginalized it seems to be increasingly that tools like technology become proprietary to certain people. So unless you set things up so the more likely to be marginalized group has access with intent, without that intent you are more likely to increase the fact that they become marginalized* (ID 11).

Similarly, the director of a donor programme in ICT for development identified the way in which technology exacerbates pre-existing divides:

*Because obviously kids from poor families are much less likely to have access to ICTs and therefore ICTs can become yet another status marker, that actually differentiates between richer/poorer, also depending upon what type of ICT you’re talking about. ICTs that are based on literacy, for example, will make children who are not so literate disadvantaged from those who are more literate* (ID 16).

In recognition of this, UNICEF has adopted a proactive strategy towards promoting equity in their child-focused ICT for development initiatives. The Senior Advisor to the UNICEF Executive Director on Innovation, and co-Lead of the Innovation Unit explained the importance of deciding to invest time and money among the most marginalized, stating that this leads to, *‘...a tremendous additional value per development dollar spent’* (ID 04).

## 4.2 Gender

Gender was seen as a very important issue in the interviews, with 16 respondents commenting at length. They mentioned the following key challenges for girls.

### a) Access to ICTs

Husbands often pass on their old mobile phones to their wives and some children are allowed access from them (ID 24). However, boys are more likely to be given mobiles than girls (ID 16). Moreover, fathers and husbands often try to control women’s social contacts (ID 03) and so women and girls may struggle to be allowed free access to a computer or a mobile phone (ID 03).

*Sometimes it is even easier for a boy to use the computer for gaming than it is for the girl to use the computer for homework* (ID 03).

Experts cited examples of projects in Pakistan and India where families would not let girls use mobile phones for educational purposes (ID 13), but when literacy standards rose, community leaders changed their stance and condoned usage (ID 08). Kleine (2011, 2013) speaks of

gendered social norms regarding the use of time and space and this was a prominent theme in the interviews.

As one designer pointed out, girls were very busy – taking care of other children and looking after the household. This pressure on their time made them, as he put it, *'the most demanding end user you can probably design for in the world'* (ID 17). Girls would have to go home directly after school so after-school computer classes would be used only by boys (ID 07). ICT-based attendance tracking showed that girls would not be in school around religious holidays, when they were expected to help in the household with preparations for the celebration (ID 22).

Because of their workload and the families' concern about preserving their reputation, girls can be among the most isolated people in society (ID 17). In terms of having spaces where they can meet and learn ICTs, some projects had experimented with using public libraries as safe spaces (ID 16). Girls' Club initiatives make separate spaces available just for girls (ID 05) and the GraceOne project (ID 03) created a computer lab for girls only. ICT camps for girls (ID 13) also invited some female role models along. Given the fact that in class girls can often outperform boys in school (ID 22), there is great potential in such initiatives. The AkiraChix project in Kenya tries to open up the IT industry, which is traditionally 'male and pale' (ID 13) by teaching girls at high school level to code.

#### b) Sexual harassment and violence

However, girls are in danger of harassment and sexual violence, both online and offline. Simply having electricity and light on at night when studying in rural areas might pose security hazards for girls and young women which would not be the case for boys in the same way (ID 07). Harrassmap in Egypt is an online tool which allows girls and women to report and map incidences of sexual harassment and violence (ID 13). There are SMS-systems which allow older girls to help younger girls report corporal punishment or harassment at school (ID 19). In South Africa, where boys have been convicted of raping girls, filming the rape on mobile phones, placing it on YouTube and boasting about it at school, ICT-assisted initiatives now exist to raise awareness among boys that rape is wrong (ID 20). In another project, known as 'Township Mamas', in one of the poorer areas of South Africa, an SMS-based system is used to alert the network when a rape has occurred.

As far as online dangers are concerned, *'If you are getting young African girls online there will also be dangers of paedophilia that we need to address'* (ID 16). Indeed, the evaluation of one pilot conducted in Uganda from 2009 to 2010 with a 'google health' application found that the only measurable outcome was that users were often unfaithful to their partners (Kitamura 2013). Take Back the Tech is a project which records and raises awareness about sexual harassment of girls and women online (ID 13). The Praekelt Foundation runs an online forum (Young Africa Live) which gives girls and women a space to talk about sexual issues anonymously (ID 17).

#### c) Gender in e-health

In e-health projects, the power dynamics in households can prevent women receiving key information, for example before and after pregnancy, with consequences for the health of their child (ID 20). Recognising that ICTs themselves will not change those power dynamics, some projects have resorted to recording health messages around pregnancy for the husband in a male voice, rather than in the voice of the female health worker or midwife (ID 24). While this may result in better uptake of health messages, it is also reinforcing perceptions of authority being linked to maleness. Experts in our study were concerned that designers of mobile phone interventions did not understand that women do not make health decisions on their own, but as actors embedded within social relationships. *'If it's women's health you want then think community, because women make their health decisions in relationships and not at the little screen on their mobile phone'* (ID 03).

In terms of the design of programmes, experts noted that women, similarly to children, were often intended beneficiaries but were rarely involved in the design of interventions concerning their lives (ID 17). As interview partners stressed, unless you specifically think about gender power you will simply be reinforcing existing inequalities with ICTs (ID 11).

### 4.3 Intermediaries

The role of intermediaries was seen differently in the main sectoral areas of application. In e-health and mobile health, there was universal support for working with intermediaries, while this remains a key debate in e-learning.

#### a) E-health / m-health

In many societies, due to gender inequality, fathers and husbands may still be the only persons in the household who own a mobile phone, so that health messages, including those related to a woman's pregnancy and a child's health (ID 01) reach men more easily. In a family it might be husbands and mothers-in-law, as much as the pregnant woman, who make decisions on the care the woman receives (ID 24). Other key intermediaries are midwives and community health workers, and respondents stressed the importance of understanding that some of them might see their authority or livelihood threatened by new ICTs (ID 03).

In Kenya the Kunji project provided community health workers with laminated cards and mobile phones which, if they scanned the code on the card, could play a short video reinforcing the health message on the card (ID 24). SMS-based tools can help health workers carry out basic health care updates with mothers (ID 08), and SMS networks can help community health workers seek information from doctors or other community health workers. ICTs can also be used by health workers to collect data on children in a community and share the data in aggregate forms (ID 06). ICT can also be used in triage, improving the system so that straightforward cases can be dealt with at lower levels, leaving specialist time freed up to consider more complex cases (ID 10). Practitioners stressed the need to work vertically with different layers of intermediaries, not just with one layer (the community health worker), but also with doctors and health system managers who would frequently be using ICT-assisted data gathering in their management decisions (ID 24).

#### b) E-learning / m-learning

Most interviewees found the emphasis on giving technology into the hands of children without guidance by an intermediary to be mistaken.

Some speculated on the commercial motives which incentivise companies to advocate for a one-to-one relationship with technology.

*GSMA [Groupe Speciale Mobile Association] and a lot of the big telephone companies are pushing, there is a lot of money in mobile education tools, so they are kind of pushing that you can replace teachers with self-directed learning and everyone is sort of just going to go online or on their phone and download these videos and they are just going to get educated that way (ID 08).*

Instead, respondents listed teachers, parents, headmasters, parent-teacher associations, Ministry of Education representatives and inspectors as relevant intermediaries in education systems.



Many acknowledged the key problem of the limited education of teachers, especially rural teachers. ID 21 cited 35 per cent vacancy rates and 35 per cent absentee rates for teachers in Uganda, and government figures allegedly show that 65 per cent of primary school teachers cannot read aloud a paragraph of English. Many teachers had poor education themselves (ID 05) and many reproduced overly didactic forms of teaching (ID 03). ID26 stressed that most teachers faced class sizes of 50 as the norm. Making changes in teacher training colleges takes 5 years (ID 26) with many donor-funded projects designed to a much shorter timeline. The best teachers tend to gravitate towards urban schools, leaving rural schools with some less motivated or less well-trained teachers (ID 28). ICTs can be used more effectively by the better-educated teachers, thus potentially exacerbating existing inequalities in teaching provision (ID 12).

However, there was often strongly expressed concern that projects such as One Laptop per Child (OLPC) did not approach these issues the right way.

*[OLPC founder] Negroponte, he just had this almost loathing for education systems and disdain for teachers. You know there is some reason for that – education systems are in a really bad shape and teachers are undertrained and so on. But he would often see these technology solutions as a way of getting around these problem people, rather than including them (ID 18).*

Apart from radical constructivist approaches to learning, another reason why projects might bypass teachers is the perception that this will speed up progress towards project objectives (ID 03).

Most expert respondents favoured approaches which focused on teachers – one laptop per teacher rather than one laptop per child (ID 22). The Wahesha project in Kenya trained 16,000 teachers (ID 22). Good practice was seen to be:

- combining different technologies, including radio, internet and SMS (ID 07)
- letting teachers own a tablet so that they could fully appropriate it (ID 20)
- having an offline database in schools with digital materials including curriculum materials and lesson plans (ID 26)
- working with teachers in schools, including team teaching with a trainer (ID 05)
- teaming up teachers with technology trainers, who would be the junior partner in the relationship (ID 26)
- facilitating peer-to-peer exchange between teachers through regular meetings to compare ideas for use of tools (ID 25)
- getting buy-in and leadership from head masters (ID 27)
- using systems such as Rapid SMS to gather feedback and updates from teachers on the programme, with the bill for SMS being paid by the organization leading the programme (ID 26).

In one example of an e-learning project, the idea of the ‘intermediary’ was turned on its head with teachers encouraging children to find out what issues or problems their parents needed assistance with and then using class-time to find relevant information about these online. In this case, the children themselves became intermediaries.

Many interviewees expressed the view that e-learning is ‘big business’ that a variety of companies were interested in tapping into. ID1 was conducting an ongoing study which provided one group of children with one Kindle per child. In a second group, every teacher received a Google Nexus Tablet which had lesson plans already included, as well as video clips helping with the pronunciation of some Kiswahili and English letters and words. In a third group tutors visiting 10 to 15 schools were given a tablet to remind them of the feedback they had previously given teachers. Results of the study are soon to be published. OLPC focused on giving each child a laptop. ID 22 mentioned teacher-focused white boards, Promethean boards and the

Intel classmate, a system halfway between pupil-centred and teacher-centred approaches, with machines depending on a central server controlled by the teacher. ID 28 described a project by Cisco which provides schools that are lacking suitably qualified teachers with a toolkit to broadcast a lecture by a skilled teacher in Delhi (ID 28).

In many of these cases, the hard- and software that teachers train on is significant because it co-determines the commercial relationships schools and education ministries might enter into. This was noted by several respondents, including one anonymous expert who commented:

*[A dominant software company] has come in pretty hard and said, you know we'll do a free training for all teachers on [company name] products. Well they didn't say that but that is what they'll do, they'll train teachers on how to use [company name] products which is another huge expense if they decide to go that way rather than something open source.*

Another problem identified with the techno-centric focus of many e-learning projects was that national and local politicians would rather announce numbers of tablets deployed than highlight gradual improvements in teacher training, with the integration of technology use where appropriate (ID 11).

#### 4.4 Local demand and appropriate design

The issues of responding to local demand and determining appropriate designs for different contexts were recurring themes throughout the interviews.

##### a) Need for user engagement

Many interview partners were concerned that often ICT4D projects did not engage sufficiently with children as users. Some went further and demanded that children should also be involved as co-creators, in project design, and some felt they could contribute to content creation and software programming.

*It's actually listening to the child's perspective, often it's ... and I think in general in development there is a tendency to design programmes for children from an adult perspective instead of actually listening to children and let them have a greater say in what they might actually need (ID 16).*

There was a strong consensus that the focus should be on needs, rather than on technology (e.g. ID 23, ID25). ID 23 pointed out that children are not a homogenous user group and that needs changed, for example as children grew into youths, and employment skills became more of a concern.

Obstacles to meaningful participation that were highlighted were projects centred on a technology in search of a problem it could solve, pilot projects with a short-term mentality (ID 20) and unrealistic timelines enforced by donors.

Experts stressed that a successful programme would not necessarily require technology, and certainly not the purchase of new hardware (ID 02). Instead, it was suggested that projects should take time to analyse what technology was already being used in the local context, including the local systems for charging phones, phone repair and phone swapping (ID 05).

A designer outlined the double design challenge. Firstly 'Any service that is targeted in this environment has to be so efficient, so elegantly designed, it has to work in such a clear manner to be valuable, because you are reaching an audience with so few resources and so little time' (ID 17).

Secondly, when talking about children, *'The bar is even higher because children around the world in many ways are no different, they gravitate towards things that are fun, pleasurable, delightful, meaningful and valuable'* (ID 17).

One strong view was that African users are very different from European users, for example, with the respondent concluding that African designers would be better placed to design for their home contexts (ID 03). Indian-made Aakash computers were hailed as more sturdy and cost-effective than US-designed XO laptops (ID 11). There was also an example of a 'Mobile 4 Girls' project in South Africa which had failed because the game software was created by boys and did not speak to the girls.

## b) Ways of user engagement

There was a broad consensus that design should be more user-centred and participatory (e.g. ID17). Suggestions of good practice included:

- Listen to local people (ID 25)
- Spend an extensive amount of time in the local context and with users (ID 24)
- Understand the local context (ID 30)
- Understand the systems you will integrate with (ID 15)
- Leverage existing technologies (e.g. simple mobiles) and platforms (e.g. Facebook and Mxit) that are already being used (ID 25)
- Understand user needs (ID 30)
- Think from a user perspective, not from an IT person perspective (ID 21)
- Understand users' existing skill levels (ID 30)
- Think about inter-operability (ID 15)
- Use simple interfaces (ID 14)
- Start simple and easy to use, with obvious use benefit (ID 25)
- Involve users, including women and children (ID 25). Some suggested that children from secondary school age onwards should be actively involved in design (ID 27)
- Use iterative design and be ready to adjust things
- Involve local designers (ID 25)
- Design and/or customize for the local context (ID 25)
- Give ownership, have the community involved and responsible for part of it (ID 25)
- Scale up from there (ID 25) – where possible
- Consider financial sustainability from the start (ID 15) – this could be via a business model or by getting government buy-in to run a programme as a public service.

In particular, on the subject of equity, good practice includes:

- Think about equity issues from the start (ID 12)
- Consider gender issues throughout
- Consider designing for remote areas first (ID 21)
- Consider disabilities issues in design (ID 23).

As one respondent stressed when discussing project design:

*Technology for us is only 10 per cent of the solution. The user interaction, the user interface, how the users use the technology: that is the primary focus (ID 21).*

#### c) Points of contention

There were strong differences of opinion on two points:

First, the role of hackathons. While one expert praised hackathons (meet-ups where software developers work together and write code on an agreed set of problems), especially where they were in-country and fostered a sense of community (ID 13), another expert worried about the signal hackathons for social good would send.

*This has been promoted a lot in recent hackathons, that within 48 hours you and five programmers will come together and whip out the killer app for monitoring borehole functionality. Great, well maybe you could do that, but there are other bigger systems in place and [...] instead we should be focusing on [if] you want to improve borehole functionality, UNICEF and the Ministry of Water and Environment are using U-Report and Open X data to monitor this, make those applications better, improve on them rather than design your killer app in 48 hours (ID 19).*

Second, the role of the practitioner. While a minority of experts said that the implementers had to 'really believe in their project' to inspire buy-in and participation from local communities (ID 25), the majority saw a more cautious role as appropriate. One designer also felt that they were not qualified to plan for equity, but rather would do the designing and '... leave it to someone else to look back and figure out what are the actual cultural dynamics of who is accessing that information.' In contrast, the majority of experts felt strongly that equity issues needed to be taken into account before and not after design and implementation.

## 4.5 Accountability, open data, voice and participation

#### a) Data collection and accountability

Many experts stressed the importance of gathering data as the first step towards accountability. For example, tracking of children's births, their birth registration and subsequent collection of data on immunization and nutritional screening was seen as the first step towards improved service delivery (ID 09 and 15). Examples mentioned (ID 12) were India's universal identification programme giving mothers a unique ID, and the work of UNICEF in Nigeria using RapidSMS to register births (ID 15). Medical tracking can take place where people can be identified via fingerprint scanning or iris scan (ID 24). However, it is worth noting that there are significant privacy issues related to collecting, storing, and analysing medical data, something that none of the interviewed experts brought up. Experts argued that data collection via ICTs allowed for tracking of medical supply chains, tracking transfers, reporting corrupt health workers and mapping the uptake of vouchers, thus assisting in 'output-based aid' (ID 09).



In the school sector similar SMS systems can be used to track pupils' attendance, teacher absenteeism and reports of corporal punishment (ID 19).

The Nigerian government was cited as developing standard inter-operability guidelines so that all public facilities such as schools, hospitals and water points could be entered in a registry in a common format (ID 09).

One expert summed up the promise of data flows for accountability towards citizens with this statement: *'We have essentially been using ICTS as a way to strengthen the social contract between ordinary citizens and government, through increasing accountability of services'* (ID 19).

Data, and some respondents spoke about 'Big Data', also holds out the promise of offering real-time information which can be accessed by different services and layers of government departments. Both short-term relief efforts and longer-term management decisions can then be based on this information. SMS-based systems can be used to gather such real-time feedback.

*UNICEF is supporting the roll-out of a vaccine called PCV, for pneumonia and meningitis. Now one of the big debates that started about a month ago was, were the districts, were the facilities ready and capable for receiving these vaccines. And the ministry said yes no problem, they all have their fridge for the cold chain storage and they are functional. What we were able to do in 48 hours, we were able to poll all 3,200 facilities and [get] real time data on the current status of the fridge. So we were able to get back to them. This whole exercise cost us \$150. We had done this in the past and it usually takes about 6 months and cost \$100,000 you know, now we do this for \$150 and we have the results in 48 hours. We were able to go back to the Ministry [...] We provided them with a list of the 192 facilities that had fridges that were broken. We provided them with the contact phone number of the person who reported the broken fridge [via SMS] and what specifically the problem was* (ID 19).

Other examples included helplines that rural hospitals could call if their stocks ran low.

Concerns raised by experts were issues around ownership of data: *'There might be interests for keeping this data divide, so private sector companies, so governments keep information locked up'* (ID 13). This linked to the challenge of organizational change that would have to accompany the effective use of such feedback systems (ID 08).

## b) Voice

Interview partners agreed that it was important to give young people more of a voice. Some reported from the experience of offline youth summits that such exercises where youth representatives speak out for their peers were easily corrupted to become training grounds for young political elites (ID 23). Many argued that ICTs could be used to aggregate and amplify the voice of ordinary children and youths in the public sphere. Examples mentioned were digital storytelling, blogging, citizen journalism and online clubs such as Shujaz (ID 29). The most frequently cited example of good practice was U-Reporter in Uganda (see box 3), with its emphasis on engaging young people directly in governance.

One expert distinguished between direct and indirect effects of more voice for young people: *'Explicit voice by saying something, or a voice by increase of the ambient awareness of their needs, interests and their situations'* (ID 17). In the interviews, many experts were very positive about the potential of ICTs to help young people develop both forms of voice. Some also pointed to the role mobile phones and social media had played in recent social movements.

### Box 3: U-Report Uganda

U-Report is a new communications technology application developed by UNICEF Uganda and launched in May 2011. By sending the text message, 'join,' to a toll-free number and submitting a few personal details, anyone with a mobile phone can become a volunteer, or a 'U-reporter', and share their observations and ideas on a wide range of development issues. UNICEF staff would send out a question twice a week and collect the views of young people on a particular topic, which would then be aggregated. UNICEF then brings these voices into the media and to policy makers. Results are printed in newspapers and discussed with parliamentarians in a dedicated television programme which is also broadcast on radio.

At the time of our interviews (2013) the number of 'U-reporters' had grown to 205,000 (ID 21) and this includes every Member of Parliament. U-report representatives speak about an approximate 20 per cent response rate to any given poll. For example when a youth entrepreneur fund was launched, feedback via U-report told the government that while youths were excited about the fund, many felt excluded by the strict A and O-level requirements (ID 19), points which were fed back to the government. U-report was frequently cited as a good example and had clearly captured the imagination of some experts: *'kind of compelling'* (ID 09), *'pretty cool'* (ID 09), *'I'm really psyched about U-report right now'* (ID 10). U-Report representatives stressed that it was not about the technology: *'There are a hundred different technologies that can do effectively what we are doing. The value of what we have been able to bring is the strategic approach that links citizens to governments'* (ID 19).

Going beyond polling, U-report has also been used by aid agencies to support disaster relief efforts. U-report staff explained that another area of further development was how to use intermediaries in order to include people who were not registered 'U-reporters' in their polls. U-report has now extended to several other countries in Africa (ID 21).

## 4.6 Pilots, scale and sustainability

The subjects of pilot programmes, sustainability and scale revealed diverse perspectives among the expert interviewees. The topics are closely linked to the contested question of what constitutes a successful child-focused ICT for development programme. There was widespread recognition that the sector has not engaged sufficiently with these questions and that further investigation is required (ID 30).

### a) Pilots and scale

A strong recurring theme was the critique of pilot programmes in child-focused ICT for development, with interviewees observing the ease of demonstrating positive impact in 'idealised' conditions: *'My concern about the small level pilots is that it's very easy to show some impact on anything if you have a good ratio between the supervisor and support or the teacher and the pupil'* (ID 02). This was emphasized by another senior figure in the m-health community who explained that: *'I think the challenge with most pilots is that they were designed as pilots and so they are destined to stay as pilots – you know you can make anything look good in pilots with a*

*small group of people*' (ID 15). Combined with this were regular allusions to complaints about 'pilot-itis' – with many activities attempted in an uncoordinated and overly-optimistic way (ID 10, ID 29). Specifically, it was noted by the Director of Shujaaz that pilots often create an atmosphere in which programmes appear to be more effective with participants than they may actually be.

*So as long as the pilot project is running people will take the innovation forward, they'll adopt the new behaviour and they'll enjoy the results. But as soon as the pilot ends they'll drift backwards* (ID 29).

The perceived 'addiction' to piloting links to an identified pre-occupation with pioneering approaches. One of the experts explained the limitations of starting from scratch and repeatedly 'reinventing the wheel' with pilot projects, rather than investing the time to learn what has already been done elsewhere that can be effectively customized (ID 28). A senior adviser at Save the Children (ID 26) expressed the overarching sentiment shared by many with regard to pilots:

*You know when you do a pilot and it's bad, it gets buried. If only we lived in a world where people didn't feel the repercussions of sharing their non-successful or unsuccessful pilots, and we don't. People bury their bad pilots, and that's why we lack information as a sector, the sector being education using ICT.*

The interviewees demonstrated clear differences of opinion regarding the importance of scalability. Along the spectrum of perspectives were those who asserted that 'small is beautiful', that context is key, and displayed scepticism regarding universal solutions (ID 08), through to those who maintained that value is inherently determined by replicability and scalability (ID 04). This feeds into the ongoing wider debate across development regarding the extent to which scalability should be a key indicator of success.

The principle of 'designing for scalability' from the outset is gaining traction in the ICT for development community in order to counteract the notion that pilot projects are designed and destined to remain small-scale. One technology for development specialist explained the principle of designing for scalability from the outset, noting that in the pilot it is important to operate '*basically the same requirements we would have for national scale up*' (ID 19). He stated that this proved important in transitioning beyond the recurrent pilot problem.

*Uganda is a graveyard of successful pilots. I could list off about 40-50 projects who [sic] met all of the donor objectives and succeeded based on every metric they put in place, but disappeared months after the funding dried up and didn't scale or was not sustained* (ID 19).

This sentiment was corroborated by another expert from Uganda who reflected on the problematic patterns seen in pilot projects, noting that practitioners often hope that things will be scaled without planning for it from the outset (ID 21). There are a wide range of complex reasons why so many projects remain small and do not manage to operate at scale. Reasons offered by the experts included the lack of good compelling results (ID 26) and the fact that doing ICT for child-focused development programmes is simply very challenging: '*We can integrate it small scale in schools, but if you want to long term, we seem to fail to get it at a national level*' (ID 27). There were also recurring reflections on what happens when the project ends, and whether the gains experienced during the project will be quickly lost once it finishes (ID 08).

However, some organizations were keen to explain how they have successfully adopted a clear strategic approach to ensuring suitable programmes can be scaled effectively in child-focused ICT for development. One expert (ID 15) explained how '*The work that UNICEF itself has done with the use of RapidSMS for the identification of births in Nigeria is a very clear example where they are really taking that to scale in amazing ways.*' The overall strategic approach from UNICEF that

has enabled this recurring story of effective scaled operation was explained by an expert from the UNICEF Innovation Unit:

*There are 5 key principles that we have identified that allow us to take innovative projects, particularly projects with technology, and create them in a way that they are not only equity focused – focused on communities that are most disadvantaged – but also that they can go to global scale, and for UNICEF that is scales of ten’s and hundreds of millions of children ... The final principle is that we need to make sure that what we build is able to go to the types of scales that I described, and if we’re working for a community that is 10,000 people, that in itself doesn’t really justify the time, the organizational mandate that we have, and in order to go to scale we have to look at things that are already within an ecosystem ... Mobile phones, things that are already there, rather than bringing in the newest and fanciest gadgets when we’re building solutions (ID 04).*

In response to the challenges, interviewees identified several proposed principles for effective scaling:

- build a publicly-available framework for effective design of interventions that would focus attention on addressing the issue of scalability (ID 10)
- utilize monitoring and evaluation at the pilot stage as a tool to facilitate scaling up (ID 10)
- design for scale from the outset – fully understanding the capabilities of the community and integrating with pre-existing systems (ID 24)
- leverage existing platforms, with the usage patterns of the child, or caregiver in some cases, at the centre (ID 30).

## b) Sustainability

There was widespread agreement among interviewees regarding the important place of sustainability, and the way in which it has often been overlooked because of naïve enthusiasm, assumed uptake and overly-optimistic integration schedules. This is well articulated by one interviewee and worth quoting at length.

*In many of the ICT programmes I’ve seen in the past, there are significant funding gaps after the first year of the program. People often focus on the initial investment but neglect planning for on-going maintenance and the recurrent costs required for future years. In some cases, this has been fuelled by an assumption that a programme can become sustainable without having a strong sustainability model from the start... The key is to design with sustainability in mind; budgeting effectively for multiple years and dedicating adequate funding for maintenance, recurrent and running costs, staff, support training, and also for effective monitoring and evaluation tools. (ID 05).*

Numerous other lessons emerged regarding the ways in which to increase the chance of sustainable operation. For some this involves considering the business potential of the programme from the outset (ID 11), considering some form of payment for services from beneficiaries (ID 08), exploring multi-stakeholder partnerships and utilizing diverse funding models (ID 15). Others emphasized the importance of local ownership arguing this was a necessary precondition from the outset of the programme (ID 28). This links to the need for prioritizing technologies that communities are already familiar with rather than distributing new devices (ID 30).



## Box 4: Shujaaz: Voice and participation in Kenya

Shujaaz is an award winning multi-platform production, from the Kenya-based social enterprise called *Well Told Story*. A central point of the production is ‘ShujaazFM’, a daily radio programme broadcast by a character called ‘DJ B’, appealing to the youth of Kenya with ‘inspirational and practical ideas they can use to improve their lives’. The programmes use a story format to communicate ‘change-focused’ ideas and lessons around entrepreneurship, personal development, farming, employment and citizenship. As the website explains, the programme is ‘committed to inspiring and motivating millions of Kenyans to take action to improve their lives and engage with urgent issues that shape their future.’ (See [shujaaz.fm](http://shujaaz.fm))

Shujaaz is not simply a radio programme: the stories of the key characters can also be followed in a free monthly comic book that is distributed in the *Saturday Nation* newspaper. In addition, there is two-way communication with ‘DJ B’ through SMS, Facebook, Twitter and television. The Director of Shujaaz (ID 29) talks about how the success of the programme has been based on adopting a broad view of ICT, and using whatever tool is most effective within the specific context and at each stage:

*There is a tendency to assume that ICT has to involve a keyboard somewhere or a microchip, but I wonder whether that is really necessarily the definition because other things are technology too ... a large part of our Shujaaz channel is a comic book: we consider that to be just as much of an ICT innovation as the stuff we’re doing with SMS and mobile phones and Facebook and online, which are all part of the channel ... different types of media can provide inputs at different stages of a change process ... we only consider ICT as one component in a change process. It has a powerful role to perform at that end of the change process but it simply can’t achieve that unless it’s embedded within a set of other media that all have contributory tasks to perform. One of the weaknesses of a lot of the ICT projects that we’ve seen elsewhere is that they expect the technology piece to be a silver bullet on its own. We firmly believe that it doesn’t, it can’t be, achieve its potential unless it’s wrapped up with a set of other conversations at the same time.*

The success of Shujaaz demonstrates the way in which ICTs can have significant positive impact when considered as one component within an integrated intervention that is based on compelling, story-based informal education through media (see Isaacs and Hollow 2012). The Director explains how the initiative has always focused on a wide audience rather than just seeking to engage with the early adopters who are often targeted in ICT-based interventions:

*We think one of the major problems with social change projects or even innovation projects in development is that on the whole they focus on the level of early adopters and on the level of pilots and we think that one of the things we’ve stumbled across with Shujaaz is that because the conversation we’re able to engage people with is so enormous that we’re not only working at the level of the innovators and the early adopters but we’re also engaging the context in which they operate.*

The final point regarding effective use of whatever is already available and utilised by children was further articulated by the Senior Project Officer for Mobile Learning at UNESCO who explained:

*The ones that are sustainable, that can scale, are initiatives that really leverage technology that young people are using already, and leveraging existing platforms, whether it's Facebook or Mxit or whatever it is (ID 30).*

## 4.7 Private sector, entrepreneurship, partnerships, FOSS (Free and Open-Source Software)

### a) Private sector / entrepreneurship

It is widely acknowledged that the private sector has an influential role within child-focused ICT for development. However, disagreement among the experts focused on the advantages and disadvantages of this strong role. The Director of Business for Ushahidi (ID 13) expressed the view that financial concerns are at the heart of child-focused ICT for development and suggested, drawing on a blog post by Ushahidi's Erik Hersman, that the field should be known as 'ICT4\$' because, *'This is seeding entrepreneurship, it is seeding local initiative and ability for those companies to be born and create money and jobs'* (ID 13). Similarly, several interviewees commented on what they considered to be the most effective way to cultivate entrepreneurship. Most notable was the importance of harnessing the skills of the private sector to educate entrepreneurs, and making information increasingly accessible and available – as 'fuel for innovation' and a game changer for entrepreneurs (ID 13).

In contrast, other experts argued that the role of the private sector in child-focused ICT for development is more problematic. One interviewee declared that the role of the private sector should be critiqued because it is *'...primarily interested in making profit – and it is the profit that leads to inequality'* (ID 23). The independent consultant in ICT4D and education expressed the view that any initiative that is led by either the private sector or by a donor is inherently problematic (ID 20). Their important critique is concerning the 'leading' role of the private sector and donors, rather than their involvement itself – suggesting that local communities should lead in decision-making regarding appropriate interventions.

### b) Partnerships

Many experts emphasized both the importance and pitfalls of partnership and noted the significance of recognising the distinct capabilities of different sectors (ID 05). Several experts expressed awareness that partnership terminology is often spoken of as a panacea within development work and child-focused ICT for development more specifically, without genuine learning regarding how to operationalize and sustain them effectively: *'Everyone talks about partnership – we don't do it because it is difficult – but we would make progress if we could learn how to operate in genuine multi-stakeholder partnerships'* (ID 23). It was also recognised that the sector is on an ongoing journey regarding understanding the notion of genuine multi-stakeholder partnership and the process that it requires. A UNHCR expert explained her view:

*There has to be a partnership between multiple stakeholders and not just one company wanting to look good by putting a computer in a school, as that is only part of the solution. Partnerships need to be more holistic (looking at infrastructure, ICT training, software, and staffing), where communities must have a voice about what they need as well as be active participants in the solution, in addition to NGOs, ICT experts, ICT companies and donors (ID 25).*

## Box 5: How would you spend 500,000 USD on child-focused ICT for development?

Each of the experts was asked the question: *'If you had a budget of 500,000 USD to spend within the next 12 months on a child-focused ICT4D-based intervention, how would you spend it and why?'* As would be anticipated, responses varied from detailed projects to wider interventions, and research initiatives. The selected figure of USD 500,000 also provoked diverse responses with some interviewees suggesting that this is a very large sum to allocate to a programme and others suggesting that it is insufficient to instigate any major change. Inevitably this correlated with the type of organization that respondents are working within.

Many experts suggested investing in a new project or providing additional funding for a pre-existing project. Some of the new ideas involved ICT investment in schools, which were seen as spaces that not only could benefit children directly but also become places of positive influence for their families and communities (ID 25, ID 28). Within this, it was noted that making maximum use of the USD 500,000 would require development of the project in a participatory manner, involving teachers, school staff, families, and community members (ID 01). Some would choose to allocate the funding to appropriate devices, others to sustainable energy sources (solar power), and others for curriculum and content development, maintenance and monitoring, and school management. The Founder and Director of IT for Change (ID 32) explained specifically that the money could be invested to *'...help teachers [understand] what is technology, how can technology help them in their development, how is it that they can then use technology for classroom processes, for children learning'*.

The second group of ideas focused on using the money for supporting specific *'interventions that are working really well and where we can leverage expertise, instead of reinventing the wheel and doing our own programme'* (ID 05). Among those proposed are: WorldReader (ID 05), Formhub (ID 09), Shujaaz (ID 29), Akirachix (ID 13) and Learning Centres (ID 18).

For the third group the budget represented an opportunity to invest in technology itself, to upgrade or buy more devices such as tablets and smart phones, to invest in connectivity for remote areas, or to develop specific software. Specific software examples included an introduction to agriculture for young children (ID 11) and developing a public mobile health platform that will enable other innovations for m-health (ID 24).

The fourth group emphasized the importance of using the funds to invest in strengthening networks of different actors working with children. This could involve identifying and supporting key stakeholders who may work to promote child development through the use of ICT in a range of different environments – from rural communities through to government Ministers (ID 27, 28). Within this, some suggested promoting learning hubs to create virtuous cycles of training and mentorship of skills development for job creation, in which young people could mentor children's ideas and their elaboration (ID 17), or promote peer-to-peer networks, in which children help and support each other (ID 30).

The fifth group chose to prioritize investing the budget in innovative new ideas. The Senior Advisor of Innovation, Transparency and Strategic Change at Plan International (ID 08) proposed identifying between 7 and 10 countries interested in exploring the

innovative use of ICT and providing training and funding for their own initiatives, while documenting all the learning experiences. Related to this, the Executive Director of mHealth Alliance (ID 15) proposed using the money to gather a group of experts to brainstorm ideas that could be developed afterwards by different groups participating on a challenge grant.

The sixth group would invest the money into research regarding ICT and child-focused development. Some simply noted that projects should include research as a funded component, while others proposed specific research initiatives including:

- To what extent can digital inclusion be a self-taught process? (ID 06)
- To what extent can ICT access and ICT training strengthen the learning capacities of girls and enable them to explore additional roles for themselves besides those of wife and mother? (ID 16)
- What are the challenges related to numeracy and literacy that face young African children, and how could ICT assist? (ID 20)
- How might mobile apps help the poorest and most marginalized children, such as street children or those with disabilities? (ID 23)
- What methodologies for the implementation of projects concerning ICTs and children are most suitable to be taken to scale? (ID 26)

Similarly, a couple of experts reflected on the way in which they would prioritize partnership more highly if they were to begin again working in child-focused ICT for development and would invest heavily into the process from the outset (e.g. ID 18, ID 19). For example an ICT Policy Specialist explained:

*I would have done much more to sort of explore the landscape of birth registration – who can be a possible stakeholder, I should have done much better homework. If I had a chance to go back I would do that. So now I am meeting with all these new partners and try to ... capitalise on those critical opportunities coming from IDs (ID 14).*

### c) Free and Open-Source Software (FOSS)

The interviewees from UNICEF were very clear in articulating the rationale for their commitment to promoting and using Free and Open Source Software (FOSS):

*We have to be open source about not only the technology that we create but also the content that is created in it, as an organization that is in 135 countries, if we're working with proprietary software, if we're working with content for children that we cannot adapt and scale we not only limit our ability to take things from one context to another, but in situations of emergency or situations where we would need to act quickly and have ownership of our material we actually put people's lives at risk (ID 04).*



UNICEF maintained that it is possible to effectively scale-up open source projects, claiming that it would be easy to ‘...find countless examples of open source scaled businesses’ such as Red Hat. Similarly, one of the largest mobile health projects in the world is in Nigeria and is built by a small development group that was trained by UNICEF. The co-lead of the UNICEF Innovation Unit explained how this demonstrated an approach that combines three important factors: an initiative that is profitable, sustainable and runs on open-source software (ID 04).

The majority of the discussion regarding the importance of FOSS was from UNICEF interviewees. A UNICEF country representative from Uganda explained that this is because open source is a foundational principle for effective operation in the organization:

*It has to be open source, because we can't have the poor pay for any tool or anything – and that would keep them away from being connected to it – should be something where once an investment is made in a particular tool it should be available to all the users free and people don't have to invest twice or thrice in the same tool (ID 21).*

However, others outside UNICEF also spoke about the subject in depth. One example is the ICT Director for the Millennium Villages Project (ID 09) who explained how they are using open-source software to build smart-phone-based data collection tools. He noted that for one project they have so far been able to ‘...register a couple of hundred thousand kids across communities and then tracked their basic health’ (ID 09); this is also now being utilized for data collection and monitoring and evaluation by many other NGOs around the world.<sup>7</sup>

## Box 6: Future trends in the use of ICTs for children

The interviewees were asked to reflect on the most significant new initiatives and trends in the transformative use of ICTs for children that may emerge over the next five years. Their responses have been categorised into five groups: growth of hardware penetration, content production and internet usage; increase in sharing and learning initiatives; increased role in youth civil participation; increased integration of different and diverse systems; and the rise of ethics and the importance of child rights.

The most common response was that new projects are likely to be able to scale more easily because of the increased access to ICTs, especially tablets and smartphones. As explained by one interviewee from UNHCR, enthusiasm can grow after the introduction phase is completed (ID 25). There will be an increase in the production of content as a result of greater access to tablets and smart phones and improved internet connectivity. Some speculated that specific applications for health and education would flourish while others suggested that it will become increasingly popular for users to navigate their own way through available content, without the assistance of formal services. Despite this, it was also emphasized that this will not occur universally and there may be ‘even greater extremes because [the ones] that are left behind now will just be much further behind in five to ten years’ (ID 11).

<sup>7</sup> One of the tools is called Formhub – a free and open source platform that works with ODK (open data kit).

Sharing and learning through networks or open educational resources is another anticipated trend. They identified the likelihood of increased exchange between teachers, schools and universities, not only facilitating peer learning and a network of support, but also producing shared and situation specific content and educational tools. This links to the wider reflection that the next five years will see more initiatives explicitly designed to benefit teachers as an effective route to improve educational outcomes (ID 02, 18).

Increased civil participation was emphasized by several experts. As the interviewee from Plan (ID 08) noted, mainly young people have been involved in social movements facilitated by social media and this is likely to lead to an ongoing increase in citizen activism from youth (at least from those youth who have the time and educational resources to engage). In the same way, an independent consultant on ICT for development and education (ID 20) anticipated an increase in *'citizen journalism for young people and children to blog and write'*, with the simultaneous potential to promote more social movements where they themselves are beneficiaries.

Increased integration of diverse projects and services through ICT is also anticipated to be a major trend of the next 5 years. Examples most commonly focused on the way in which financial systems, monitoring, data collection and service delivery will all become increasingly integrated. The Executive Director of the mHealth Alliance anticipated increased cross-sector integration with the example of a *'...life-course approach to health ... looking at things from a much more comprehensive and holistic view ... with technology helping us to break through some of that'* (ID 15).

The fifth area that emerged was the rising importance of ethics and child rights. Specifically, experts emphasized child-informed consent, privacy and data ownership. In a note of warning, the Director of IT for Change (ID 32) notes that some of the advances in technology may affect children by reducing their agency and critical thinking. This was a somewhat contested area, with the Lead ICT Policy Specialist, World Bank (ID 22) stressing the positive benefits of increased data capacity for monitoring educational performance. The interviewee from Plan (ID 08) also emphasized protection, highlighting the way in which alert systems are being developed to help prevent and track the trafficking of children.

## 4.8 Innovation, evaluation, failure

### a) Innovation

It was widely recognised that innovation is a complex term, used to describe a wide variety of diverse and sometimes conflicting ideas and practices.

Key points identified are that:

- Those wanting to be innovative in using ICT to promote child-focused development would do well to concentrate efforts on exploring how technology can be utilized to reach the poorest of the poor (ID 04).

- Innovation for children should not be synonymous with ICT – some of the most innovative interventions for child-focused development may well have nothing to do with technology (ID 08).
- Genuine innovation for children should ensure that the child is the starting point and then the design process builds on that foundation (ID 20).
- The sector would benefit from investing resources to catalogue and systematise the wide range of activities taking place under the banner of ‘innovation’ to provide an overview and facilitate analysis (ID 24).

## Box 7: The One Laptop per Child (OLPC) initiative

One Laptop Per Child (OLPC)<sup>8</sup> is a non-profit organization which exists in order to provide ‘low-cost’ laptops for children across the world. There was no pre-determined intention within the research process to focus the interviews on the OLPC programme. Indeed, no particular initiative was highlighted in the questions posed to the interviewees. However, throughout the interactions with experts, they repeatedly chose to use OLPC in order to illustrate their responses. Some 18 of the 35 interviewees made specific reference to OLPC. Of these, 12 were explicitly critical, 5 were neutral or mixed, and one was firmly positive. The single positive response came from OLPC, who were not available for an interview but instead provided written responses by email.

It is noteworthy that this well-known project was criticised by the interviewees more than any other and was even described by one as ‘an unmitigated disaster’ (ID 02). On the positive side, some interviewees noted that OLPC has had notable achievements, explaining that the founder, Nicolas Negroponte, had gained unprecedented media attention for an ICT4D project and had *‘definitely created a vision of something that has changed a market ... and created space for people to think’* (ID 04). This sentiment was shared by another interviewee who explained that despite the lack of impact they perceived some progress as a result of the project:

*I think it is true that it did lead to other sorts of developments, you know a lot of people have accredited it to having been the idea that spurred the creation of tablets and other sorts of innovation, so I think in that sense it was good. I think there was a lot of hype around it that hasn't been warranted or hasn't proven itself actually on the ground (ID 08).*

Several dominant themes emerged from the criticisms of OLPC and these provide valuable lessons for the sector more broadly. In brief, the key concerns can be summarised as follows:

- lack of integration with pre-existing curriculum, viewing the technology as an end in and of itself (ID 09)
- the initiative was too driven by hardware and lacks sustainability (ID 11)
- there are now cheaper alternatives to do a similar job (ID 11)
- inadequate attention was paid to maintenance and electricity costs (ID 24)

8 [www.laptop.org](http://www.laptop.org)

- the distribution model was flawed with a lack of training and lack of understanding regarding the implications of owning a high-value device in a poor community (ID 07)
- lack of foresight regarding the disposal of the technology leading to digital waste (ID 02)
- the amount of money required to operate at scale and lack of cost-benefit analysis (ID 01, 09).

This final challenge is encapsulated well by one interviewee who focused on the challenge of proposing ‘one per child’ solutions in countries where extreme poverty is widespread and budgets limited. He observed how OLPC, *‘Was going into countries and asking them to spend more money on computers than they had budgeted towards teacher training ... I think his [Negroponte] idea will have its time but we are not there yet’* (ID 09). However, OLPC defended their approach and expressed their belief in the efficacy of the initiative:

*By providing connected devices, children have a window to the world. Even children in the most remote and rural areas now have an opportunity to access the world’s resources, giving them the possibility to access quality education, equal to any other child living in the developed world* (ID 34).

In stark contrast to the perspective expressed by OLPC, another interviewee explained how he thought the organization made the common mistake of assuming that technology can solve problems without understanding local contexts:

*OLPC had this vision of ICT being the solution to all of these problems and in my mind was really very techno-centric ... it didn't address all of the other components in the education system, teacher training, educational support, curriculum and assessment, school organization ... it didn't integrate it into a larger system or a broader vision of change* (ID 18).

Others highlighted the importance of understanding the contexts within which OLPC may be suitable. This focused on choosing middle-income countries where there is sufficient infrastructure to support the change (ID 22). Similarly, others noted that OLPC has progressed from the point where they *‘...did not test things properly and they thought hardware was the solution’* to their more recent work where *‘they are talking about content on the hardware’* (ID 26). OLPC explained their current preferred approach:

*The work involved in planning, raising awareness, and training teachers and volunteers to get effective use from the technology is every bit as important as the technology itself ... It does not work to just drop technology off without local adaptation or using English-only as the language platform. It does not work if infrastructure is not developed or if local capacity, mentoring and training don't exist ... programs are not sustainable without broader participation, training and commitment* (ID 34).

It therefore appears possible that OLPC are moving towards a change in practice and attempting to engage with many of the critical points raised.



It was emphasized that the term innovation should not be used as a means by which to avoid the need for evidence building: 'You want to encourage innovation, but you don't want to inflict innovations that don't work on a lot of people' (ID 24). This was corroborated by a senior advisor from Save the Children who emphasized the importance of an adequate definition regarding innovation:

*In many locations there is a belief that ICT is an innovation because it's new: Oh we're using technology so let's call that innovation, let's tick that box – rubbish, it's not innovation. Innovation is a cycle that takes thinking into value into the organization over a period of time ... I don't like the word innovative, because it's used just to describe something that you've set up. It is new thinking or new ideas that ultimately lead to value for the organization ... innovation is a cycle and ICT is a technology (ID 26).*

One specific application of innovation expressed by the interviewees was the potential for the provision of increasingly integrated services in child-focused ICT for development. As noted by a Director of Mobile Health Innovation at the Grameen Foundation, regarding a specific project:

*One of the innovative things about the MOTECH project is that it simultaneously has community health care workers entering information about pregnant women who are receiving care. So, for example, when a woman comes in to the clinic to receive antenatal care, information about her visit is entered into an electronic health record. The system has a scheduled care programme programmed into and can identify when a woman has missed care that she is scheduled to receive. In that event, an alert is sent to both the pregnant woman and the health worker who is serving that pregnant woman. This linkage of the health record to alerts targeted at a specific individual is one of the innovations that has quite a bit of promise (ID 24).*

## b) Evaluation

One positive aspect of this topic was the potential of new technologies to collect large scale data with reduced cost and time (so-called 'Big Data') (ID 09). Specifically, experts noted the potential of using tools to collect close to 'real time' data that can be integrated into programme implementation rather than awaiting the publication of a formal report (ID 10). Others were keen to emphasize the limitations of simply collecting additional data – highlighting the importance of training people in how to make effective use of the data gathered in order to help them better fulfil the desired outcomes (ID 06).

There is increasing emphasis within the ICT for development community to prioritize building an evidence base of understanding what approach makes programmes more or less effective (ID 15). A Senior Advisor for Education Research at Save the Children noted that it is vital when working with children to combine the enthusiasm with the evidence base (ID 01). This is a clear progression from the early stages of using ICT in development when decisions were often made assuming that the input of technology would inevitably lead to an improvement in outcomes (ID 17). It is now increasingly recognised that, alongside their impact and accountability functions, monitoring and evaluation should be understood as processes of embedding learning throughout a programme (ID 25, 26).

However, it was also noted by an ICT Innovations and Education Specialist at UNHCR that effective monitoring and evaluation is still lacking in many programmes, leading to a situation where little can be confidently stated from the programme results.

*There is limited statement of confidence in terms of actual quantifiable benefits of introducing ICT within a lot these contexts, and what programmes/models make the biggest impact. I think a lot of the time that's because evaluation isn't prioritized, and at times the programme theory and the programme implementation aren't divided when you look at evaluating these programmes (ID 05).*

### c) Failure

A senior figure in UNICEF emphasized the importance of making sure failure is a recognised part of innovation within ICT for development – and not only recognised but also proactively discussed:

*There are millions of technology development projects and millions of development projects that fail and nobody talks about them, or keeps saying that they're working and I think that we have to be open about these failures and make sure that failures in the development of these projects happen quickly and at low expense at the beginning and that of course we're working ethically and authentically in our relationship to children and young people while we're doing them (ID 04).*

He went on to note how various well-established technologies, which are now used for child-focused development, were built on the foundation of numerous previous failed attempts: *'There isn't any success that isn't built upon those failures and that you can't learn from them unless you document and capture them'* (ID 04). A lead ICT policy specialist explained that they have taken a pro-active approach, participating and organizing environments<sup>9</sup> in which leaders in ICT for development can *'...come clean about what keeps them awake at night and complain about why projects that look great on paper did not work in practice'* (ID 22).

Many interviewees were willing to offer their advice regarding how to try to minimise failure. An interviewee working in Kenya, for example, reflected on the government plan to distribute a laptop to every school child:<sup>10</sup>

*It is their kind of headline election promise, so they're being held kind of accountable to it ... we're trying to tread a careful line because we feel like it's our responsibility to tell them the preponderance of evidence around laptops for kids in the developing world ... have all been really negative ... (ID 02).*

Interviewees reflected on the most common reasons for failure that they have encountered:

- building a clever technical solution and then trying to find people who will benefit from it rather than first identifying the challenge and then considering how technology might be helpful in addressing it (ID 05, 16)
- failing to consider integration from the outset and just giving technology to children, assuming they will know how to use it in a constructive manner (ID 10)
- assuming that because something works in one place it will work in another; paying insufficient attention to social and cultural context and not establishing whether there is a demand for the proposed approach (ID 16, 19)
- under-estimating the disruptive nature of an ICT intervention and not investing in effective change management processes (ID 19)
- designing ICT-based interventions for children without involving people actually located within the anticipated beneficiary community (ID 20, 21)

9 A well-known example of this is the Fail Faire concept <http://failfaire.org/about/>

10 <http://www.biztechafrika.com/article/kenya-government-makes-laptop-child-promise/5755/#.UnDF1PnIbko>

- adopting a short-term and techno-centric approach (ID 20)
- choosing to focus too much on hardware (ID 26)
- fear of disappointing donors – leading to recipients being reluctant to report problems and accepting ICT donations which are not actually useful (ID 25).



## Conclusions and Recommendations

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After having organized much of the report into key themes, in the conclusion we return to the overarching questions which guided this research:

- 1) Considering children, where and how can ICTs help with reducing inequality?
- 2) Considering children, where is there a risk that ICTs will increase inequality?
- 3) Where might ICTs offer quick wins for child-focused development objectives?
- 4) How can ICTs contribute to the future of child-focused development efforts?
- 5) How can ICTs be integrated in other child-focused development efforts, especially in regard to innovation and collaboration?
- 6) How have ICT projects been successful, or not, in assisting the most vulnerable and disadvantaged children?
- 7) What do UNICEF's work and the field of ICT4D have to contribute to one another?

In the following section, we offer brief responses to each. However the exploration of questions 1, 2, 4 and 6 is best undertaken in the more sector-specific contexts which have been laid out in Chapter 4 of this report where readers can examine those more nuanced findings. Here we engage only with some cross-cutting aspects.

### **1) Considering children, where and how can ICTs help with reducing inequality?**

A significant cross-cutting point to make here is that in principle ICTs can facilitate more equitable access to information, which can have a positive impact, for example on health and education outcomes. This in turn depends on equity of access and equity of use. Access consists of multiple dimensions, such as availability, affordability and skills necessary for use of the technologies (Gerster and Zimmermann 2003), as well as the social norms that define who has time to use them and which access spaces are open to which social group (Kleine 2013). In particular, the study findings underlined the need to create spaces, online and offline, where it is safe for less powerful groups such as, in many contexts, women and children – particularly girls – to access ICTs.

In many countries and areas suffering the greatest income poverty, electricity and basic connectivity are an ongoing constraint, with interesting initiatives such as the newly released BRCK device offering some practical solutions. However, there is little doubt that, as universal access includes remote areas or user groups which are not attractive to market actors, ultimately determined state and civil society intervention will be necessary.

ICTs also help reduce inequality where projects are specifically targeted at the more marginalized, including street children, migrant children, children with disabilities, those living in child-headed households and, in general, children living in income-poor households and more disadvantaged areas of the country. UNICEF's strategy to focus on equity and consequently on the more disadvantaged children is thus highly appropriate.

### **2) Considering children, where is there a risk that ICTs will increase inequality?**

Expert respondents were very concerned that there are multiple ways in which ICTs could reinforce and increase existing inequalities. There was a view that private-sector actors would only ensure that connectivity would be provided where there was both demand and income. As a result, there was a concern that remote areas or income-poor households would remain unconnected, or that the cost of hardware, and in particular usage costs, would be out of reach for income-poor families. Skills such as literacy, which are needed for meaningful use of the internet or even SMS, were also unevenly distributed.

Another key area of inequality was gender. Girls are more often prevented by their parents from using mobile phones or the internet than boys. Besides often not receiving the same educational opportunities, many girls are expected to take on household and care responsibilities and as a result of additional workloads may have less time to use ICTs than their male siblings.

With a growing middle class population in many lower- and middle-income countries, some groups of children are growing up in materially comfortable, well-educated and often urban surroundings with easy access to the ICTs provided by the market. Their life reality contrasts starkly with that of children in income-poor households in remote rural areas in the same country. There is a significant temptation for ICT4D projects to ignore the hardest-to-reach groups of children, which could even jeopardize project success, often narrowly defined as uptake and usage of a technical device. ICT4D projects will have to make a conscious decision to engage with the relatively more disadvantaged groups if they are to avoid reinforcing existing inequalities. In turn, funders will have to define project success focusing much more specifically also on more disadvantaged groups.



### **3) Where might ICTs offer quick wins for child-focused development objectives?**

The short answer here is that hardly anywhere can ICTs offer quick wins for child-focused development objectives. The literature review, and in particular the vast majority of expert views, stated that technology itself was only a small part of the overall challenge of socio-technical change processes for development. Socio-technical change, like social change, takes time and involves careful considerations of the process, relationships and ownership aspects if it is to be sustainable. Projects are at significant risk of failure where technology is used for 'quick wins' or trying to 'rush along' changes which have to take place at the social and cultural level. The main reasons for failure are firstly the unintended consequences of fast technological change and secondly unhinging the technical from the social dimension of development. In some cases ICTs will speed up social change, such as when network effects in social media lead to fast dissemination of ideas, but more broadly ICTs offer most real and sustainable benefits when viewed as embedded with the pace and 'messiness' of social change processes.

### **4) How can ICTs contribute to the future of child-focused development efforts?**

ICTs have a lot to offer as potential ways to support and amplify the impact of a variety of child-focused development efforts. For this to happen, the focus will have to be first and foremost on the needs of the child, not on the technology, nor indeed on innovation for its own sake. Having established the needs of the child and identified the intended impact of the initiative, the next step must be a thorough stocktaking of the local context. As outlined above, basic conditions such as reliability of electricity and availability and affordability of access need to be assessed, as well as local social norms related to access.

Further, such stocktaking should include a search for existing technical solutions: the experts interviewed in our study stressed that there was no need to reinvent the wheel when many of the required technologies already exist. Further, they stressed the need to assess what other development initiatives were ongoing, what are the usage patterns of ICTs currently available and indeed what the landscape of stakeholders looked like. Perhaps more so in work with children than in other ICT4D areas, it is important to assess the role that intermediaries such as parents, teachers, community health workers, street or social workers play in the lives of children. Such stocktaking before initiatives start should lead to a pragmatic project design integrating technology where appropriate and possible with the participation of users. Such an approach provides a good foundation for the effective use of ICTs in child-focused development efforts.

### **5) How can ICTs be integrated in other child-focused development efforts, especially in regard to innovation and collaboration?**

Perhaps the most positive and encouraging news is that a remarkable degree of agreement exists among the experts interviewed on good practice in conducting ICT4D projects, some of which contrasts starkly with earlier or even with existing approaches. Below we reiterate the points collected on good practice in design (section 4.4) which may be expanded to work in ICT4D more generally:

- Use participatory approaches
- Listen to local people
- Spend an extensive amount of time in the local context and with users
- Understand the local context
- Understand the systems you want to integrate with
- Leverage existing technologies (e.g. simple mobiles) and platforms (e.g. Facebook and Mxit) that are already being used
- Understand user needs
- Understand users' existing skill levels
- Think about interoperability

- Involve users, including women and children
- Use iterative design and be ready to adjust things
- Involve local colleagues
- Design and/or customize for the local context
- Give ownership, have community involved and responsible for part of it
- Scale up from there – where possible
- Consider financial sustainability from the start – this could be via a business model or by getting government buy-in to run a programme as a public service
- Engage with failure and share lessons that will benefit others.

In particular, on the subject of equity, good practice includes:

- Consider equity issues from the outset
- Consider gender issues throughout
- Consider designing for remote areas first
- Consider disabilities issues.

Reviewing these recommendations, many are very similar to principles which could apply to practically any development intervention, not just ICT4D and certainly not just ICT for child-focused development. However, their application in the child-focused context gives rise to another important question:

## **6) How have ICT projects been successful or not in assisting the most vulnerable and disadvantaged children?**

A significant reason for the limited number of success stories of ICT projects assisting the most vulnerable and disadvantaged children is that most ICT4D projects do not target them in the first place. Only a limited subset of ICT4D projects focuses explicitly on children, and within that many are not applied to the most vulnerable or disadvantaged groups. As one designer put it, girls disadvantaged by their household workload are *‘the most demanding end user you can probably design for in the world’* (ID 17). However, our study has gathered some good examples of work with extremely vulnerable and disadvantaged groups, such as digital birth registration projects in remote areas, and work with child migrants.

Partnerships involving the private sector, especially those not funded through corporate social responsibility funds, are more likely to focus on offering devices to easier-to-reach groups of children. Private sector hardware or software companies, who are vital partners in ICT4D work, often have a natural tendency to prioritize projects which focus on a particular device, or promise to become self-sustaining at some stage. This kind of financial sustainability relies not just on demand but on at least some limited ability to pay for ICT services. This last bias is shared with some ICT4D funders who often narrowly define project sustainability as being independent of public or donor funding. It is worth noting that if project success is defined in these terms, then the most vulnerable and disadvantaged children remain a risky target group to work with for any ICT project.

UNICEF, with its strategic focus on equity, has an important role to play in championing the needs of more disadvantaged children within the ICT4D field and in inviting other stakeholders, including funders, private sector companies and government agencies, to focus more of their work on them. There are some success stories of ICT projects working with the more disadvantaged groups, but achieving a step change in the number of such successes will require a clear commitment to focus projects and programmes on these groups first and foremost.

A final point in relation to this question is the need, expressed by a number of the interviewed experts, to move away from binaries of successful or unsuccessful projects and instead move to an approach which is open to ongoing learning. Interviewees called for more iterative project

and programme design which integrates monitoring and evaluation as a continuing activity, not simply an end-of-project work package. Thus, dichotomised rhetoric about success or failure could transition to a more measured discussion of lessons learned, continuing dialogue and partnership with users, and ongoing co-production.

## **7) What do UNICEF's work and the field of ICT4D have to contribute to one another?**

Much of UNICEF's work with children, and in particular less privileged children, can be rendered more effective by embedding forms of ICT into projects or using their specific characteristics (e.g. ability to collect and process large amounts of data, cheap instantaneous communication in multiple ways, etc.) as the amplifying mechanism (Toyama 2011) of a development purpose.

At the same time, as a group to engage with, children deserve more recognition in ICT4D literature. Children are both emblematic for their potential vulnerability and iconic for their supposedly innate ability to connect with and understand ICTs. As the literature review and interviews have shown, children cannot be seen as a homogenous group; instead there are multiple additional factors to take into account including age, gender, rural/urban, disability, and prior education opportunities, to name but a few. Further, child maturity is situationally specific: an 8-year old could conceivably be a very gifted programmer, but they will still have the capacity for moral judgement and the emotional needs of an 8-year old. If technology then needs to be embedded in socio-technical change processes, children likewise need to be conceptualised not just in relationship to technology, but also in relationship to society.

It is right to view children as co-creators of technology and actors in their own future. And yet other forms of work with children, including UNICEF's, can guide the field of ICT4D to understand how children can be given safe spaces and responsible intermediaries so they can express voice, creativity and action in a way that simultaneously protects them from harm, offline and online.

There is much to be discussed here, and we hope that by presenting the findings of this report, we have helped initiate this vital dialogue.

More research will need to be undertaken to better understand the relationship between children's lives and socio-technical change. There is a heavy imbalance in that there is much more research on children's media and IT use in the global North than in the global South, more on children in relatively urban areas than in rural areas. From an equity point of view, this imbalance needs to be addressed urgently.

Further, if technical change takes place embedded in socio-technical change processes, then ICT4D is not just a subset of technological innovation and development work, but is also closely linked with social innovation, including process innovation. This should be further explored.

ICTs are not some technical sphere separate from people's lives. They are increasingly woven into the very fabric of people's lives, in income-rich and also increasingly in income-poor countries. Our experts stressed that if there is no targeted engagement with these socio-technical innovations, they are likely to reinforce existing inequalities. It follows that a focus on both children as future generations and on greater equity will lead us to an active and reflective engagement with the potential and challenges of ICTs and child-focused development work. It is hoped that this report is a stepping stone towards a broad and informed dialogue between research, policy and practice in achieving this engagement.

## Final reflections by the authors

As a team we believe passionately that research, policy and practice need to be in constant dialogue if we are to make progress towards positive social change and development. This has been an exciting project for us because it is designed to use research to gather different formats of knowledge, both published materials and, through the interviews, the wealth of experience that practitioners at different levels encapsulate. This is to be used to inform policy, encourage and guide practice and identify where more research is needed. It has been a privilege for us to work with UNICEF and especially to have these fascinating interviews with highly knowledgeable colleagues.

No two experts would have exactly the same notion of development, and a range of implicit and explicit assumptions about development was evident in the interviews. One of us has argued elsewhere (Kleine 2010) that ICT4D practitioners and academics should always be explicit about what they mean with the 'D' in ICT4D. Her own definition of development is closely related to that of Amartya Sen as the process of expanding the freedom people have to live the life they have reason to value (Sen 1999) while she would add to this 'within ecological limits' (Kleine 2013). Sen's capabilities approach is just one of several development approaches which remind us that it is not synonymous with economic growth, but something even more fundamental.

One of our first observations is that work related to children seems to rarely focus on the economic dimension alone. There is a strong emphasis on well-being and health, on education as a way to a life which is richer in more ways than the material one, and on rights-based approaches. In this context, economic resources are often seen as a means, but not an end in itself. In fact, we allow ourselves to think about children in a more holistic way – a perspective which may well be worth transferring to adults too. In this respect, the field of ICT4D could learn a lot from child-focused development discourse.

Second, we started this research with the question whether ICT4D needed to pay greater attention to children as users, co-creators, beneficiaries. In a snappy Twitter-friendly way this might be covered under '#ICT4kids'. The obvious point to make here is that children are not a uniform category but differ tremendously in age, gender, ethnicity, potential disability, cultural and social context of their upbringing and personal characteristics. The participants in our ICTD2013 workshop made this very clear. Further, throughout the interviews, we were struck how differently children are being construed by our expert interview partners, from technophile whiz kids who represented the hope for the future, to impressionable (especially the boys) and in need of guidance, or vulnerable (often the girls) in need of protection. It would be good to have a more informed debate, informed for example by child and developmental psychology, to understand better how children reason and make decisions, and therefore how to strike the balance between respecting their agency, while accepting responsibility for protecting and guiding children as they encounter communication technology. In the light of this, we are positive regarding the umbrella term #ICT4kids, as long as we then start speaking with greater nuance and awareness of more specific categories. We may also need to develop an altogether more nuanced vocabulary around ICTs for child-focused development.

Third, it was encouraging to see a high degree of recognition of the possibility of ICTs to create change at a systemic level and that this might be a powerful way of impacting the lives of children. This marks a move away from a preoccupation with 'one device per child' which in many of the poorest communities will remain an unaffordable approach, at least in the medium-term. Change at the systemic level in many cases requires not just technical but socio-technical change and this in turn requires buy-in from intended users. Understanding the context and recognising the existing incentive systems is vital if any such systemic changes are to be implemented successfully.

Fourth, it became clear that when it comes to children in the global South, there is still very little research into the context of their media and IT use – what Tacchi (2006) might call their 'communicative ecologies'. There is a lot of research into children's media use in more income-rich

countries, and among middle-class children in some cities of the global South. In section 3.7 of this report we reviewed some of that literature, and while these are valuable contributions, it was striking how easily a language was used which generalized children by country-level – ‘children in Russia’ etc. Clearly there is a need to explore more what colleagues in the countries themselves have published in languages other than English, but further we need to urgently conduct more fine-grained research which recognises the equity issues between children in rural and urban, richer or poorer communities and of boys and girls.

Fifth, the research method we chose, talking to 35 experts about successes and failures in child-related ICT4D work with the possibility of them remaining anonymous, felt like a welcome antidote to a field (ICT4D) which continues to be characterised by a lot of noise and hype. Perhaps inevitably, where the immense potential of technology to change life worlds and the rapid pace of innovation mixes with a communication culture of technical entrepreneurship, there is too much (self-) promotion and overly positive (self-) evaluation. Mike Best (2010) has sketched this out very appropriately as a ‘hoorah for my thing’ mentality in ICT4D. Interviewing experts resulted in more nuanced and critical assessments. The project our experts most frequently cited as problematic was one which was at one time probably the best known ICT4D project in the world. Academic peer-review is still too slow to keep up with the pace of innovation while non-peer reviewed grey literature (websites, blogs, brochures, non-reviewed reports etc.) is too vulnerable to hype. Consequently there remains a need to find robust and timely evaluation, review and dissemination mechanisms for ICT4D work. Multiple expert interviews reviewing a field might be one potential methodology.

Sixth, the challenge of talking about failure. ICT4D has gone from a period of hype to a new interest in ‘failfares’ – opportunities to speak about project failure. Perhaps unique among the different fields of development work, the field of ICT4D overlaps in part with a discourse of Silicon Valley-style entrepreneurialism which embraces failure as a learning experience and communicates it as a kind of rite of passage. In many ways speaking more openly about failures, lessons learnt and iterative project design is a valuable corrective in all kinds of development work.

However, we are concerned that failure in development work should never be treated with the same cavalier attitude as a consumer product which was aimed at an income- and opportunity-rich audience but which failed. The time, energy, and perhaps most significantly the hopes of local people are tied up in development innovations and projects. Every time a project fails, some of those hopes get dashed – often in contexts where hope is in short supply. Dorothea Kleine writes about ‘psychological resources’ which can be depleted in that way (2013). Children in particular may hope more intensely than adults and they may feel the sting of disappointment more intensely – so colleagues in ICT4D for children carry an additional responsibility. More work is needed to move to a model of responsible iterative design and learning, and away from the rhetorical extremes of overblown hype and spectacular failure.

Seventh, it was noticeable how often evaluation is still viewed as an end-of-programme activity. David Hollow has written about the need for a significant rethinking and transition towards using embedded evaluation as a systemic learning tool. This would lead to more early avoidance of failure and a more responsible approach towards initiatives or aspects of initiatives that do go wrong.

Finally, it was striking so see where the fault-lines of disagreements ran and where there was common ground. There were, for example, significantly different points of view on what the role of the market and the state should be in ICT4D, how to conceptualise children as beneficiaries or actors in development, and how significant scaling-up was. However, it was very heartening to hear the high degree of consensus on approaches. Participatory approaches, led by local demand and guided by an understanding of local context, working with existing organizations, technologies and systems were just some of the principles that were mentioned repeatedly.

Of course these proclaimed principles are complex to apply in practice. However, the overall evidence bodes well for the future of ICT4D as a whole, and is a promising basis for future child-focused projects.





## Appendices

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### 6.1 Informal Peer-Review: ICT4Kids Workshop at ICTD2013 Cape Town

#### Introducing the workshop

The Sixth International Conference on Information and Communication Technologies and Development (ICTD 2013), a leading conference series in ICT4D, was hosted at the University of Cape Town, in South Africa on 7–10 December 2013. The aim of the conference is to bring together hundreds of academics, practitioners and policy makers to examine the role of new information and communication technologies in social, economic and political development. Previous conferences were held in Berkeley (USA, 2006), Bangalore (India, 2007), Doha (Qatar, 2009), London (United Kingdom, 2010) and Atlanta (USA, 2012).

The format of the event features two days of open sessions and two days of academic paper presentations. The open sessions include panels and workshops which allow participants to engage, learn and give their views on a diversity of issues. The ICT4D Centre, in collaboration with the UNICEF Office of Research, submitted a successful workshop proposal titled *ICT4kids – Collective Learning Experiences in child-related ICT4D* to the competitive peer review process for open sessions. The objective of the workshop was to share initial findings of the research study *Assessing the potential and challenges of using information and communication technologies in child-focused development* (now this report), share the space with related initiatives and gather feedback from key academics, practitioners and policy makers interested in ICT4D and children.

The session was organized as a panel of experts including: Linda Raftree (Plan International USA), Marietta Muwanga-Ssevume (UNICEF ESARO), Kristine Pearson (Lifeline Energy) and Kieran Sharpey-Schafer (Dimagi Inc.). The Director of the ICT4D Centre, Dr Dorothea Kleine, gave a brief presentation of the findings of the study (circulated in advance to the speakers) before panel members commented from the perspective of their own work on ICT4D and children. This was followed by a moderated discussion with the audience. Some 26 participants attended the session, including experts from academia, practice and policy making. As well as taking part in the discussions, participants were offered to leave their email to have the report sent to them and to be involved in future discussions on ICT4D and children, an offer which all attendees took up.

### Summary of the responses and discussions with the experts

Experts on the panel and in the audience agreed on several points. In response to the quotes from the report expressing concerns with a supply-led approach, open session participants argued that child-related projects should include the use of ICTs in their projects only where it would help improve their activities, avoiding the trend of adding technology just to ‘appear innovative’. Participants commented that a misplaced focus on the technology had caused some projects to fail, especially when coupled with simply giving away devices. However, this problem is not easy to solve, for instance because many organizations, including private sector companies, will still offer project support in the form of donating devices, incentivising projects to design their activities around a given device instead of finding the best technology for the problem faced.

Second, the report presentation highlighted a number of sectoral applications for ICT4D. In the workshop, projects using ICTs for education and those in which children are indirectly benefitting, such as birth registration initiatives, were mentioned as the most successful interventions. Nevertheless, these also face challenges. Education projects are difficult to scale because the curriculum has to adapt to the particular characteristics of the country, context and different realities. Similarly, projects with indirect benefits have struggled to measure their impact on children, i.e. the project may monitor that every child is successfully vaccinated, but there may be no information regarding whether this led to improved health. Open session participants concurred with the observation in the study findings suggesting that there was a lack of monitoring and evaluation, whether in cases of successful or failed projects, was frequently mentioned. Participants strongly agreed with the good practice recommendation in the report calling for integrated and systematic monitoring and evaluation of projects.

Third, the report presentation raised the question of whether Open Source software was preferable to proprietary solutions, showing some of the quotes from expert interviewees who supported this notion. Open session participants responded by mentioning the lack of skills of local organizations, both in relation to ICT expertise and project management. This meant that some local projects were unable to survive without external support and made their initiatives unsustainable over time. For this reason, Open Source software was considered a good idea in theory but not always in practice because of the intensive training required to make it feasible.

Fourth, the report presentation offered quotes calling for the involvement of children in the design of projects, especially those initiatives aimed at them as direct beneficiaries. In response, open session participants shared different experiences of children’s participation in project design.

They mentioned some of the ethical challenges, for instance how to document parental consent from people afraid of signing documents or from families where orphaned children were the de facto heads of households. It was concluded that children's participation is valuable when they can state their own opinions (one expert suggested from four years and older). Notwithstanding this, it remains a challenging process that requires a good relationship with the children, and a methodology that allows several consultations and in some cases prototype design, which is conducted more easily with older children.

Fifth, there was a discussion about equality of access. In response to relevant quotes from the report, one open session participant suggested that access to ICTs was more equal between boys and girls than among women and men (which was not something the 35 experts interviewed in the study observed). Further, open session participants pointed out that little was known about the quality of that access, and this was seen as a major concern for children of both genders. Experts who were present stressed that usage is not enough without quality of usage.

Sixth, e-waste was not mentioned in the report presentation, but was cited by open session participants as an emerging theme that requires greater attention. The implementation of projects using ICTs also means more devices are used and these need to be reused, recycled or discarded, which also requires specific skills. Children themselves could be trained in reuse, giving them another learning opportunity and a chance for more meaningful appropriation of the technology. However, this requires resources and training that sometimes are not available. Consequently, it was mentioned that it is necessary to train some participants of the projects to maintain and appropriately reuse ICTs and eventually have them recycled in a responsible way.

Finally, the report team asked participants explicitly whether they thought children should be seen as a separate user group in ICT4D. There was strong support for this notion, under two conditions. First, participants were concerned that 'children' was not a monolithic term but required internal differentiation, especially between gender and age groups. Second, they made the point that their support for children as a special user group was based on the understanding that there would also be other user groups, such as elderly users or users with special needs, who would also benefit from being seen as separate user groups. Children, the experts at the open session concluded, should be treated as a separate user group in ICT4D, not only because they can also be considered as a vulnerable population, but because working with children raises specific challenges, such as how to allow them to participate in an age-appropriate and ethical manner.

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## Latin American Literature

After the first draft of the report, reviewers noted the regional imbalance of references, and requested in particular more references relating to Latin America. So a small additional literature review was conducted, looking specifically for Latin American and Caribbean resources. Most of the literature was found using the search engines SciELO ([www.scielo.org/php/index.php](http://www.scielo.org/php/index.php)) and Google Scholar, and from the Inter-American Development Bank (IADB) site. The initial screening resulted in more than 40 documents, and the detailed review resulted in the list below. Although there may be other examples of projects involving children, the available literature mostly discusses the usage of ICT in the areas of Education and Health.

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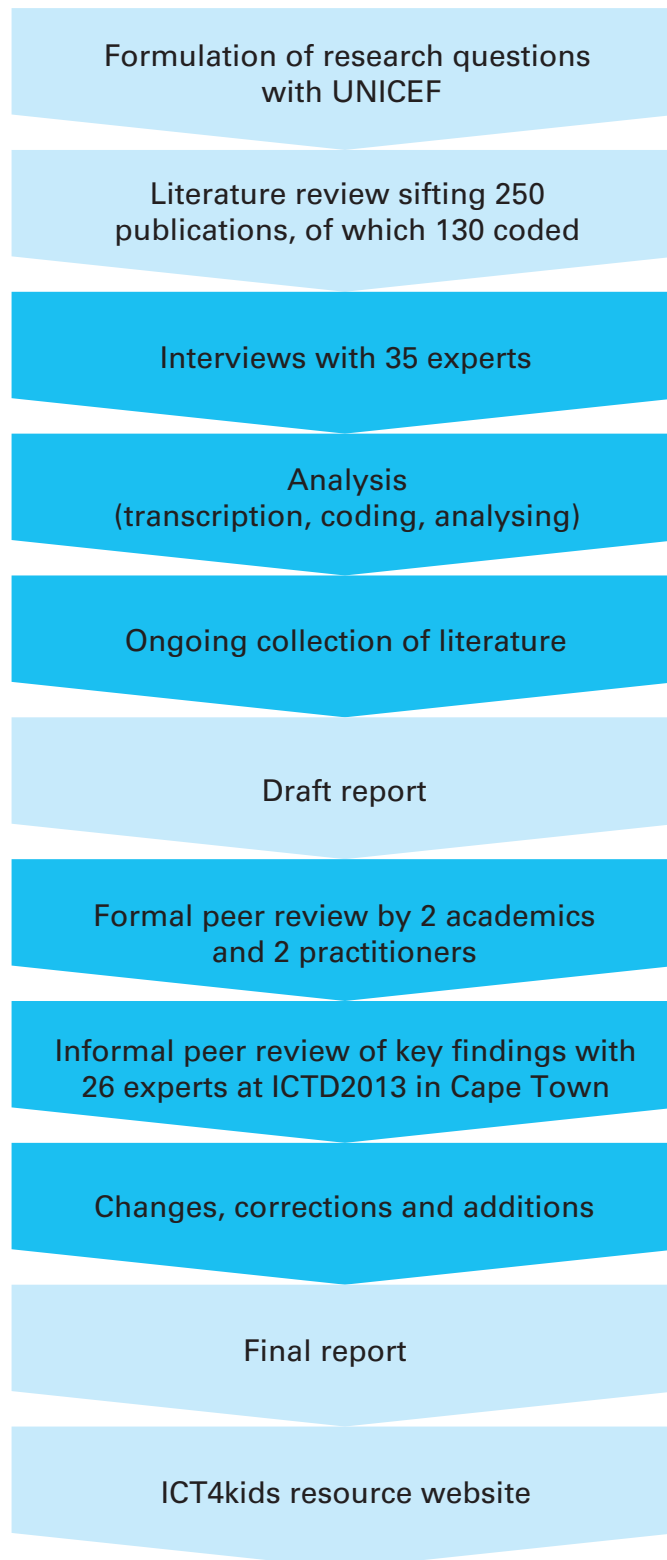
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## 6.3 Interviewees

Each interviewee was allocated an ID number that was used to identify their ideas or quotations through the report. Many of the interviewees requested anonymity and so their names and job titles are not included with their ideas or quotations. Permission has been granted from interviewees for all identifiable quotations.

Name of interviewee	Role and affiliation
Matt Berg	ICT Director for Millennium Villages Project
Sean Blaschke	Technology for Development Specialist, UNICEF Uganda
Rob Burnet	Director, Shujaaz
Mary Burns	Senior Technology Specialist, <i>Education Development Center</i>
Ineke Buskens	Project Leader and Research Director, GRACE Network
Amy Jo Dowd	Senior Director, Education Research, Save the Children
Christopher Fabian	Senior Advisor to the Executive Director on Innovation, and co-Lead of the Innovation Unit, UNICEF
Robert Fabricant	Creative Director of Frog Design
GSMA	[written response from GSMA representative]
Erin Hayba	Associate Education Officer with UNHCR
Shafika Isaacs	Independent consultant, ICT4D and education
Noriko Izumi	Chief of Child Protection, UNICEF Nigeria
Jonathan Jackson	CEO, Dimagi
Gurumurthy Kasinathan	Founder and Director of IT for Change
Tim Kelly	Lead ICT Policy Specialist, World Bank
Martine Koopman	Country Manager, Ghana, IICD
Robert Kozma	Emeritus Director and Principal Scientist, Center for Technology in Learning, SRI International
James Lawrie	Senior Education Adviser: Research, Innovation, and Strategy, Save the Children
Nathaniel Manning	Director of Business, Ushahidi
Patricia Mechael	Executive Director, mHealth Alliance
One Laptop Per Child (OLPC)	[written response from OLPC representative]
Kristine Pearson	CEO, Lifeline Energy
Benjamin Piper	Chief of Party, PRIMR Kenya, RTI International
Linda Raftree	Senior Advisor, Innovation, Transparency and Strategic Change, Plan
Michael Riggs	Knowledge and Information Management Officer, FAO
Sharad Sapra	Country Representative, UNICEF Uganda
Merrick Schaefer	Senior Innovation Specialist, World Bank
Michelle Selinger	Director of Education Practice for the Global Public Sector practice of the <i>Cisco IBSG</i> .
Jackie Strecker	ICT Innovations and Education Specialist, UNHCR
Mike Trucano	Senior ICT for Education Specialist, World Bank
Paula Uimonen	Director for The Swedish Program for ICT in Developing Regions
Tim Unwin	Secretary General of Commonwealth Telecommunications Organisation
Steve Vosloo	Senior Project Officer, Mobile Learning, UNESCO
Niall Winters	Senior Lecturer in Learning Technologies for Development, London Knowledge Lab
Tim Wood	Director, Mobile Health Innovation, Grameen Foundation

## Project Overview: Main Phases





## 6.4 Communication with interviewees

Dear xxx,

I'm emailing today with a request for your assistance with a UNICEF research study. We (the ICT4D centre at Royal Holloway and Jigsaw Consult) are working in partnership with UNICEF to conduct research on the ways in which ICTs are being used, or could be used, to assist child-focused development efforts. We are interviewing a range of experts and would really value including your perspective.

The core component of this research is a series of interviews conducted with leading experts from the ICT4D policy and practitioner community who have particular expertise related to child-focused development. **Our aim is to make sure that the limited funds for child-focused development are spent in a well-informed way**, by drawing on the years of experience and knowledge accumulated within the ICT4D community.

As a recognised expert in our community, we believe you could greatly help this effort. Would you be able to participate in this research as a named expert, by being interviewed for one hour (either face-to-face, via Skype or phone)? If you are able to participate please suggest 2-3 suitable dates and times for conducting the interview in the next few weeks. We will then send you a framework of initial questions that you can reflect upon before the interview.

Your expertise is greatly valued, and any ideas or quotes will be fully attributed, unless you choose to offer some views in anonymous form, which is also absolutely acceptable. Unless otherwise requested, all contributors will of course be named in the list of experts in the final UNICEF report and acknowledged in any related academic articles.

We trust that this research will provide a valuable contribution to the ongoing study of how ICTs can be used as a transformative tool for benefitting marginalized children. Please let us know if you have any questions at this stage or else please do send dates and times.

Thanks in advance for considering this and we look forward to hearing from you.

With best wishes,

Dorothea, David, James and Patrizia  
(James Elder and Patrizia Faustini, Communication and Advocacy, UNICEF Office of Research)  
(Dr Dorothea Kleine, Director, ICT4D Centre, Royal Holloway, University of London)  
(Dr David Hollow, Jigsaw Consult)

## 6.5 Interview questions

In the lives of the most materially poor and marginalized, what do you think is the most significant way that ICTs can support a transformative change for children?

We would like to find out how you think ICTs affect equity and equality among children:

- In what ways might ICTs lead to increased equity and equality?
- In what ways might ICTs lead to increased inequity and inequality?

We would like to find out what you think works and does not work with ICT4D initiatives related to children:

- From your experience of working in ICT4D initiatives related to children, what has worked? Why? (Prompts: consider what technology, project level, approach, engaging with children as a group?)

- From your experience of working in ICT4D initiatives related to children, what has not worked? Why? (Prompts: consider what technology, project level, approach, engaging with children as a group?)

We would like to find out about particularly successful and less successful projects:

- Could you please name a project which, from your point of view, has been particularly successful in using ICTs to help children, and explain why you consider it to have been successful (regardless of whether it has received public praise)?
- Could you please name a project which, from your point of view, has not been successful in using ICTs to help children, and explain why you consider it to have been unsuccessful (regardless of whether it has received public praise)?

What do you think are the top three ICT4D interventions that are helping the most materially poor and marginalized children make progress towards the MDGs?

If you had a budget of 500,000 USD to spend within the next 12 months on a child-focused ICT4D-based intervention, how would you spend it and why?

What is the most innovative programme that you are aware of that is currently using ICTs to help children?

Please can you share with us what you consider to be the most significant lesson in relation to ICT4D programme design and implementation for children over the last ten years?

What do you think is the most significant current missing emphasis within the ICT4D community in regard to using technology in a manner that is appropriate for children?

As we look to the future, what do you think will be the most significant new initiatives and trends in the transformative use of ICTs for children over the next five years?

## 6.6 Codes for interview transcript analysis

A total of 31 codes were used in the analysis process.

- Access (including connectivity, electricity)
- Accountability (including transparency)
- Affordability (including cost; value for money and cost effectiveness)
- Big Data/Open data (including crisis mapping)
- Cross-cutting: conceptualisation of children and ICT
- Demand
- Design (including user-centred/local/participatory etc.)
- Digital literacy
- e-Learning
- Entrepreneurship (including income creation, innovation for entrepreneurship)
- Equity (including gender and rural/urban)
- Evaluation (and monitoring, impact assessment)
- Failure
- Free and open source software (FOSS)
- Gender (including girls and women; men, masculinities)
- Hype around ICT4D
- Innovation

- Intermediaries (including teachers; healthcare professionals)
- Mobile (i.e. the tools, including smartphones)
- Mobility
- M-Pesa
- OLPC
- Partnership
- Privacy (including on social media)
- Private sector (including market expansion)
- Scale (including scalability)
- Sustainability (including institutional or financial)
- Systems thinking
- Unintended consequences (including negative effects)
- Voice and participation
- Tablets

## 6.7 Sources for literature search

The literature review utilized Google Scholar, ICT4D journals and websites of relevant organizations.

Relevant ICT4D journals:

- Information Technologies and International Development (ITID)
- Electronic Journal of Information Systems in Developing Countries
- Information Technology for Development
- African Journal of Information and Communication
- International Journal of Education and Development Using Information and Communication Technology
- Asian Journal of Communication
- Journal of Health Informatics in Developing Countries
- Information Development

Websites of relevant organizations:

- Department for International Development ([www.research4development.info](http://www.research4development.info))
- The International Development Research Centre (IDRC) ([www.idrc.ca](http://www.idrc.ca))
- International Institute of Communication and Development (IICD) ([www.iicd.org](http://www.iicd.org))
- ICT4D Collective ([www.ict4d.org.uk](http://www.ict4d.org.uk))
- Eldis ([www.eldis.org](http://www.eldis.org))
- infoDev ([www.infodiv.org](http://www.infodiv.org))
- UNESCO ([www.unesco.org](http://www.unesco.org))
- CTO ([www.cto.int](http://www.cto.int))

[Notable omissions include: ITU which charge for access to much of their site, ODI as they are mostly working on ICTs for rural livelihoods, IDS as no examples were found relating to children and ICTs]

## 6.8 Quantitative profile of literature

The following descriptive summary of the literature is based on the 133 papers. The numbers represent the number of times within the literature review the topic listed was the dominant subject of the article.

Geographical areas the resources focused on:

- Africa = 43 references
- Oceania = 1 reference
- Europe = 13 references
- America = 16 (5 in North America) references
- Asia = 25 references
- Multiple regional foci (global) or no geographical focus = 35 references
- Sectors the resources focused on: Extreme poverty, hunger and inequalities = 15 references
- Maternal health = 18 references
- Children health = 6 references
- Maternal and child health = 7 references
- Nutrition = 3 references
- Access to quality education = 37 references
- Governance and accountability = 21 references
- e-Participation = 4 references
- ICTs and children = 20 references

Type of ICT engaged with:

- Mobile phones = 19 references
- SMS = 2 references
- Cash transfer software = 3 references
- e-banking systems (incl ATM) = 1 references
- e-health applications = 2 references
- e-learning applications = 3 references
- Digital pens = 1 reference
- Desktop computers = 11 references
- Laptops = 1 reference
- Tablets = 1 reference
- Media spaces / online networks = 2 references
- Web pages / sites = 1 reference Information systems = 4 references
- Internet = 14 references
- Gaming = 1 reference
- Micro-blogging = 1 reference
- Different software applications = 5 references
- Radio = 3 references
- Cloud computing = 1 reference

- Assistive technologies = 1 reference
- Unique Identification = 1 reference
- Wireless grid software = 1 reference
- Multiple technologies covered or No specific technologies covered = 54 references

Dominant methodological approach utilized in the item of literature:

- Case study = 42 references
- Evaluation of projects = 2 references
- Project reports = 9 references
- Anecdotal evidence for study = 6 references
- Mixed methods = 9 references
- Literature review = 33 references
- Expert opinions = 5 references
- Interviews = 8 references
- Surveys, questionnaires = 5 references
- No specific methodologies covered = 18 references

Type of intervention recorded:

- Analysis of case studies = 6 references
- Experiment = 11 references
- Multiple interventions / implemented projects = 45 references
- Conceptual / methodological contributions / frameworks, others = 12 references
- No specific intervention = 59 references





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