The Role of ICT for the Achievement of SDGs in Countries with Low Digital Infrastructure

From barriers to breakthroughs:
unveiling the complexities
and opportunities
of ICTs for sustainable development

A Project of

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With the Support of

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Acknowledgments

We extend our heartfelt gratitude to Joshua Harvey, whose invaluable support ranged from reviewing early drafts, offering advice on the overarching text, to editing the research. Our thanks also go to Alessandro Masciadri and Fulvio Bersani of the 'Innovazione per lo Sviluppo' programme, as well as Maurizio Bertoldi from 'Informatici Senza Frontiere'.
Their participation in the interviews ensured that the case studies presented
are both insightful and rooted in practical experiences. We also appreciate Alessandro
Domanico from 'Informatici Senza Frontiere' for his meticulous examination
of the 'Open Hospital' case study. Ultimately, we would also like to express our gratitude
to Natascia Mascia from NGO M.A.I.S. for sharing the inspiring story of the 'WEE.CAN!'
project, which focuses on empowering Syrian refugee women. Although the story
did not make it into the publication due to thematic incompatibility,
its essence and impact have left a lasting impression on our research team.

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Introduction

Who would have imagined that, fifty-one years after Truman's inaugural address in 1949, history would repeat itself?

Truman's inaugural address in 1949, known in development studies as the moment when 'underdeveloped were invented', called for making available "the benefits of [...] of technical knowledge in order to help [underdeveloped areas] realise their aspirations for a better life.". Fifty-one years later, the same discourse was reproduced in one of the key development agendas, that is, Millennium Development Goals (MDGs). The MDG 8 on "Developing Global Partnership for the Development", Target 8.F, states the following: "In cooperation with the private sector, make available the benefits of new technologies, especially information and communications."

Technology has always been a cornerstone in the discourse of human progress. Defining 'human progress', however, means different things for different socio-political, economical, cultural, and ideological positions. Two examples may help us illustrate this point.

Before and during World War II, Nazi Germany maintained a long-lasting business relationship with the U.S.-based multinational, International Business Machines (IBM), to develop punched card technologies. These technologies helped the Nazi regime organise its national census, provide a quantified portrait of the nation and its citizens, and identify Jews, Roma, and other ethnic groups deemed undesirable. They were later used during concentration camps to statistically measure their capacity. And this was how "human progress" was defined by the Nazi Regime in Germany.

On the other hand, another vision of 'human progress' was taking place in Chile between 1971-1973. Project Cybersyn was launched during the presidency of Salvador Allende aimed at constructing a distributed decision support system to aid in the management of the national economy. The project consisted of four modules: an economic simulator, custom software to check factory performance, an operations room, and a national network of telex machines that were linked to one mainframe computer. Project Cybersyn was based on a viable system model theory approach to organisational design, and featured innovative technology at its time: it included a network of telex machines ('Cybernet') in state-run enterprises that would transmit and receive information with the government in Santiago. The project, after the military coup on 11 September 1973, was abandoned, and the operations room was destroyed. In a 2014 essay for The New Yorker, technology journalist Evgeny Morozov argued that Cybersyn helped pave the way for big data and anticipated how Big Tech would operate, referring to Uber's use of data and algorithms to monitor supply and demand for their services in real time as an example.

Only in the early 2000s can we speak about the new field of Information and Communication Technologies for Development (ICT4D), when the world wide web (www) had become more interactive, friendly and accessible, as well as Information Technology (IT) infrastructure accompanied by mobile phones and other devices became more distributed around the world.

ICT4D thus has increasingly become a cornerstone in shaping sustainable growth and social change. In an age where technology is often seen as a panacea for societal issues, it is crucial to examine its true impact on development. This research takes a deep dive into the often-celebrated field of ICT4D and its evolved form, Information and Communication Technologies for Sustainable Development Goals (ICT4SDG). While ICT4D has been praised for its potential in bridging the digital divide and fostering social and economic development, it has also faced criticism for sometimes perpetuating inequalities and failing to deliver long-lasting change. The study further explores the transition to ICT4SDGs, which aim to align technological interventions with the United Nations' Sustainable Development Goals (SDGs). Particularly, this research focuses on Italian development and cooperation programs in 22 priority countries, examining how they leverage ICT4SDGs to achieve sustainable outcomes.

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Introduction

Why this research?

There is a conspicuous absence of comprehensive studies that scrutinise the effectiveness, challenges, and best practices associated with ICT4D, and specifically ICT4SDGs.

Specifically, research is limited regarding Italy's role in leveraging these technologies in its development and cooperation programs in priority countries. This study aims to fill this void by offering a nuanced examination of ICT4SDGs in this context, responding the following questions:

- Can ICT play a crucial and enabling role in facilitating the achievement of SDGs? If yes, in what way and under what conditions?
- Which digital technologies (hardware and software) – GIS, AI, IoT, Blockchain, etc. – are more efficient in relation to achievement of SDGs 1, 2, 3, 5, 10 in contexts of low infrastructure, and why?
- What are the main challenges, tensions and dilemmas of the role of ICT in achieving SDGs?
- How are ICTs being used, both quantitatively and qualitatively, in relation to SDGs 1, 2, 3, 5, 10 by the Italian development cooperation programmes carried out in the 22 priority countries, and what is their societal impact?

Methodology

The research employs a mixed-methods approach, combining qualitative data from literature reviews, case studies, and expert interviews with quantitative data from surveys and statistical analysis.

For the literature review, a research protocol was established which included: a) types of publication and studies; b) populations and locations of studies; c) publications timeframe; d) languages; e) databases to be screened; and f) number of keywords.

For the quantitative data, a questionnaire was developed and sought to engage a representative sample of Italian NGOs actively involved in development cooperation. To build a comprehensive database of organisations, we meticulously aggregated data from various sources, including the Italian Agency for Development Cooperation (AICS) website, OpenAID, and other reputable online sources, including manual scoping and aggregation of data. This extensive database included information about the organisational focus, geographic presence, and development priorities.

Out of the 195 Italian NGOs initially identified and contacted, 26 organisations responded to our questionnaire, providing valuable insights into their engagement with ICTs and development cooperation. While we had hoped for a higher response rate, the willingness of this subset of the Italian NGO community to contribute to our study is greatly appreciated and reflects the willingness of a subset of the Italian NGO community to contribute to our study.

Ultimately, qualitative data were collected through in-depth interviews which have taken place over the course of the research and represented here as case studies.

This holistic methodology allows, I believe, for a more comprehensive understanding of the complexities involved in implementing ICT4D and ICT4SDGs.

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Outline of chapters

The research is organised into five main chapters, each serving a distinct purpose in the overall narrative:

① **Chapter 1: Situating SDGs in Development**
This chapter sets the stage by delving into the emergence and relevance of Sustainable Development Goals (SDGs). It discusses public perceptions and the role of international organisations in shaping the SDG narrative.

② **Chapter 2: Situating ICTs in Development**
This chapter navigates the complexities of ICT4D, discussing its historical evolution, principles, and criticisms. It lays the groundwork for understanding how ICT4D has evolved to align with SDGs.

③ **Chapter 3: From ICT4D to ICT4SDG**
This chapter elaborates on the transition from ICT4D to ICT4SDG, outlining the alignment with SDGs and providing case studies that exemplify both successes and challenges in relationship to SDGs 1, 2, 3, 5, 10.

④ **Chapter 4: The Use of ICT4SDG in Italian Development Programmes**
This chapter offers an examination of Italy's role in employing ICT4SDGs in its development and cooperation programs across 22 priority countries. It encompasses statistical analyses, expert interviews, and case studies.

⑤ **Chapter 5: Recommendations & Suggestions**
The concluding chapter synthesises the research findings to offer actionable recommendations. It outlines best practices, pinpoints challenges, and suggests avenues for future research.

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CHAPTER 01

Situating SDGs in Development

This chapter aims to situate the United Nations' Sustainable Development Goals (SDGs) within the broader narrative and evolution of development theory and practice. As the global community grapples with urgent issues like poverty, hunger, and inequality, the SDGs serve as a comprehensive framework to address these challenges. However, despite their pivotal role, awareness and understanding of these goals remain limited among the general public. By delving into the priorities of both the public and the research community, this chapter seeks to illuminate the gaps and alignments between them. Moreover, it scrutinises the current state of gender violence and economic inequality to understand the efficacy of existing development initiatives. In doing so, it revisits age-old questions surrounding development, such as its historical origins and the linguistic issues that may have hindered its progress. Ultimately, the chapter offers a multi-dimensional analysis that aims to enhance our collective understanding of how the SDGs fit into the complex puzzle of global development.

Time for Facts

A 2017 report[(1)] t published by The Organisation for Economic Co-operation and Development (OECD) about how much people know and think about the Sustainable Development Goals (SDGs) find that between 28 and 45 percent of people have heard of the goals. As the report itself states "SDG awareness does not necessarily translate into knowledge.". According to the Eurobarometer (2017) just over 1 in 10 Europeans know what the SDGs are. Although these early findings – only two years after the endorsement of the SDGs in 2015 – should be treated with caution, the report states that "nonetheless, awareness that there is a global set of goals appears to be on the rise".

Another, most recent, survey (2021) [(2)] conducted by Ipsos in partnership with the World Economic Forum about the United Nations' Sustainable Development Goals finds "zero hunger" (SDG 2), "no poverty" (SDG 1) and "good health and well-being" (SDG 3) ranking as the global public's top priorities. Interestingly, all the three SDGs are also in line with the priorities of this research whose aim is to look more specifically in SDGs 1 (No poverty), 2 (Zero hunger), 3 (Good health and well-being), 5 (Gender equality) and 10 (Reduced inequalities). However, SDG 5 "Gender equality", in the Ipsos survey, is ranked at the end of the priorities occupying the place of 15 out of 16. Whereas the SDG 10 "Reduced inequalities" stands in the place 12 out of 16.

Both of these results are rather surprising considering that the violence against women remains "a global public health crisis of pandemic proportions" [(3)]. According to the 2021 report published by the World Health Organisation, 30% of women (15-49 years) have experienced intimate partner violence or non-partner sexual violence. That's 736 million women around the world. When it comes to inequality too, the situation is no better. Oxfam's most recent report "Inequality Kills" (2022) [(4)] claims that the wealth of the 10 richest men has doubled, while the incomes of 99% of humanity are worse off, because of Covid-19. According to the same report, inequality contributes to the death of at least one person every four seconds.

These findings, whether we desire it or not, do bring us to the old questions of development: how is that, 72 years since Harry Truman's inaugural address in 1949, who launched the concept of "fair deal" for the entire world, poverty and hunger remain yet the biggest challenges of the world? Wasn't Truman's doctrine postulated precisely on the idea to solve the problems of the "underdeveloped world" across the globe? Or are we witnessing yet again the repetition of the history where the word "poverty" [...] is extensively used and abused by everyone (Rahnema: 1991)?

However old these questions may be, the problem of poverty and hunger today remains the problem of contemporaneity. It is thus important that we undertake a brief journey in the tale of development to remind ourselves how it started and what it took to arrive at today's 2030 Agenda for Sustainable Development.

(1) *Organisation for Economic Co-operation and Development, 2017. What People Know and Think About the Sustainable Development Goals. [pdf] Available at:* ***<https://www.oecd.org/development/pgd/International_Survey_Data_DevCom_June%202017.pdf>*** *[Accessed 10 February 2023]*

(2) *Boyon N., 2021. Global public ranks ending hunger and poverty and ensuring healthy lives as top priorities among U.N. SDGs. [online] Available at:* ***<https://www.ipsos.com/en/global-public-ranks-ending-hunger-and-poverty-and-ensuring-healthy-lives-top-priorities-among-un>*** *[Accessed 10 February 2023]*

(3) *WHO, on behalf of the UN Inter-Agency Working Group on Violence Against Women Estimation and Data, 2018. Violence Against Women Prevalence Estimates. [pdf] Available at:* ***<https://apps.who.int/iris/rest/bitstreams/1347689/retrieve>*** *[Accessed 10 February 2023]*

(4) *World Health Organisation, 2018. Violence Against Women Prevalence Estimates. [pdf]* ***https://apps.who.int/iris/rest/bitstreams/1347689/retrieve*** *[Accessed 10 February 2023]*

The tale of development: a brief reminder

In his post-World War II essay "Anti-Semite and Jew," Jean-Paul Sartre recounts his personal experience in school, where a fellow student at the lyceè expressed annoyance with Jews for passing the state's teacher exam. Sartre's notable passage "If the Jew did not exist, the anti-Semite would invent him" (Sartre [1948] 1995: 14) suggests that, in order to maintain his identity and justify his laziness and exam failure, his classmate made use of a system of interpretation and thus needed the figure of the Jew.

Did not a similar occurrence transpire with 'development' to some extent? That is, in order to justify the new 'era of development', a system of interpretation was put in place to invent the underdeveloped. To paraphrase Sartre, if the *Underdeveloped did not exist, the Developed would invent it.* The discursive artefact of this invention is considered the inaugural address as president of the United States on January 20, 1949, by Harry Truman who would announce the following:

> We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas.
> The old imperialism – exploitation for foreign profit – has no place in our plans. What we envisage is a program of development based on the concepts of democratic fair dealing.

Gustavo Esteva (2019) identifies 20 January 1949 as the day when underdevelopment began[(5)]. As he put it: on that day, 2 billion people became underdeveloped. But on that day too, a new era began – the era of development. Now that the underdeveloped was invented, the development needed the knowledge structures to carry on this massive enterprise.

In a post-World War II, United States emerged as hegemonic power and had an unquestionable central position on world affairs. The Truman doctrine should be seen in this light, that is, as a (geo)political campaign on a global scale with an ambitious intent: to bring about the conditions necessary to replicating the world over the features that characterised the "advanced" societies of the time—high levels of industrialisation and urbanisation, technicalisation of agriculture, rapid growth of material production and living standards, and the widespread adoption of modern education and cultural values (Escobar [1995] 2012).

Wallerstein (2014) identifies this mechanism as a theory of stages. The assumption was very simple: the separate units—"national societies"—all developed in the same fundamental way [...] and that "the most developed" state could offer itself as a model for the "less developed" states, urging the latter to engage in a sort of mimicry, and promising a higher standard of living and a more liberal government structures ("political development") at the end of the rainbow (Wallerstein 2014: 10). Of course, the United States was not alone, as Wallerstein emphasises, the Soviet Union too adopted the concept of stages of development, although, for rhetorical purposes, Soviet scholars changed the terminology.

By now we can trace the emergence of the new world that is designed around the axis of Core-Periphery. The core-periphery concept was developed by Raul Prebisch within the framework of the United Nations Economic Commission for Latin America (ECLA) and it is considered an essential contribution of Third World scholars in several disciplines. Essentially, the concept describes how the world trade was dominated by a small number of economically developed countries who were part of the Core (sometimes referred to as "Centre" or "Global North"), while most countries have a secondary or even a tertiary position in world trade, that is, in Periphery (sometimes known as "Global South"[(6)]).

While the Truman doctrine aimed at sending the model of the United States to periphery in order to advance their (under)development—Prebisch argued that those theories and models stemming from the developed world (the centre) were not applicable in the non-developed world (the periphery) due to different situations and historical experiences (Prebisch 1950).

In international development there are many examples where ready-made models from the centre were transported to the periphery. One early example is the wholesale dismantling of an ancient system of irrigation and rice cultivation in Bali in the name of modern development, starting with the late 1960s Green Revolution (Escobar [1995] 2012). This destruction resulted in a profound social and environmental crisis for an entire population (Lansing 2006, as cited in, Escobar [1995] 2012).

(5) *For factual reasons we shall note that Esteva (2019) admits that the term 'underdeveloped' was first used – and was probably invented – by Wildred Benson, a former member of the Secretariat of the International Labour Organization (ILO) when he referred to 'underdeveloped areas' while writing on the economic basis for peace in 1942.*

(6) *In the academic circles there is still debatable whether the terminologies such as "Developing countries", "Global South", "Underdeveloped", "Third World", "Low- and lower-middle-income countries" etc., have pejorative connotations. A fairly new terminology – which seems to satisfy most parts – has entered the discourse, that is, "Majority World". In this research, we will thus use "Majority World" as an overarching term for the terms aforementioned. The citations from other authors will remain unchanged.*

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A more recent example is Facebook's "Free Basics", which we discuss more extensively in Chapter 2. This project aims to connect the unconnected. Facebook originally portrayed Free Basics as a philanthropic endeavour to reach isolated rural communities. However, its underlying strategy mirrors a "gateway drug" commercial approach: by offering a taste of connectivity, the intention is to increase data consumption, grow Facebook's user base, and establish the company as the main internet gateway for mobile users across the Global South.

As Gustavo Esteva (2019) writes: "in saying 'development', however, most people are now saying the opposite of what they want to convey". In numerous cases – and particularly when it comes to the use of Information and Communication Technologies (ICTs) – the development actors, practitioners, and decision-makers have often, under enthusiastic—or even euphoric notes—have promised one thing and delivered another. As such, development remains yet an ambivalent discourse[(7)] because on one hand it emphasises the importance of social transformation and progress, but on the other hand the way how this 'social transformation and progress' is packaged leaves very little—if not at all—place for alternative imaginaries.

As any discourse, the development discourse too has gone through various transformations and modifications. In discourse analysis they are known as framing, reframing, and frame modifications. For the sake of brevity we won't be able to provide an in-depth analysis, however, in the next section, we will explore briefly how the ambivalent discourse of development has been reframed and transformed around the notion of 'inclusiveness' and 'freedom' leading to what today is known as the central promise of Agenda 2030: Leave No One Behind (LNOB).

(7) *The term 'ambivalent discourse' is drawn from Arran Stibbe's work on Ecolinguistics (2015) where he classifies the discourses – in relation to environment – into three main categories: destructive, ambivalent, and beneficial.*

Development, inclusiveness, and the birth of the Millenium Development Goals

If we look back at Truman's inaugural address, we can see how the development is framed as the beginning of a new era – in Truman's own words "a bold new program" – that makes available "scientific advances and industrial progress" for the "improvement and growth of underdeveloped areas".

The framing of development here entails the idea that the United States' scientific, technological and industrial advances will be made available to help the poor areas. This altruistic-paternalistic framing, however, is accompanied by another important element of the Truman's address:

> Experience shows that our commerce with other countries expands as they progress industrially and economically. Greater production is the key to prosperity and peace.

Economic and industrial growth are placed as insurers of peace and prosperity. But it also sets up 'business' and 'private capital' as major participants in achieving this goal (Stibbe 2015: 57). Since Truman's new bold program started, the world has seen the expansion of the process of globalisation and integration of neoliberal economic models – known as Washington Consensus [(8)] – whose emphasis was on economic growth and poverty reduction.

Despite Truman's warning that the development will not be a substitute for the old imperialism, history has shown how the development was, nonetheless, accompanied by neo-colonial and neo-extractivist models.

The idea of development today, shows cracks and starting to crumble, [...] stands like a ruin in the intellectual landscape (Sachs [1992] 2019: xxvii). The development discourse, therefore, needed a new modification on its frame, it needed a new identity. This is how, around 1970[(9)], the term 'equitable development' was coined. Wolfgang Sachs (2010: 28) describes it as following:

> [...] every time in the last thirty years when the destructive effects of development were recognised, the concept was stretched in such a way as it included both injury and therapy. For example, when it became obvious around 1970, that the pursuit of development actually intensified poverty, the notion of 'equitable development' was invented so as to reconcile the irreconcilable: the creation of poverty with the abolition of poverty.

Quickly, this discursive modification too crumbled. By 1980 it became clear that the 'equitable development' was not equitable across generations (Stibbe 2015: 58). Thus, a new discursive modification — what Arran Stibbe calls frame modification — was deployed. Its name was 'sustainable development'. This is how the Brundtland Report[(10)] defines it:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; [and the concept of environmental limits].

By the time that Brundtland report was out and development discourse was directed towards the notion of 'sustainable development' —, the world had entered into a new era.

In the end of '80s and beginning of '90s, the world witnessed the fall of the Iron Curtain and the end of the Cold War. On 1989, Francis Fukuyama's influential essay "The End of History" proposed the thesis that dialectical-ideological clashes between two blocs – Western liberal democracy and communism – has been resolved with the triumph of the Western idea, and that, "what we may be witnessing is not just the end of the Cold War, or the passing of a particular period of postwar history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government[(11)]".

(8) *Washington Consensus are described as "fiscal discipline and reorientation of government expenditures, tax reform, privatisation of state owned assets, deregulation, protected property rights, trade liberalisation (indeed interest liberalisation rates), openness to inward foreign direct investment and unified and competitive exchange rates" (Perrotini-Hernández et al 2011: 28).*

(9) *One should recall that '60s and '70s were also the period of decolonisation and the rise of Third World nationalism which, to some degree, influenced the discursive changes around development.*

(10) *United Nations' The Brundtland Report, 1987. Our Common Future. [pdf] Available at:* ***https://www.are.admin.ch/dam/are/en/dokumente/nachhaltige_entwicklung/dokumente/bericht/our_common_futurebrundtlandreport1987.pdf.download.pdf/our_common_futurebrundtlandreport1987.pdf*** *[Accessed 10 February 2023]*

(11) *Fukuyama F., 1989. The End of History?. [pdf] Available at:* ***https://pages.ucsd.edu/~bslantchev/courses/pdf/Fukuyama%20-%20End%20of%20History.pdf*** *[Accessed 10 February 2023]*

Development, inclusiveness, and the birth of the Millenium Development Goals

During the 1990s the development discourse (and practice) went yet again under another shift. The emphasis, in this period, is put around the concept of 'inclusiveness' and 'freedom'—as well as 'equity' and 'growth'. In addition, the 'ecocratic discourse' starts to unfold too, a conceptual marriage of 'environment' and 'development' (Sachs [1992] 2019: 35).

The 1990s marked some important events. In 1995, the World Summit for Social Development took place in Copenhagen, whose aim was to establish a people-centred framework for social development [that would] build a culture of cooperation and partnership and to respond to immediate needs of those who are most affected by human distress[12]. By the late 1990s, when it became clear that the results of the Washington Consensus were far from what it promised, the Post-Washington Consensus emerged, emphasising the failures of the Washington Consensus and providing a more nuanced and context-specific approach to development. Additionally, in the late 1990s, Amartya Sen's Development as Freedom (1999) presents freedom as the central value in the development which influenced not only various currents in the development studies but also the work of the major international organisations. For example, the launch of The Human Development Report (HDR) by the Pakistani economist Mahbub ul Haq and Amartya Sen, and published annually by the United Nations Development Programme (UNDP), aimed to bring a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living[13].

The arrival of the new millennium (the start of the year 2000) needed a new response by the major global actors in the field of development. This is how John W. McArthur (2014) explain the origins of the Millenium Development Goals (MDGs):

> The Millennium Development Goals (MDGs) were established as a response to many of the world's foremost challenges as they appeared in 2000. At the time, the policy orthodoxy that had focused on development through macroeconomic fundamentals had achieved limited results. [...] The late 1990s also saw a deepening global mistrust towards international economic institutions. Many people viewed globalization as a force imposing the will of rich corporate interests against the needs of the disempowered poor. [...] Tensions culminated in the December 1999 "Battle in Seattle," where street protests forced the midstream abandonment of a [World Trade Organisation] WTO ministerial meeting.
>
> In 2000, a momentous turn of the calendar offered political leaders an opportunity to revise the terms of global cooperation. Although the UN had a mixed track record in supporting development outcomes during the twentieth century, its core premise of one-country-one-vote gave it unique legitimacy to convene the global conversation. Moreover, then-UN secretary-general Kofi Annan was at the height of his influence and his perceived moral leadership was pivotal to reframing debates around a new spirit of partnership. That spirit gave rise to the MDGs[14].

We can see how, yet again, the development discourse needed to reframe itself—this time around the 'new spirit of partnership'.

This 'new spirit' aimed at unifying the polarising world that was split, by the end of 1990s, between the anti-globalisation movement, on one hand, and on the other hand, the major international actors who were promoting globalisation. Annan's March 2000 "We the Peoples" report[15] is framed precisely in the way that it appeals to the people as One unified subjectivity. The report also set the stage for the Millennium Summit, held in September 2000, and urged that the extreme poverty target be reached "in every region, and every country." (J. W. McArthur 2014: 8).

As Jonathan W. McArthur argues (2014) contrary to many beliefs, the MDG launch process did not take place on a single date as a unified global policy effort, accompanied by explicit budgets, strategies, or operational procedures [but] instead, the MDGs took shape through a complex mix of international political processes, agreements, and proposals, interwoven with real-time global debates. However, the end product of the UN Millennium

(12) *Nielsen P., 1996. Social Priorities of Civil society: Speeches by Non-Governmental Organizations at the World SSummit for Social Development. New York: DIANE Publishing*

(13) *Human Development Index, 2023. Human Development Index. [online] Available at:* ***<https://hdr.undp.org/data-center/human-development-index#/indicies/HDI>*** *[Accessed 28 February 2023].*

(14) *McArthur J. W. , 2014. The origins of the Millenium Development Goals, vol 34, n. 2, pp. 5-24.*

(15) *(Annan et al., 2000). We the Peoples. [online] Available at:* ***<https://digitallibrary.un.org/record/413745>*** *[Accessed 28 February 2023]*

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Summit held in September 2000, followed by the Millenium Declaration as the main outcome of the Summit — was a September 2001 report of the secretary-general entitled “Road map towards the implementation of the United Nations Millennium Declaration”, considered as the first document to present the formal term “Millennium Development Goals” as a specific package of goals and targets (McArthur 2014: 7).

The United Nations Millennium Development Goals (MDGs) are the eight Goals, measured by 18 Targets, set by the 189 UN member states in September 2000 and agreed to be achieved by the year 2015. According to the monitoring portal of the MDGs[(16)] — the MDGs were derived from [the] Millennium Declaration, and specific indicators and targets were attached to [each of] them.

Figure 1.1: Millennium Development Goals © United Nations

But, have MDGs been achieved and have they made any difference? A large number of studyies and reports have been produced around this question. Undoubtedly, it is a great challenge to measure such a global effort distributed into eight main goals. Nonetheless, numerous studies (J. W. McArthur, K. Rasmussen 2017; H. Ritchie, M. Roser 2018) have evidenced that much of the progress and achievements occurred in saving lives, particularly decreased numbers of child mortality, maternal mortality, HIV/Aids, and tuberculosis—as well as the reduction of extreme poverty. Most of the progress and acceleration in the post-2000 world happened in low income countries and in sub-Saharan Africa, whereas, middle-income countries and the rest of the world, outside of China and India, typically registered larger gains but less acceleration (J. W. McArthur, K. Rasmussen 2017: ii).

Global Change Data Lab’s project Our World in Data had analysed[(17)] the data and found out that most of MDGs have been missed, but the degree to which they were missed varies between several near misses and a few very clear and alarming failures (H. Ritchie, M. Roser 2018). According to the same analysis the MDG targets on which the world failed most miserably were the environmental targets in MDG 7 which called for a “reversal of the loss of environmental resources” and a “reduction of biodiversity loss“. Interestingly, also the study “Change of Pace: Accelerations and Advances during the Millenium Development Goal Era” (J. W. McArthur, K. Rasmussen 2017) concludes that “the clearest shortcomings during the MDG era were in the realm of environmental sustainability, [and that] the 2010 target for biodiversity loss did not succeed.”.

Post-MDG era which starts in 2015 is characterised by the newly launched framework known as the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) whose central promise is: Leave no one behind (LNOB).

(16) *MDG Monitor, 2023, Millennium Development Goals. [online] Available at: **<https://www.mdgmonitor.org/millennium-development-goals/>** [Accessed on 28 February 2023]*

(17) *Ritchie H, Roser M, 2018. Now it is possible to take stock - did the world achieve the Millenium Development Goals? [online] Available at: **<fhttps://ourworldindata.org/millennium-development-goals>** [accessed 15 March 2023]*

Leave no one behind: the discourse of universal values

In July 2014, the Open Working Group (OWG) of the United Nations General Assembly submitted a formal proposal comprising 17 goals, intended for consideration and endorsement by the General Assembly in September 2015. This pivotal document known as "The 2030 Agenda for Sustainable Development" provided the foundation for the Sustainable Development Goals (SDGs) and the international development agenda for the period of 2015-2030. The 17 Goals[(18)] were adopted by all UN Member States in 2015, as part of the 2030 Agenda for Sustainable Development which set out a 15-year plan to achieve the Goals.

Interestingly, the core document – "The 2030 Agenda for Sustainable Development" – which sets out the vision for the implementation of the 17 Goals is grounded in the discourse of human rights, human dignity, equality and non-discrimination. They are framed under overarching concept of Universal Values[(19)] which are condensed in three principles: 1) Human Rights-Based Approach[(20)]; 2) Leave No One Behind[(21)]; 3) Gender Equality and Women's Empowerment[(22)].

One can see how development undergoes numerous discursive transformations that respond to the ever-changing world's political, economical, and social configurations. It is worthwhile, at this stage, to make a brief overview of these transformations.

In post-World War II the development was initially framed as a 'new bold programme' to help "underdeveloped" areas. In the 19060s and 1970s we see the second shift of paradigm—the discourse is now framed around 'equitable development'. When it became clear that the notion of equity was falling short, the new framing emerged in the 1980s, that is, 'sustainable development'. In the 1990s we saw the emergence of 'ecocratic discourse' and framing of development around 'inclusiveness' and 'freedom'. Following the crisis of 1990 and the rising anti-globalisation movement, the newly-launched MDGs (in 20000) aimed to plead the world's countries to join in the 'new spirit of partnership' and global effort in achieving eight Goals. Ultimately, with the expiration of MDGs and the launch of the SDGs in 2015, the development discourse returned – perhaps, for the first time – to the core foundation document of the United Nations, that is, the Universal Declaration on Human Rights. As a consequence, we see the universal values of human rights, equality, dignity and non-discrimination consisting of the new discourse of SDGs.

Table 1.1: Framing and reframing of the discourse of development over time

Period	Framing(s) of development	Discursive artefact (s)
1949 >	New bold programme Improve underdeveloped areas	Harry Truman's inaugural speech
1970 >	Equitable development	The United Nations Conference on Trade and Development's Towards A New Development Strategy World Bank's World Development Report (1978)
1980 >	Sustainable Development	Brundtland report
1990 >	Development as freedom Human development	Amartya Sen's Development as Freedom The Human Development Report
2000 >	New Spirit of Partnership We the Peoples Millenium Development Goals	The UN's Millennium Declaration Koffi Annan's We the Peoples Report
2015 >	Universal Values of human rights, equality, and non-discrimination Sustainable Development Goals	The 2030 Agenda for Sustainable Development

(18) *More information about the 17 Goals. [online] Available at:* ***<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>*** *[Accessed 15 March 2023].*

(19) *For more information, see here:* ***<https://unsdg.un.org/2030-agenda/universal-values>*** *[Accessed 15 March 2023].*

(20) *For more information, see here:* ***<https://unsdg.un.org/2030-agenda/universal-values/human-rights-based-approach>*** *[Accessed 15 March 2023]*

(21) *For more information, see here:* ***<https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind>*** *[Accessed 15 March 2023]*

(22) *For more information, see here:* ***<https://unsdg.un.org/2030-agenda/universal-values/gender-equality-and-womens-empowerment>*** *[Accessed 15 March 2023]*

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Leave no one behind: the discourse of universal values

Each of the 17 SDGs is accompanied by a number of targets that sets the roadmap for action. Each target is further broken down into a number of measurable indicators which are monitored and evaluated. For example, the SDG 1 "No poverty" which aims to eradicate extreme poverty by 2030, has 7 Targets and 14 Indicators. In order to provide more transparent reporting about the progress of SDGs, the SDG Tracker portal[(23)] has been launched where detailed tracking, monitoring and measurement of each SDG is published.

Monitoring and evaluating progress within the SDGs poses several challenges for local and subnational governments, as there are many possible differences between cities, including geographical, socio-economic and governmental, which make it difficult to select globally applicable and meaningful indicators (M. Woodbridge 2015: 1). The Sustainable Development Goals Report 2022, published in July 2022, has raised the alarm about the jeopardy of the SDGs: "Using the latest available data and estimates, it reveals that the 2030 Agenda for Sustainable Development is in grave jeopardy due to multiple, cascading and intersecting crises. COVID-19, climate change and conflict predominate[(24)]."

Despite the difficulties, the UN's Department of Economic and Social Affairs (DESA) has launched a call for submissions for Good Practices that took place between November 2018 to February 2019. Out of 700 submissions, 509 were approved as Good Practices.

Figure 2.1: SDGs, Targets and Indicators © ICLEI Briefing Sheet, 2015

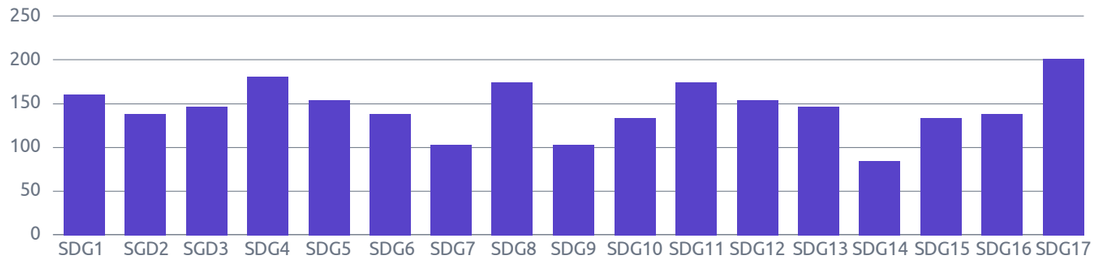
Measuring and Monitoring the SDGs

17 SDGs

169 TARGETS

229 (TBC) INDICATORS

Figure 3.1: Number of Good Practices per SDG, with most practices applying to several of the SDGs © DESA



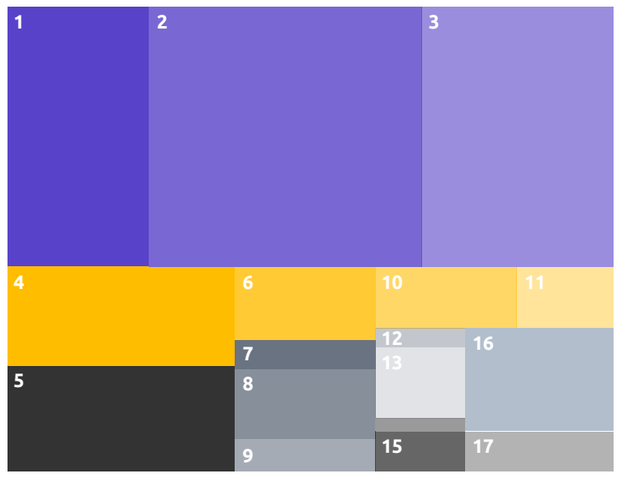
(23) *For more information, please see here* ***<https://sdg-tracker.org/'— SDG Indicators'.>*** *[Accessed on 08 March 2023]*

(24) *Sachs, J., Lafortune, G., Kroll, C., Fuller, G., Woelm, F., 2022. From Crisis to Sustainable Development: the SDGs as Roadmap to 2030 and Beyond. Sustainable Development Report 2022. [online] Available at:* ***<https://s3.amazonaws.com/sustainabledevelopment.report/2022/2022-sustainable-development-report.pdf>*** *[Accessed 08 March 2023]*

Leave no one behind: the discourse of universal values

These early results indicate, however, that central issues of SDGs such as eradication of poverty, climate change, and reduced inequalities do not lead with the Good Practices. If we combine these data with the data about the available resources for 2022 (16.1 billion dollars), for each SDG, we can see how SDG 10 "Reduced inequalities" received only 3% of available resources, whereas the SDG 13 "Climate action" only 2.2%. Other three SDGs which are central for the purpose of our research have received nuancing resources. SDG 2 "Zero hunger" stands better with 24.5% of resources allocated, followed by SDG 3 "Good health and well-being" with 18.3%— SDG 1 "No poverty" has received 12.9%, and SDG 5 "Gender equality" 8.5% of resources.

Figure 4.1: Where is the money going? (These figures exclude an additional $818.5m of programmes available resources that are currently not yet attributed to a particular SDG on UNINFO) © UN INFO



1. No Poverty - 12.9%
2. Zero Hunger - 25.4%
3. Good Health & Well-being - 18.3%
4. Quality Education - 7.9%
5. Gender Equality - 8.5%
6. Clean Water & Sanitation - 3.6%
7. Affordable & Clean Energy - 1.4%
8. Decent Jobs & Economic Growth - 3.4%
9. Industry, Innovation & Infrastructure - 1.6%
10. Reduced Inequities - 3%
11. Sustainable Cities & Communities - 2.3%
12. Responsible Consumption & Production - 0.6%
13. Climate Action - 2.2%
14. Life Below Water - 0.5%
15. Life on Land - 1.3%
16. Peace & Justice - Strong Institutions - 5.7%
17. Partnerships for the Goals - 2.2%

We started this chapter looking at the findings of the 2021 survey conducted by Ipsos in partnership with the World Economic Forum about the United Nations' Sustainable Development Goals, where "zero hunger" (SDG 2), "no poverty" (SDG 1) and "good health and well-being" (SDG 3) ranking as the global public's top priorities. We have seen how Sustainable Development Goals Report 202 painted a worrying picture about the progress of SDGs in all areas, claiming that for the second year in a row, the world is no longer making progress on the SDGs. The available resources allocated to various SDGs are also perplexing, following the patterns of MDGs—particularly when it comes to climate change. If we look at SDG Index[(25)] We can see a clear division between the Global North which leads in almost all the SDGs, and the Global South standing behind in alarming numbers.

Will the 2030 Agenda for Sustainable Development hold to its promise in Leaving No One Behind despite the prospects of its future appearing bleak? Will SDGs survive the existing predicament filled with economic inflation, precarious work, wars, and the rising concerns of climate change? Or, to repeat Majid Rahnema's inquiry, are we witnessing yet again the repetition of history where the word "poverty" [...] is extensively used and abused by everyone?

To conclude, this chapter has explored the intricate relationship between the SDGs and the broader field of development, both theoretically and practically. It has highlighted that while the SDGs serve as a modern compass guiding global development efforts, they are set against a backdrop of historical challenges and evolving public priorities. The disparity between public awareness and the actual complexities of development issues indicates the need for more nuanced and accessible discourse. This calls for a re-examination of our language and methodologies in development studies, as well as a more integrated approach that recognizes the interconnectedness of the SDGs. As we move forward, it is imperative to align these multi-dimensional efforts more closely to create a more equitable and sustainable world for all.

(25) *For more information, see here:* ***<https://dashboards.sdgindex.org/map/goals/SDG1>*** *[Accessed 08 March 2023]*

CHAPTER 02

Situating ICTs in Development

There is not yet—and perhaps there won't be—a harmonised definition on what Information and Communication Technologies for Development (ICT4D) are. Technology as such is designed by humans, is used by humans, is adopted and re-appropriated by humans in different contexts around the world—its complexity is, therefore, inherently shaped by human perspectives, values, and experiences. Nonetheless, there are numerous attempts to provide definitions of ICT—as well as ICT4D—however, these definitions are not fixed or immutable. They change together with technological evolution and advancements. The speed at which technological evolution and advancements are made is unprecedented. In 2001 more information could be sent over a single cable in a second than in 1997 was sent over the entire Internet in a month (Gilder 2000, as cited in Human Development Report 2001).

The United Nations Development Programme's (UNDP) "Human Development Report 2001: Making New Technologies Work for Human Development." defined ICTs as following:

> Information and communications technology involves innovations in microelectronics, computing (hardware and software), telecommunications and opto-electronics—micro-processors, semiconductors, fibre optics. These innovations enable the processing and storage of enormous amounts of information, along with rapid distribution of information through communication networks.

Richard Heeks - (1999) defined ICTs as "electronic means of capturing, processing, storing, and communicating information".

One can notice from the definition above how "ICT" without "D" is purely a technical discipline. It is the "D" of development that contaminates this technical discipline with a humanistic one. World Bank's "ICT in Agriculture: Connecting Smallholders to Knowledge, Networks, and Institutions" (2016) refers to ICT4D as following:

> Information and Communication Technology for Development (ICT4D) refers to the application of ICTs toward social, economic, and political development, with a particular emphasis on improving outcomes for poor and marginalised populations in low- and middle-income countries.

Computer scientist and international development researcher, Kentaro Toyama (2015) refers to ICT4D as "the use of digital technologies to promote social and economic development in the developing world".

Within the Master programme "ICT for Development and Social Good"[(26)] —ICT4D is defined as the following: "The practical application of knowledge of the intersection of computation, data, and networks for social transformation and the provision of assistance during and after a crisis[(27)]."

Once the "D" of development enters into play, the ICTs are situated as means through which the Majority World[(28)], the poor, the marginalised can be empowered. The technological advancements, indeed, have always been a key element in the development discourse.

The complexity of ICT4D, as a multidisciplinary field drawing knowledge and insights from multiple distinct areas of study, relies on the fact that the field draws upon various disciplines to explore how ICTs can contribute to sustainable development and improve the lives of people in underserved areas. The main fields from which ICT4D draws are the following[(29)]:

(26) *The Master programme "ICT for Development and Social Good" it's the first Master in Italy dedicated to ICT4D and it has been active since 2018. More information can be found here:* ***https://www.ictforsocialgoodmaster.eu/***

(27) *We owe this definition to Joshua Harvey who lectures two courses at the Master programme: Technology for Development and Social design.*

(28) *In this research, we use "Majority World" as a substitute for other terms such as "developing countries" or "low-income countries." However, when these terms appear in citations, we retain the original wording without modification.*

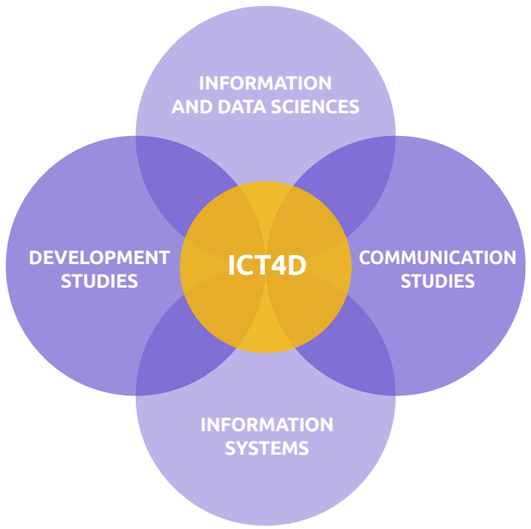
(29) *This framework is slightly adapted from Richard Heeks' Therozing research (2007)*

- **The I of ICT4D** draws from information and data sciences.
- **The C of ICT4D** draws from communication studies.
- **The T of ICT4D** draws from information systems.
- **The D of ICT4D** draws from development studies.

Now that we have looked at various definitions of ICT4D, we can summarise as following:

- ICT4D is a transdisciplinary field that draws from information and data sciences, communication studies, information systems, and development studies.
- ICT4D encompasses a wide-range of technological infrastructure spanning from telecommunications networks to hardware and software computing;
- ICT4D aims to leverage the knowledge from the aforementioned disciplines and utilise innovations in technological infrastructure to enhance, improve, and empower the development of marginalised populations worldwide. Additionally, it strives to provide assistance during and after an emergency crisis[30].

Figure 2.1: Transdisciplinarity of ICT4D



But, where can we locate ICT4D timeline-wise? How did ICT4D evolve over decades? At the practical level, what was the impact of ICT4D initiatives?

Richard Heeks (2019: 2) identifies three main periods of ICT4D. Although, there is no dividing line or a consensus where one ends and the other begins, they help us identify and cluster main developments, challenges and impact that ICTs had on the development sector.

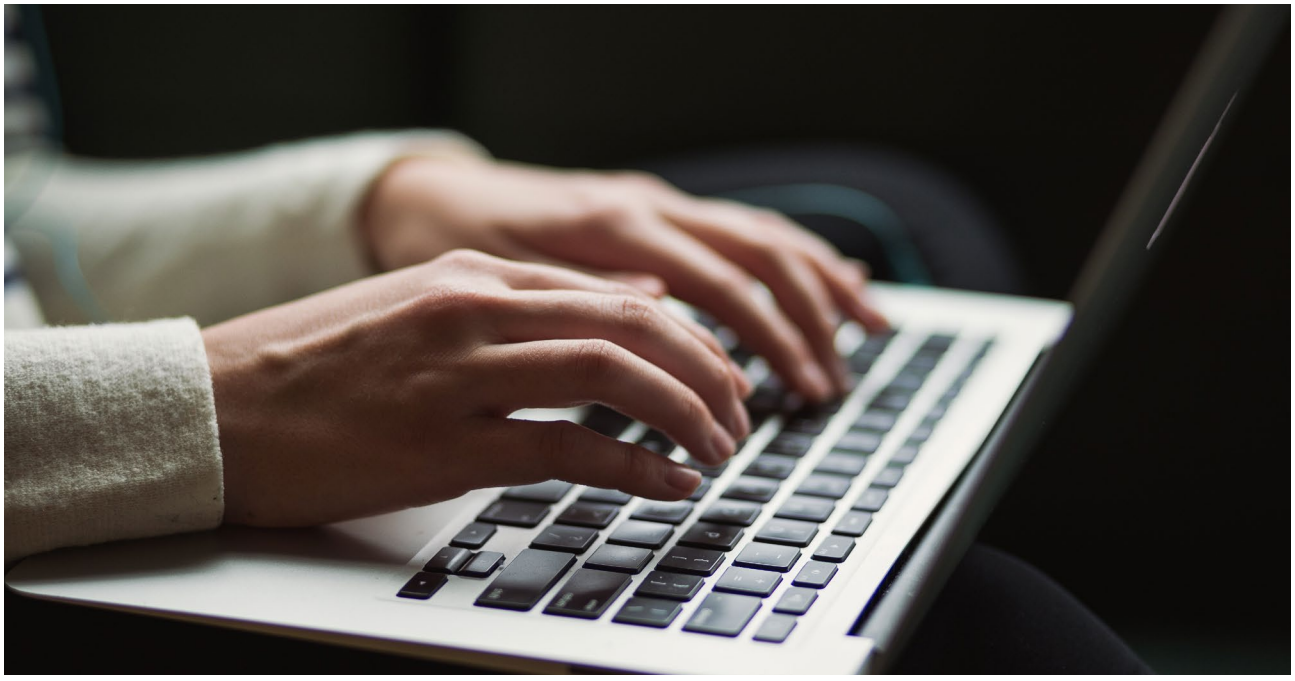
1. **ICT4D 0.0** – which spans from 1960s until mid-1990s and predates modern technologies.
2. **ICT4D 1.0** – covers the period between mid-1990s until mid-/late-2000s and it is centred around the concept of Internet-connectedness and telecentres.
3. **ICT4D 2.0** – encompasses the period between mid-/late-2000s until the present times and it represents, perhaps, the peak of deployments of ICTs in development. This period is accompanied also by the rise of Web 2.0.

The rise of new technologies such as Artificial Intelligence (AI), blockchains, metaverses, drones, etc.—gave birth to a new type of Web known as Web 3.0. These technologies, as

(30) *It should be noted that a large part of the ICT4D initiatives are employed in humanitarian programming and contexts, such as: natural disasters, health-related disasters, (civil) wars, etc..*

we will see in the next sections, are certainly influencing the development sector too. Are we witnessing, thus, the birth of a new phase of the ICT4D, that is, ICT4D 3.0? The same question is explored by Heeks (2019) where he argues that "we could talk of a paradigmatic shift" and suggests that the ICT4D 3.0 "could be collated as a new "digital-for-development" paradigm".

In the next sections we will explore how ICTs evolved, were situated, and deployed in various parts of the world to help development agendas during each of the periods.



ICT4D 0.0 – introducing IT4G

In the period between 1960s until mid-1990s – which, according to Heeks, is identified as the period of ICT4D 0.0 – we cannot speak really about ICT in the classical sense, but instead of Information Technology (IT). Why?

Because the Internet was expensive technology and it required extensive infrastructure that very few could afford. The '70s, the majority of Internet use was for e-mail discussions. Between the 1970s and 1990s, however, four technological milestones significantly contributed to the widespread adoption of the Internet.

- **Internet Protocol:** in the late '70s Vint Cerf and Robert Kahn came up with a networking standard known as Internet Protocol (IP). This service brought new growth in connecting new computers through the Internet network.

- **Domain Name System (DNS):** Between the 1960s and 1970s the Internet was mainly used within the academic sector. The invention of the Domain Name System (DNS) by Paol Mockapetris in 1983 marked a significant milestone in the expansion of the Internet beyond its academic origins. Domain Name Service allowed for more dynamic and distributed name service for the world's online websites. This address system is still in use today, for example: .com, .org, .edu, and many more.

- **World Wide web (WWW):** Tim Berners-Lee developed the World Wide Web in 1991 as a means for individuals to exchange information. The utilisation of the hyper-text format within his Web significantly improved the usability of the internet since all documents could be viewed on-screen without the need for downloading.

- **Web browser:** In 1993, Marc Andreessen introduced Mosaic, the first software known as a "browser". Its introduction led to a more seamless experience for internet users, with the ability to easily view images and graphics online, and opened up a whole new world of possibilities.

While the first digital computer put to use in a developing country was installed in Kolkata in 1956 at the Indian Institute of Statistics for scientific calculation work (Heeks 2008: 26), in the rest of the Majority World Internet was mainly used by governments as part of internal administrative functions of the public sector. Additionally, during the period of ICT4D 0.0, IT was seen as a tool for delivery of economic growth in the private sector. We might thus christen this "ICT4D 0.0" period IT4G – Information Technology for Government; then overtaken by information technology for growth (Heeks 208: 2).

The challenge of connecting the Majority World to the Internet remained twofold: a lack of access to electricity made it challenging to distribute and adopt the internet, and the lack of connectivity infrastructure hindered the delivery of the internet to people's homes.

Nonetheless, by the late 1990s, thanks also to the aforementioned technological inventions, the Internet had opened new horizons about what is to come in the next decades. Peter Huber, a senior fellow at the Manhattan Institute, quoted in a 1992 Forbes article titled "An Ultimate Zip Code'', would claim the following:

> Combine GPS with a simple transmitter and computer ... If you want to track migratory birds, prisoners on parole or – what amounts to much the same thing – a teenage daughter in possession of your car keys, you are going to be a customer sooner or later[31].

What Huber visioned in this 1992 interview is precisely what is happening in today's hyper-connected world: the emergence of citizen science movement is using low-cost open source

(31) *[As cited in] Anderson J. Q., 2005, Imagining the Internet: Personalities, Predictions, Perspectives. Maryland. US: Rowman & Littlefield Publishers.*

ICT4D 0.0 – introducing IT4G

devices to investigate environmental pollution or biological sensing; large number of prisons are using technologies to track prisoners; and a growing number of car insurance companies are equipping cars with small GPS tracking devices known as 'black boxes' providing real-time analytics on any journey.

David Porush, a professor at the Rensselaer Polytechnic Institute, in a 1992 speech for the Library and Information Technology Association, stated that:

> If cyberspace is utopian it is because it opens the possibility of using the deterministic platform for unpredictable ends …[32]

As Heeks (2008: 2) argues, the ICT4D 1.0 period emerged in the late 1990s due to two significant developments: the expansion of the Internet, or "cyberspace" as David Proush called it, and the Millennium Development Goals (MDGs).

The Internet was constantly looking to expand its applicability in other parts of the world and sectors, while the MDG Agenda was seeking to deploy new Internet inventions in the Majority World as a solution to help those most in need. It was an organic marriage between the two during the dot-com boom[33]. The wind of change had arrived in development.

(32) *Idem.*

(33) *The dot-com boom (or dot-com bubble) occurred during the late 1990s and lasted from 1995 until its peak in 2000. This period was characterised by a significant increase in Internet adoption, a surge in available venture capital, and the exponential growth of valuations in new dot-com startups. It was also marked by a stock market bubble.*

ICT4D 1.0 – The wind of change: embracing technology in development

The rising success of the dot-com boom in the United States of America and Europe had opened the doors for development practitioners to think about the adoption of such a success. Traditional communications technologies such as TV, radio, and newspapers were viewed as outdated, while alternative projects such as community radios and participatory videos were not deemed attractive enough for key actors in the development sector.

On the other hand, we can see the growth of Internet users in Majority World. For example, in 1998, less than one out of every 100 inhabitants in developing countries was an Internet user. By 2008, that figure was 22 out of every 100. In 1998, 2 of every 100 inhabitants in developing countries were mobile phone subscribers. By 2008, that figure was 55 out of every 100[34].

These figures suggest that the digital divide between the developed and Majority World world has narrowed between mid-/late-1990s and mid-/late-2000s, potentially enabling new opportunities for economic and social development. However, it is important to note that access to technology does not necessarily equate to its effective use, and issues of infrastructure, literacy, and affordability still pose significant challenges in many parts of the Majority World.

But the wind of change has arrived, consequently, this trend prompted key actors and practitioners in international development to explore opportunities to utilise the technologies of the 1990s in the service of development goals, particularly of the poor. But in order to do so, the development actors needed new knowledge and meaning—that is, discourse— about the use of such technologies in development. This is how a number of publications, events, programmes and project funding came to operationalise in order to bring the ICT4D discourse into the light. This is how Richard Heeks traces the emergence of ICT4D discourse:

> The digital technologies of the 1990s, then, were a new tool in search of a purpose. Development goals were new targets in search of a delivery mechanism. That these two domains should then find each other was not unexpected.
>
> They gave rise to ICT4D in flurry of publications, bodies, events, programmes and project funding: the 1998 World Development Report from the World Bank, highlighting the role of information, knowledge and ICTs in development; the creation by the G8 countries of the Digital Opportunities TaskForce in 2000, setting an agenda for action on ICT4D; and the World Summits on the Information Society held in Geneva in 2003 and Tunis in in 2005, acting as key learning and policy-formation points along the ICT4D path.
>
> The key actors became international development organisations and NGOs (non- governmental organisations); and the priority application of ICTs was to the MDGs. Centrally, the MDGs are about improving the lives of what Prahalad has called the "bottom of the pyramid": the four billion majority on the planet who live on an average of less than US$2 per day[35].

However, the promises of technologies to help the “bottom of pyramid” fell short. Drawing from a wide range of literature (Heeks 2008; Leach, Scoones 2006; Brewer, Demmer, et. al. 2005) we can summarise the following shortcomings of the ICT4D 1.0 initiatives:

- **Technological fixes:** most of the projects and pilots during the period of ICT4D 1.0 aimed at using quick technological fixes. The problem with this techno-centric approach was that it ignored social, cultural and institutional contexts in other parts of the world. The technologies ‘transported’ in the countries of the Majority World were designed by and for the industrialised world. Instead of encouraging bottom-up participatory process of development—the innovation model that it applied was that of ‘pro-poor’, that is, innovations were done outside of poor communities but on behalf of the poor (Heeks 2008: 7).

- **Design—reality gap:** one of the most pervasive ICT interventions in this period has been telecentres. Telecentres are strategic facilities where ICT-based services

(34) *ITU. ICT Statistics Database, International Telecommunication Union, Geneva, 2009.*

(35) *Heeks R., 2008. ICT4D 2.0: The Next Phase of Applying ICT for International Development. IEEE Computer, 41(6), pp 26-33*

ICT4D 1.0 – The wind of change: embracing technology in development

and applications are accessible to the public (Mukerji, 2008). Telecentres seek to help integrate marginalised citizens into the wider community and empower them with information and growth opportunities (Chawinga & Ngwira, 2015). They were the archetype of the 'pro poor' innovation model: they could be installed fairly quickly; could provide tangible evidence of achievement; could deliver information, communication and services to poor communities (and could provide sales for the ICT companies who were partners in the most ICT4D forums) (Heeks 2008: 3). The problem with such initiatives – and here we can also include One Laptop Per Child (OLPC) – is that it easily runs into the danger of "design—reality gap": a mismatch between the assumptions and requirements built into the design, and the on-the-ground realities of poor communities (Heeks 2008: 8).

? **ICTs as an isolated bubble:** during ICT4D 0.0 period most development policy- and programme-makers tended either to ignore IT (as it then was) completely, or to isolate it from the mainstream of development into separate policies and ministries (Heeks 2008: 12). In the ICT4D 1.0 period, there was limited interaction between disciplines, such as computer science, information systems, and development studies, that converged and contributed to ICT4D. Development studies had generally turned away from technology in the 1980s, and as a result, ICT4D remained isolated from the development mainstream, which remained sceptical about new technology (Heeks 2008: 10). The lack of authentic engagement between these three disciplines has isolated ICTs from the development's perspective, consequently, hindered the ICT4D's impact to the "bottom of pyramid".

Box 2.1 "One Laptop Per Child": its strength was its weakness

In 2005, Nicholas Negroponte founded the non-profit One Laptop Per Child (OLPC) organisation, which designed and built a $100 XO laptop. The organisation leveraged $1 billion of investment and partnerships with individuals, UN agencies and private companies like eBay, Red Hat, Google and News Corporation to pursue a broad goal of providing a "rugged, low-cost, low-power, connected laptop" computer for each primary-school child in Majority World.

However, three unique conditions had to be met:

1. Low power: since these laptops were going to be deployed in developing countries, low power was the key because most children do not have electricity at home.
2. Sunlight readability: the laptop needed to run on both human power and long-life batteries. Sunlight-readable displays were important for outdoor use as well as power conservation.
3. Automatic connectivity: lastly, connectivity could not assume DSL, WiFi hotspots, or anything similar. Instead, the laptops collectively had to make a network automatically, without a child or teacher intervention. That way roughly 500 children should be able to share a single point of backhaul to the Internet (S. Coomar, I. Ryzhov: 1).

According to OLPC Foundation, five principles were designed to safeguard the good use of XO laptops[(36)]:

1. Children are the owners of the laptop;
2. Beneficiary children are aged 6-12;
3. Every child and teacher receives a laptop;
4. Children are connected through a local network or the Internet; and
5. Software is open-source and free.

Even though the initiative's strengthness to respond to various contexts, specifically in countries of Majority World, it also turned out to be its weakness too. Here we can learn from development studies, that is, the contextual differences are too wide even within Majority World. We live in pluriversal world, a world where many worlds fit (A. Escobar 1995: xxviii). Perhaps, OLPC's shortfalling comes from the idea of generalising the Majority World as one singular unity, instead as many worlds—as pluriverse.

Without doubt OLPC succeeded in numerous 'worlds' such as, for example, in Nigeria's Galadima, in Uruguay or Solomon Islands. But, on the other hand it had failed in other parts of the world such as Peru, India and Ethiopia, to mention some[(37)].

Ultimately, OLPC represent one of such innovations that Heeks classified as 'pro-poor'—an innovation that belongs to ICT4D 1.0 period and that is done outside of poor communities but on behalf of the poor. While in some countries it worked, in others it fell into the trap of design-reality gap. And its lack of engagement particularly with the development field reduced it into a mere technological fix. As Tony Fry writes, "the world of the South has in large part been an ontological designing consequence of the Eurocentric world of the North (Fry 2017: 49, as cited in, Escobar: 2018). The OLPC is one such example.

(36) *OLPC Five Principles, 2013. [online] Available at:* ***<https://wiki.laptop.org/go/OLPC%3AFive_principles>*** *[Accessed 13 May 2023]*

(37) *For more in-depth insights about OLPC's successes and failures,see "A Short Case Study of the Impacts of the OLPC Project around the World"*

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By mid-late 2000s Web 1.0[38] was slowly dying, and a new Web was rising—Web 2.0. Thanks to hypertext transfer protocol (HTTP) and other innovations, the Web 2.0 started to act as a social web and allowed for more dynamic interactions between users enabling them to generate content. During the previous ICT4D 1.0 period participation was defined as access and connectivity; whereas, in ICT4D 2.0 period the connotations attached to the idea of participation shift: now collaboration and social interaction have become its core elements (Schäffer 2011: 31). In other words, people turned from 'passive downloaders' of Web 1.0 into 'active uploaders' of Web 2.0.

The success of a Web 2.0 platform depends on a large group of users providing data and media content (O'Reilly, Battelle 2009). Many media practices enabled by Web 2.0 applications were developed earlier, but easy-to-use interfaces in popular applications have led to an amazing increase of user-generated content (Schäffer 2011: 35). As Clay Shirky claimed 'communication tools don't get socially interesting until they get technologically boring' (Shirky 2008). Shirky's assumption is correct in the sense that when communication technologies are user-friendly and easy to use and deploy, user's participation in media and data production will undoubtedly increase.

The Internet's transformation from Web 1.0 to Web 2.0 has transformed development models and structures too. Richard Heeks, in his article "Development 2.0: the IT-enabled transformation of international development" has identified three categories of such transformation, which will be summarised in the table below.

(38) *Web 1.0 term is used to describe the earliest form of Internet. Web 1.0 due to its costs allowed few people writing content and owning webpages for a larger number of people. Hence its model was a "read-only" web in the form of a static web.*

Table 2.1: ICT4D 2.0's new transformation model

Category	Summary	Example
New Relations	Connecting the excluded: IT has the potential to bridge historical barriers and connect the world's poor, enabling access to valuable informaation, suppliers, customers, and distant social connections crucial for economic opportunities.	Babajob (http://www.babajob.com), is a networking site on which potential employers in urban India can post details of lowskilled, informal sector job like cleaners, cooks and the like. To reach beyond those with Internet access, the system sends job alerts via SMS to those who might be looking for such a job, or who might know someone who is.
	Disintermediating: in cases where the poor are not disconnected, their connections are frequently mediated by unreliable gatekeepers, such as corrupt officials for accessing government services, usurers for obtaining finance with exorbitant interest rates, or infrequent visits from agricultural extension officer for accessing assistance.	The Bhoomi project has provided e government services in India's Karnataka state since 2001; for example issuing land ownership certificates to farmers who need these to obtain bank loans.
New Roles	Digital production: the increasing diffusion of IT is providing the poor with access to the means of production for digital economy, offering transformative opportunities for earning a living and breaking free from the cycle of agriculture and poverty.	Txteagle (http://txteagle.com) is an example that brings crowdsourcing to the mobile phone base in Kenya. It takes simple tasks suitable for a voice and SMS phone and outsources them in bite-sized components to those who have both a mobile and time on their hands.
	Digital innovation: the diffusion of IT is empowering the poor by providing them with access to means of production for a digital economy, creating transformative opportunities for breaking free from agriculture and poverty through new avenues of income generation. They have appropriated the technology to such an extent that they start to do new things with it.	Many such uses are digital memes: ideas that originated somewhere; perhaps simultaneously in the slum areas surrounding most Third World cities that are crucibles of both poverty and creativity. Beeping (or flashing) is one such: hanging up a call before it is answered. This has developed into a free messaging system.
New Models	Collective power: despite having collective strength and the ability to collaborate effectively, expressing their collective power to external entities, such as the government, poses challenges for many impoverished communities.	In Belo Horizonte, Brazil, the city government allocated a US$11m decision to an online vote of ordinary citizens; who were given a choice between spending money on a new sports complex, library, street renewal, or commercial centre regeneration. This "e-participatory budgeting" initiative drew in more than 500,000 votes (the sports complex won); seven times more participants than seen with earlier non-IT-based participatory budgeting.
	Social enterprise: impoverished communities often face the dilemma of being overlooked by commercial models due to perceived lack of resources, while developmental models brought by the government may lack dynamism, breed dependency, and suffer from inefficiency or corruption.	IT has enabled the use of social enterprise; for example allowing the growth of "social outsourcing", which sub-contracts IT work to the urban and rural poor in a deliberate attempt to create new livelihoods. The Kudumbashree initiative in India's Kerala state has been a leader in this, diverting the state government's data entry, digitisation, IT training, and PC assembly and maintenance work to social enterprises created by groups of unemployed women from below poverty line families. By 2010, the project's results had been the creation of around 2,500 new jobs that have pulled hundreds of households out of the poverty trap.

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While ICT4D period 1.0 was characterised by large-scale hardware and operating system innovations originating from the 'Global North' and aimed at addressing the needs of the bottom of the pyramid, such as initiatives like OLPC or PlayPump, the ICT4D 2.0 period witnesses innovations occurring on a smaller scale, involving the adaptation or application of existing technologies (Heeks 2008: 7). This shift is exemplified by the examples provided in the table above.

Nonetheless, ICT4D 2.0 is accompanied also by two other elements. The first is the innovation model which in the ICT4D 2.0 period is what Heeks identifies as per-poor innovation, that is, innovation occurs by and within poor communities – not in the traditional laboratory or R&D sense of the term, but in the sense of adapting and applying the technology in a new way (Heeks 2008: 8). This brings us to the second element which is the ability of the poor in the Majority World to engage with the technology affordances.

Introduced by Hutchby (2011), the concept of technology affordances as a non-deterministic perspective acknowledges the unique material characteristics of technologies while allowing for diverse interpretations and uses. For example, "[...] a given technological form (for instance, a bridge) can be represented in at least two competing ways (for example, as means of carrying people over a road or as an instrument for the perpetuation of racial inequality[39]". This framework emphasises the importance of understanding how the inherent properties of technologies shape and influence human actions and interactions, without imposing rigid determinism on their outcomes.

The transformations influenced by ICT4D 2.0 are, perhaps, a consequence of the affordances and its relational ontology, [and] the ontological differences in affordances are due to two contradicting perspectives: design vs use[40]. In other words, affordances are neither an outcome of the artefact alone nor the actor alone, but of the interaction between the actor and the artefact [41]. Some 'anecdotal' examples that highlight the relational ontology of technological affordances, that is, the contradictory differences between the design vs use of certain technologies can help understand how poor themselves have made some unexpected adaptations to those technologies. Such examples[42] include:

- Beeping (or flashing) that allows messages to be communicated without call being completed. Street vendors use this to receive free "I want to buy now" messages from known customers.
- Use of airtime as currency has allowed mobile phones to metamorphose into mobile wallets. Those who own phones in poor communities have therefore been able to use them for payments or for receipt of remittances from distant relatives.
- Back-street rechipping of phones. Informal-sector enterprises are emerging that strip and resell their circuitry from high-end phones, replacing it with basic call-and-SMS-only functionality. They then sell the resulting high-end-body-with-low-end-organs as a unique hybrid for those who want the latest look but lack the budget to match.

In conclusion, the transition from ICT4D period 1.0 to ICT4D 2.0 has brought about significant changes in the approach to technology adoption and innovation within development contexts which can be summarised as following:

- The first change is the shift towards smaller-scale adaptations instead of large-scale large-scale hardware and operating system innovations and applications of existing technologies.
- The second change relates to the innovation model, where the shift has moved from concept of pro-poor innovation (innovations were done outside of poor communities but on behalf of the poor) into per-poor innovation (innovation occurs by and within poor communities).

(39) *Hutchby I., 2001. Technologies, Texts and Affordances. [pdf] Available at:* ***<https://journals.sagepub.com/doi/10.1177/S0038038501000219>*** *[Accessed 18 August 2023]*

(40) *Stendal, K., D. Thapa, and A. Lanamäki, 2016. Analyzing the Concept of Affordances in Information Systems, 49th Hawaii International Conference on System Sciences (HICSS). IEEE.*

(41) *Van Osch, W. and O. Mendelson, 2011. A typology of affordances: Untangling sociomaterial interactions through video analysis.*

(42) *These examples were described first by Richard Heeks, 2008. ICT4D 2.0: The Next Phase of Applying ICT for International Development, IEEE Computer, 41 (6), 26-33.*

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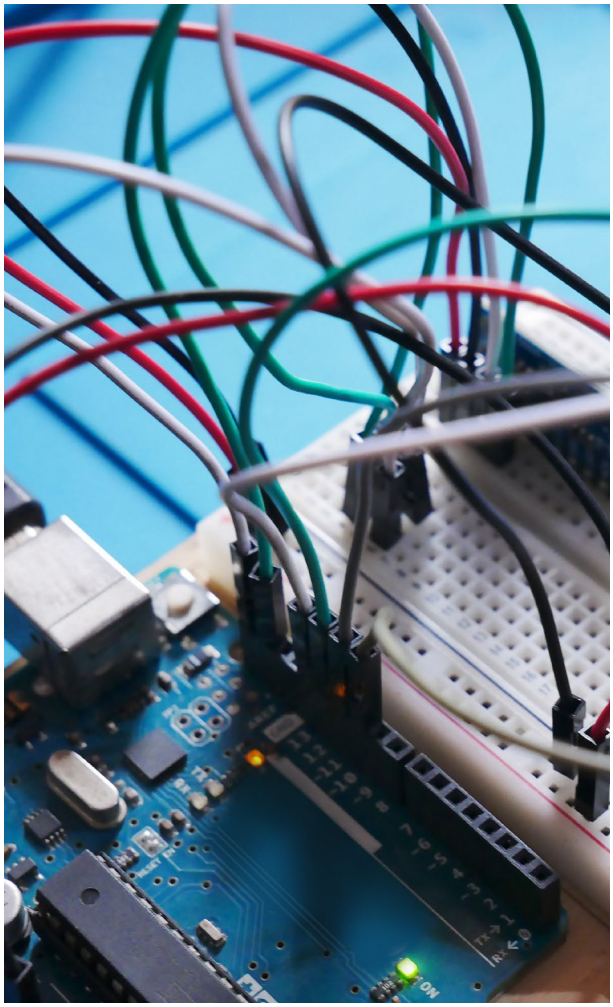
? And ultimately, the interpretation of technology affordances, has highlighted the agency and creativity of marginalised communities in utilising technology in ways that suit their specific circumstances and aspirations. This shift towards a more context-sensitive approach has enabled marginalised communities to have a certain degree of control and ownership over the technologies they employ for development purposes.

The next section will delve into the period of heightened expectations and hype surrounding ICT4D in the year 2010, exploring the implications and challenges that emerged during this time. By examining the 2010 hype, we can gain valuable insights into the complex dynamics between technology, development, and the aspirations associated with ICT4D initiatives, and perhaps provide a clearer picture in terms of situating ICTs in development.



The rise and the fall of the 2010 innovation hype in development

A hype is a situation in which something is intensely (and extravagantly) advertised, discussed and promoted in order to attract everyone's interest. The 2010 represented the start of the innovation hype in the development sector. The hype was intensified thanks also to the success that Web 2.0 was having at that time—promoting new types of collaborations, opening new opportunities for businesses, facilitating user-generated content and social networking, and going as far as being influential instruments in social unrests such as Arab Spring and Occupy Movement.

The 2010 hype surrounding ICT4D was accompanied by four main transformations in the development sector. We need thus to further examine these transformations in order to gain a better understanding of their impact and implications in the development sector.

Technologies for Development

During the 2010 hype in the development sector, the proliferation of technological buzzwords became prevalent and played a significant role. The development community witnessed a surge in interest and enthusiasm surrounding emerging technologies, particularly in the field of data, Internet of Things (IoT), "cloud"-ing, wearables, open-source technology, crowdsourcing and crowdmapping, as well as frontier technologies such as Artificial Intelligence (AI), virtual reality (VR) and augmented reality (AR), blockchain, drones and others. Phrases like "data-driven development," and "big data for sustainable development" were often used to convey the potential transformative power of technology in addressing complex development challenges. Yet, as observed in previous periods, technology alone, despite the excitement, doesn't guarantee positive social transformation. The need for more bottom-up, participatory development and the recognition that simply placing technologies in communities without considering their specific needs, human factors, and the surrounding context, and expecting them to magically solve problems, was evident.

This lesson thus was accompanied by the shift that international organisations made towards engaging with processes such as participatory co-design in encouraging more inclusive and human/community-centred policies, programmes and services. The first organisation which started to think about consolidating, formally, the failures of the past into a set of guiding principles is UNICEF.

In 2009 the organisation launched "The Principles for Innovation and Technology Development. The principles may be also a response to failure like that of UNICEF's 2007 initiative QOWA (meaning "strength" in Arabic) initiative. This ambitious project aimed to provide quality education to children affected by the Iraqi conflicts and to create a community of learners and teachers using a blend of straightforward technological solutions[(43)].

Following UNICEF, in 2012 the UK Government too launched their own "Digital Service Design Principles"[(44)].

However, in order to prevent a spillover of principles, ethics, and guidelines from other organisations, governments, and sectors—in the same year, international donors and multilateral organisations met to synthesise existing guidelines for institutionalising lessons learned in digital development.

The Principles for Digital Development were thus created[(45)]. By 2015, an endorsement campaign for the Principles was launched by USAID and 54 international organisations endorsed them in the first year.

(43) *In a series of three blog posts titled "Learning From Failures", Zhiyao Ma, an analyst at UNICEF's Innovation unit shares reflections about the organisations' failure in Iraq. [online] Available at:* ***<https://www.unicef.org/innovation/stories/learning-failures-part-1>*** *[Accessed 22 May 2023].*

(44) *UK Government, 2012. Government Design Principles' [online] Available at:* ***<https://www.gov.uk/guidance/government-design-principles>*** *[Accessed 22 May 2023].*

(45) *"Principles for Digital Development" are nine living guidelines that are designed to help integrate best practices into technology-enabled programs and are intended to be updated and refined over time. More information available at:* ***<https://digitalprinciples.org/>*** *[Accessed 22 May 2023].*

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Box 2.2 UNICEF's RapidSMS in Improving Healthcare Delivery

In 2007, UNICEF implemented a groundbreaking initiative known as RapidSMS to enhance healthcare delivery in several countries. RapidSMS was built as an open source platform and utilised the widespread availability of mobile phones to establish a real-time communication system between healthcare providers and communities in remote and underserved areas. One notable case was its implementation in Zambia, where the country faced significant challenges in providing timely healthcare information to its population. UNICEF partnered with the Zambian Ministry of Health to develop a comprehensive RapidSMS platform, enabling the transmission of vital healthcare information and facilitating the coordination of health services[(46)].

The impact of RapidSMS was substantial. Healthcare providers could send and receive important messages regarding disease outbreaks, immunisation schedules, and maternal and child health directly to community members via SMS. This real-time information exchange significantly improved the accessibility and effectiveness of healthcare services. For example, pregnant women received reminders about antenatal care visits and important health tips, leading to increased attendance and improved health outcomes. Additionally, RapidSMS enabled communities to report potential disease outbreaks promptly, allowing authorities to respond swiftly and contain the spread of diseases[(47)]. The use of RapidSMS also enhanced the efficiency of the healthcare system by reducing the need for physical paperwork and streamlining data collection, analysis, and reporting processes.

Another compelling case involving RapidSMS took place in Malawi, where the initiative targeted the improvement of education outcomes. UNICEF partnered with the Malawian Ministry of Education to deploy a mobile-based RapidSMS system to monitor school attendance and performance. Teachers were equipped with mobile phones and could easily report student attendance using simple SMS messages. This system facilitated real-time monitoring and enabled education officials to identify schools or regions with high rates of absenteeism, allowing for targeted interventions and support. As a result, school attendance improved significantly, and the system contributed to the reduction of drop-out rates, ensuring children's continued access to education.

UNICEF's impleme+ntation of RapidSMS demonstrated the potential of leveraging mobile technology for effective communication, data management, and service delivery in challenging contexts. The successful deployment of RapidSMS not only showcased the value of innovative solutions but also highlighted the importance of adapting and utilising existing technologies, guided by the Principles of Innovation and Technology Development, to effectively address development challenges.

As stated in the “Innovation Case Study” (2019: 17) published by the UNICEF’s Evaluation Office, RapidSMS' success is credited also to the partnership that UNICEF built with a number of firms and organisations, particularly with “frog”, a global innovation firm that supports organisations with product design and development. Over a period of six months, “frog”, UNICEF and its partners aligned on common objectives and how the organisations would work together. Organisations aligned on issues such as end-user design, openness, and the open source approach and sustainability of the application. Alongside “frog”, a one-day workshop was held in Zambia, which brought together public health stakeholders and mobile operators to explore partnership structures. Throughout the design process, UNICEF worked closely with the Ministryof Health in Zambia to understand the potential value generated through a real-time information management system and to inspire a vision for a data-enabled health system.

However, as Richeard Heeks argues (1999: 3) the technology itself and the information on which it operates cannot sit in the vacuum, [but] it exists within an ‘environment’ of institutions (organisations, groups, markets) and of influencing factors (political, economic, socio-cultural, technical and legal). It is thanks to this 'environment' that such technologies are experimented with, deployed, accelerated, hyped, or downplayed. The 2010 hype expanded this 'environment' by opening new spaces for innovation.

(46) *UNICEF Innovation, 2015. Project Mwana: Using mobile technology to improve early infant diagnosis of HIV. [online] Available at:* ***<https://www.unicef.org/innovation/stories/project-mwana>*** *[Accessed 22 May 2023].*

(47) *Blaschke S., Alinaitwe Th., 2015. ICT Innovations Now Replicable. [online] Available at:* ***<https://www.unicef.org/innovation/stories/ict-innovations-now-replicable>*** *[Accessed 22 May 2023].*

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New Spaces for Innovation

Starting from 2010 there has been a proliferation of new spaces for innovation in the development sector—across NGOs, UN agencies, and bilateral and multilateral agencies. Such spaces include: innovation "labs," "units," "spaces", “hubs”, “centres”, “accelerators”, and so on.

They played a key role in amplifying and intensifying the 2010 hype. In what may have then been the apex of enthusiasm about innovation, the World Humanitarian Summit in 2016[(48)] made “transformation through innovation” one of four key themes[(49)].

But, what are these spaces? Who built them? What role did they play in deploying ICTs for development and social good? We will map and explore some of these spaces briefly, as delving into the details would be beyond the scope of this research. However, it should be emphasised that a comprehensive mapping and further research are needed to examine the role, impact, successes, and failures of such spaces in the development sector.

International Organisations

United Nations Children’s Funds (UNICEF) is considered as one of the early adopters of the ‘innovation culture’ by launching its first Lab models. Since 2007, UNICEF has established a dedicated innovation unit[(50)], which has expanded to include 14 (external) innovation labs worldwide by 2015. Notably, UNICEF launched the (internal) UNICEF Innovation Fund[(51)] in 2016, the first financial vehicle of its kind within the United Nations. This fund invests in early-stage, open-source, emerging technology and digital public goods with the potential to make a global impact, particularly benefiting children.

Another organisation which also embraced innovation as a means of driving development is the United Nations Development Programme (UNDP). In 2014, UNDP introduced the Innovation Facility[(52)], a funding mechanism that supports promising development interventions on the ground. Building upon the success of the "Inno4dev" initiative from 2015 to 2018 [(53)], UNDP established the "Innovation for Development" program in 2018. This program aims to enhance the skills and capacities of individuals, particularly young women and men, and institutions in the fields of innovation, entrepreneurship, and the Sustainable Development Goals (SDGs). Furthermore, UNDP has launched "Accelerator Labs"[(54)] in 91 locations, providing support to 115 countries worldwide.

The United Nations High Commissioner for Refugees (UNHCR) has been actively engaging with ICT4D and innovation technologies. In 2012 the UNHCR launched its Innovation Unit, a small team that aims to ‘amplify’ the good practice already happening in the agency, as well as to ‘connect’ people to solve problems and ‘explore’ solutions with new partners (L. Bloom, R. Faulkner 2016: 3).

Through initiatives such as the Innovation Service[(55)] — UNHCR has explored the use of technology to improve refugee assistance and protection. They have a role of ‘accelerator’ by supporting and funding external proposals for the innovation funds: Digital Innovation Fund, Data Innovation Fund, Environment and Climate Action Innovation Fund, and Refugee-led Innovation Fund.

The World Food Programme (WFP) has made significant strides in utilising ICT4D and innovation technologies to address hunger and food security. WFP’s “Innovation Accelerator” programme helped pilot new solutions and scale promising innovations to disrupt hunger[(56)]. These technologies enable efficient food distribution, market monitoring, and nutrition tracking, enhancing the effectiveness of WFP's operations and empowering vulnerable communities.

World Bank (WB) too initiated Innovations Lab which serves as catalyst, enabler and accelerator for World Bank Group staff to learn about and build expertise around emerging technologies’ potential to support the Sustainable Development Goals and the WBG’s Disruptive Technologies agenda [(57)].

(48) *UN General Assembly (Report of the Secretary-General for the World Humanitarian Summit), 2016. One Humanity: Shared Responsibility. [pdf] Available at: Report of the Secretary-General for the World Humanitarian Summit* ***<https://reliefweb.int/attachments/8585e24b-2262-38f4-8a83-33a7611d8e13/Secretary-Generals%20Report%20for%20WHS.pdf>*** *[Accessed 22 May 2023].*

(49) *Wells T., 2023. The rise and fall of innovation labs in the aid sector”. [online] Available at:* ***<https://devpolicy.org/the-rise-and-fall-of-innovation-labs-in-the-aid-sector-20230213/>*** *[Accessed 22 May 2023].*

(50) *Office of Innovation - UNICEF. [online] Available at:* ***<https://www.unicef.org/innovation/> [****Accessed 22 May 2023)*

(51) *UNICEF, 2016. UNICEF Innovation Fund to invest in technology startups. [online] Available at:* ***<https://www.unicef.org/turkiye/en/press-releases/unicef-innovation-fund-invest-open-source-technology-start-ups>*** *[accessed 22 May 2023]*

(52) *SDG Integration, 2014. UNDP Innovation Facility. [online] Available at:* ***<https://www.undp.org/publications/undp-innovation-facility>*** *[Accessed on 22 May 2023].*

(53) *UNDP, Innovation for Development. [Online] Available at:* ***<https://www.undp.org/arab-states/innovation-development>*** *[Accessed 22 May 2023]*

(54) *UNDP, Accelerator Labs. [Online] Available at:* ***<https://www.undp.org/acceleratorlabs>*** *[Accessed 22 May 2023]*

(55) *UNHCR Innovation Service - Innovation starts with People. [Online] Available at:* ***<https://www.unhcr.org/innovation/>*** *[Accessed 22 May 2023]*

(56) *World Food Programme - Innovation Accelerator. [Online] Available at:* ***<https://innovation.wfp.org/>*** *[Accessed 22 May 2023]*

(57) *World Bank - ITS Technology & Innovation Lab. [pdf] Available at:* ***<https://thedocs.worldbank.org/en/doc/724241569427635399-0250022019/render/WBGITSInnovationLabDigital.pdf>*** *[Accessed 22 May 2023]*

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Bilateral Agencies

As Tamas Wells argues[58] bilateral agencies also joined the rush of being part of the '2010 innovation hype'. This is how the United States Agency for International Development (USAID) started its "Global Development Lab" in 2014. The Lab served as an in-house innovation hub to "produce breakthrough development innovations by sourcing, testing, and scaling proven solutions to reach hundreds of millions of people" as well as "to accelerate the transformation of the development enterprise by opening development to people everywhere with good ideas, promoting new and deepening existing partnerships, bringing data and evidence to bear, and harnessing scientific and technological advances [59]."

A year later, in 2015, Australia's Department of Foreign Affairs and Trade (DFAT) launched "InnovationXchange" as the development innovation unit within the DFAT. The unit was assigned the responsibility of devising inventive and improved approaches to enhance the delivery of Australia's foreign aid program, with a focus on effectiveness and efficiency.

"Innosuisse"[60], the Swiss Innovation Agency, was launched on January 1, 2018. It is the Swiss federal agency responsible for promoting science-based innovation in Switzerland and supporting the transfer of knowledge and technology between research institutions and businesses.

Italy's Ministry of Foreign Affairs and Ministry of Education, University and Research launched, in 2012, a joint initiative called "Innovitalia". Designed in a format of an online portal, Innovitalia's main purpose is to "enhance the network of Italian researchers abroad, offering a space for networking and collaboration among the different actors of Italian research and innovation on the international scene, sharing information on opportunities for research, work and further education in different foreign countries[61]."

In 2015, the International Development Innovation Alliance (IDIA) was launched as a collaborative platform with the shared goal of "actively promoting and advancing innovation as a means to help achieve sustainable development [62]." The establishment of the Alliance included a number of OECD bilateral donors, NGOs,the Rockefeller Foundation, and the Bill and Melinda Gates Foundation.

In the humanitarian sector, the UK, Netherlands and Norway also supported a new innovation grant-making facility called the "Humanitarian Innovation Fund[63]" which was launched in 2011 whose mission is to improve humanitarian outcomes through partnership, research and innovation.

By 2016-2017, the majority of development agencies, spanning from Europe to the United States of America, Latin America to Oceania and Asia, had launched, to varying degrees, an 'innovation initiative'. These initiatives encompassed a range of models can you such as hubs, accelerators, labs, centres, funding mechanisms, and other similar endeavours.

Academia

Traditionally, the academic sector has played a pivotal role in fostering innovation and driving advancements in the ICT4D field through the establishment of various spaces for innovation, as well as research and development (R&D). Some of the notable examples are located in the United States, such as: the Berkman Klein Center for Internet & Society at Harvard University; Massachusetts Institute for Technology's Media Lab; Stanford University's Impact Lab; Development Impact Lab at the University of California, etc..

(58) *Wells T., 2023. The rise and fall of innovation labs in the aid sector". [online] Available at: <https://devpolicy.org/the-rise-and-fall-of-innovation-labs-in-the-aid-sector-20230213/> [Accessed 22 May 2023].*

(59) *USAID, Global Development Lab. [Online] Available at: <https://2017-2020.usaid.gov/GlobalDevLab> [Accessed 22 May 2023]*

(60) *Swiss Agency for Development and Cooperation, Innosuisse. [Online] Available at: <https://www.innosuisse.ch/inno/en/home/ueber-uns/auftrag.html> [Accessed 22 May 2023]*

(61) *Ministero degli Affari Esteri e della Cooperazione Internazionale, Innovitalia. [Online] Available at: <https://innovitalia.esteri.it/> [Accessed 22 May 2023]*

(62) *International Development Innovation Alliance. [Online] Available at: <https://www.idiainnovation.org/> [Accessed 22 May 2023]*

(63) *ELRHA, Humanitarian Innovation Fund. [online] Available at: <https://www.elrha.org/> [Accessed 22 May 2023]*

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In Europe, Global Development Institute at the University of Manchester has been fundamental in researching the role and the impact of ICT4D. Whereas, the King's College in London established the Humanitarian Technologies Lab to develop new technologies to deliver humanitarian assistance to people in need. The Barcelona Supercomputing Center (BSC) in Spain stands out as a hub for research and innovation in high-performance computing and data analytics. In Hungary, the Central European University (CEU) has launched the CEU InnovationsLab, an incubator and accelerator for startups in the ICT sector. Moving to Italy, the Polytechnic University of Milan founded the Internet of Things Lab (IoTLab) which serves as a research and experimentation hub focused on the Internet of Things (IoT) technologies and their applications in various domains such as smart cities, healthcare, and industrial automation. Aalto University in Finland has been actively contributing in the development sector through its Aalto Design Factory and Aalto Global Impact. Most notably in partnership with UNICEF, they launched initiatives in the health field such as the UniWASH [(64)] project aiming to co-create sustainable water and sanitation (WASH) innovations in Uganda; and CareSquare[(65)], a "Clinic-in-a-backpack" that enables healthcare services to get closer to mothers who would never visit health centres and not get access to medical care.

In the African context, the University of Cape Town's (UCT) Center for Information and Communication Technologies for Development (ICT4D) serves as a research and innovation hub, focusing on harnessing ICTs to address social and economic challenges in Africa. Through collaborations with international organisations and local stakeholders, UCT's ICT4D centre conducts research, develops innovative solutions, and provides training to empower communities in areas such as healthcare, education, and agriculture.

In Asia, the Asian Institute of Technology (AIT) in Thailand, which has established the AIT Entrepreneurship Center (EC) as a place for innovation, creation, and incubation to nurture and drive the entrepreneurial capabilities of AIT in collaboration with the industry to support the socio-economic development of the region. In the Middle-East In the Middle East, the Qatar Computing Research Institute (QCRI), which functions under the umbrella of Hamad bin Khalifa University (HBKU) has emerged as a leading academic institution fostering innovation in ICT4D.

Ultimately, in Latin America Pontificia Universidad Católica de Chile (PUC) has emerged as a prominent academic institution driving innovation for development through numerous collaborations with various stakeholders, including governmental organisations and NGOs, to leverage technology for social impact.

We acknowledge that numerous academic institutions worldwide have been actively engaged in the innovation space, and it is beyond the scope—and the possibility—of this research to cover all of them.

Private Sector

The private sector's involvement in the development cooperation can be located in the 'frontier' position between governments, bilateral agencies, international organisations and local non-profit organisations. In other words, it's part of the 'multistakeholder' environment, it interacts with all actors/stakeholders, but it does so from a position of (in)direct actor/stakeholder, often making available its resources and know-hows.

Figure 2.2 : Private sector's 'frontier' role in the development cooperation

(64) *UniWASH - Aalto Global Impact. [online] Available at: <https://aaltoglobalimpact.org/uniwash/> [Accessed 22 May 2023]*

(65) *UNICEF, 2013. Caresquare. [online] Available at: http://me310.aalto.fi/project/unicef/ [Accessed 22 May 2023]*

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This involvement is characterised by a diverse range of partnerships, collaborations, and initiatives that aim to address development challenges effectively. Two most prominent examples of the private sector's engagement in development cooperation is through corporate social responsibility (CSR) initiatives and the model of public-private partnerships (PPPs).

The involvement of the private sector in the development and international cooperation, however, has long been debated. Its positions and arguments are contrasting. One viewpoint acknowledges the success of the private sector in technological innovation. Many private companies have made significant advancements in various sectors, leveraging their resources, expertise, and market-driven approaches to develop innovative solutions.

However, the other contrasting viewpoint underscores the complex dynamics – including power relationships – between the public and private sector, and that, numerous academic scholars have been rather critical of the increased engagement of the private sector in development cooperation (Schulpen and Gibbon 2002; Kolk and Van Tulder 2006; Davis 2012; Tomlinson 2012; Di Bella et al. 2013; Kindornay and Reilly-King 2013; Blowfield and Dolan 2014 McEwan et al. 2017; Savelli, Schwartz, and Ahlers 2019, as cited in L. J. Hooli 2021). As Hooli argues (2021) the central point of this critique is that there is not enough connective fabric between the engagement of the private sector in development and the development impacts provided by them.

Despite this, in SDG 17 on means of implementation, governments included two targets under the subheading “Multi-stakeholder partnerships”, but even there they first committed to enhance the Global Partnership for Sustainable Development, only “complemented by multi-stakeholder partnerships” (target 17.16) and qualified the relevance of public-private partnerships by embedding them between public and civil society partnerships (target 17.17) (J. Martens 2019).

Nonetheless, with the rise of ICTs, the leading technology companies too have launched their own initiatives to get involved in the development efforts. Some of the early examples of such initiatives launched during the 2010s period include: Google’s Crisis Response and Google for Nonprofits programmes; Microsoft Philanthropies; Amazon Web Services (AWS) for Nonprofits and Disaster Response; Facebook’s Data for Good. Bill & Melinda Gates Foundation also have contributed in expanding the research efforts in global health by launching The Grand Challenges initiatives.

Events and movements

Lastly, the 2010 innovation hype was further intensified through the explosion of various events such as hackathons, datathons, wikithons, ideathons, start-up weekends, appathons, game jams, social innovation camps, and more.

These events typically span between 24 to 48 hours, although larger global hackathons may extend over multiple days. They became a fundamental part of the development vocabulary, often accompanied by the discourse of ‘open and social innovation’, ‘civic-led initiatives’, ‘co-designing process’, and ‘participatory digital development’.

During these events, participants from diverse backgrounds come together and form teams to tackle social challenges using technology. The primary goal is to develop a minimum viable product within the given timeframe. These events typically conclude with the recognition of winners who may receive seed funding and additional support to further develop their ideas.

These events align with the ethos of Silicon Valley start-ups, encapsulated in the mantra of "move fast and break things." The underlying idea of such events – with some exceptions – relies on the belief that by approaching social challenges disruptively, often using methodologies of start-ups (i.e. agile approach, A/B testing, lean design, prototyping, etc.), and combined with high-end technologies, some of the most pressing social problems will be resolved. However, one of the key challenges arises after the event concludes when participants return to their everyday lives. The subsequent efforts to build and consolidate the prototypes developed during the event encounter the complexities and intricacies involved in solving real-world social problems. Despite these challenges, such events have brought about positive outcomes.

It is important to note that the effectiveness and long-term impact of these events in addressing complex social issues require further research and evaluation. While they offer an exciting platform for collaboration, innovation, knowledge-sharing, networking, and ideation, their ultimate success lies in the sustained commitment, political will, and support required to implement, incubate, and scale the developed solutions beyond the event itself.

On the other hand, the 2010 innovation hype

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encouraged the revival of movements such as: citizen science movement; fab labs and makerspaces movement; cryptoparty movement; mainstreaming of hackerspaces; and more. It should be emphasised that these movements are not new, but they have traditionally existed outside the realm of mainstream development efforts, often considered either too scientific or too technologically sophisticated. However, with the proliferation of Web 2.0 and the increasing interactivity, accessibility, and user-friendliness of technology and the social web, these movements have been able to move closer to the mainstream or non-geek world. Differently from the aforementioned events, the ethos of movements can be characterised as "slow incubation", where certain societal problems are approached at a more deliberate, sustained, and gradual pace.

Open Data movement across the world is one example where the work is focused in the longer term in enhancing the accessibility and quality of data and metadata – at local, national, regional, and international level – with the aim of supporting research, informing policy-making, and fostering transparency. These movements acknowledge open data as a public utility and recognise the transformative potential of open data in various domains, enabling greater collaboration, innovation, and evidence-based decision-making.

The Citizen Science movement has contributed in bringing science closer to citizens and involving them directly in conducting scientific research. To scientists, the appeal of citizen science fieldwork follows from its distributed character; they can research patterns over large scales and across latitudes in ways that would be impossible for a researcher at a single study site[66]. Whereas the role of the citizen in this is to be a careful observer; the eyes and ears of the scientist in cyberspace [and in the field[67]]. Some initiatives that made an impact in environmental monitoring are the Extreme Citizen Science research group (ExCiteS) at University College London (UCL), the associated social enterprise Mapping for Change (Mapping for Change), the Public Laboratory for Open Technology and Science (Public Lab), Safecast. In Kosovo, the Science for Change Kosovo movement has been incubated[68] for several years by UNICEF's Innovations Lab in Kosovo until it succeeded[69] [70].

Fab labs, makerspaces, and hackerspaces are movement-spaces that have emerged as part of the global movement to foster creativity, collaboration, and innovation. While each developed independently but have appeared to converge towards a similar structure and use[71]. They are considered as community workshops or manufacturing laboratories that stimulate collaboration, peer learning, and social innovation. Their rise in popularity has been fueled by emerging funding alternatives, such as the crowdfunding model (Kickstarter and Indiegogo are two prime examples), where early prototypes could independently raise money. Fab Lab Barcelona at Institute for Advanced Architecture of Catalonia (IAAC) has designed and fabricated the Smart Citizen Kit[72], an open-source environmental monitoring platform consisting of arduino-compatible hardware, data visualisation web API, and mobile app. Spaces such as this one can be found also in countries of the Majority World. Kumasi Hive in Ghana, which is a multi-disciplinary innovation hub that supports entrepreneurs and social startups, offering resources, mentorship, and access to fabrication equipment. Maker's Asylum is a community makerspace in India that has contributed to various social good projects. They have developed "Eyedentify"[73] which is a low-cost, open-source assistive device designed to help individuals with visual impairments navigate their surroundings more independently, utilising computer vision technology and wearable sensors to detect obstacles and provide real-time audio feedback to the user.

As we have seen, the innovation hype of 2010 has accelerated and, to a certain degree, given rise to a significant number of initiatives, spaces, and technologies for development. We have briefly explored some of these technologies and spaces, and looked at them morphologicallywithout delving deeply into their operations. However, in recent years the idea of labs and innovation spaces has lost its shine. As Tamas Wells argues:

(66) *Toomey D., 2014. How Rise of Citizen Science is Democratizing Research. [online] Available at:* ***<https://e360.yale.edu/features/interview_caren_cooper_how_rise_of_citizen_science_is_democratizing_research>*** *[Accessed 22 May 2023]*

(67) *Mcquillan D, 2014. The Countercultural Potential of Citizen Science. [pdf] Available at:* ***<https://bit.ly/45PetEO>*** *[Accessed 23 May 2023)*

(68) *Harvey J, 2016. Science for Change Kosovo was Development as "Movement Incubator". [online] Available at:* ***<https://medium.com/@joshharvey_69275/science-for-change-was-frustrating-good-development-abe7ad24eb80>*** *[Accessed 23 May 2023]*

(69) *Peer Educators Network (PEN), Science for Change Movement, 2016. Protests against air pollution in Prishtina. [online] Available at:* ***<https://kosovotwopointzero.com/en/protests-air-pollution-prishtina/>*** *[Accessed 23 May 2023]*

(70) *Popova E., 2018. Kosovo Assembly approves resolution on air pollution after prolonged debate. Available at:* ***<https://prishtinainsight.com/kosovo-assembly-approves-resolution-air-pollution-prolonged-debate/>*** *[Accessed 23 May 2023]*

(71) *van Holm E. J. , 2015. What are Makerspaces, Hackerspaces, and Fab Labs?. [pdf] Available at:* ***<https://bit.ly/3ZfdkNo>*** *[Accessed 23 May 2023)*

(72) *Fab Lab Barcelona - Smart Citizen. [online] Available at:* ***<https://fablabbcn.org/projects/smart-citizen>*** *[Accessed 23 May 2023]*

(73) *Maker's Asylum - Eyedentify. [online] Available at:* ***<https://makersasylum.com/project/eyedentify/>*** *Accessed (23 May 2023]*

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Many of the labs so prominently opened a few years ago have now been quietly closed or absorbed into wider agencies. Early adopter UNICEF no longer has any reference to its innovation labs. The "flurry of activity and interest" around the Global Humanitarian Lab lasted only two years before it closed. USAID and DFAT dissolved their labs. And many other aid innovation units have also closed their doors. [...] Why did leaders in the humanitarian and development sectors so strongly advocate for the creation of labs, and then so quickly abandon them [(74)]?

We argue that the period of the fall of 2010 innovation hype is cyclical as a new hype is rising: the hype of Web 3.0 technologies governed by technologies such as: Artificial Intelligence (AI), Blockchains, Cryptocurrencies, Metaverses and Spatial Computing, Non-Fungible Tokens (NFTs), and more. As these technologies proliferate in the mainstream discourse and practice, we also witness their penetration in the development efforts. But, will leaders in the humanitarian and development sectors embrace yet another hype without critically reflecting about the failures of the 2010 hype?

(74) *Wells T., 2023. The rise and fall of innovation labs in the aid sector". [online] Available at: <https://devpolicy.org/the-rise-and-fall-of-innovation-labs-in-the-aid-sector-20230213/> [Accessed 22 May 2023].*

ICT4D 3.0 – Towards the new hype in development?

Already in 2019, several scholars have started to identify the emergence of a new phase of ICT4D—that of ICT4D 3.0. Arguing for the emergence of a new "digital-for-development" paradigm, Heeks (2019) posed the following question: “What has changed in the decade or so since the ideas of a new "ICT4D 2.0" phase were first proposed?”

While the ICT4D 1.0 and 2.0 periods were significantly shaped by the MDGs, with their expiration in 2015 and their substitution by the SDGs, the changing patterns of development priorities has once yet again gone underway, with three core themes emerging (Heeks, 2014 a; Heeks, 2014c; as cited in Heeks, 2019);

- **Transformation:** “a belief that the incremental developmental changes achieved to date will no longer be sufficient in the remainder of the 21st century; and an aspiration for a step-change in approach” (ibid.:276).

- **Inclusion:** “development that provides opportunities and benefits for all, including those who have to a relative or absolute extent been excluded by development to date” (ibid.:26).

- **Sustainability:** “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987:43).

Heeks argues that the field of ICT4D has undergone two distinct phases (ICT4D 1.0 and 2.0) and proposes the emergence of ICT4D 3.0. This new phase represents a paradigm shift in how digital technologies are used for development. Heeks suggests that ICT4D 3.0 moves beyond a narrow focus on infrastructure development (ICT4D 1.0) and digital inclusion (ICT4D 2.0) to embrace a broader perspective that considers the full range of components required for digital development such as: connectivity, devices, software, content and services, etc.. Altogether they have created this “digital nervous system” for development that is spreading fast in terms of reach, scope and depth (Heeks 2019: 11). Heeks (2019: 9) also identified broad-scale patterns, based around the idea of two logics that shape society—competitive and cooperative—and the way in which digital technologies are associated with a reshaping of the pattern of relations between those two logics.

When it comes to technology, the changes are even bigger. Wayan Vota has attempted to map the 2019 Digital Development Hype Cycle[(75)]. The idea behind the hype cycle is that essentially any new technology or innovation goes through a sort-of predictable path of growing interest, then wild enthusiasm[(76)], followed by disillusionment, to finally a period of renewed but constrained use and enthusiasm. In the article, Vota identifies various technologies as part of the 2019 Hype Cycle, such as: Artificial Intelligence (AI); Blockchain; Chatbots; Data dashboards (big data, real-time data, open data); Drones; Internet of Things; platforms such as Google and Facebook; etc..

While we agree with some of the technologies that Vota listed in the article, we argue that platforms such as Facebook and Google are currently in an identity crisis. The first, has embarked on the journey of virtual reality by launching its Metaverse to extend the success of social networks in the virtual reality space. Whereas the latter, caught behind in the AI hype – particularly generative AI[(77)]– has put its emphasis on launching its own brand of generative AI[(78)].

Despite this, as the Web 3.0 is peaking with its brand of ‘frontier technologies’[(79)] and development actors have started to embrace its promise. Already in 2018, UN’s Department of Economic and Social Affairs published the World Economic and Social Survey “Frontier technologies for sustainable development”[(80)], where among other things, they underline that:

(75) *W. Vota, 2019. ICT4D Hype Cycle for 2019; AI, Blockchain, Chatbots, Data, And…. [online] Available at:* ***<https://www.ictworks.org/ict4d-hype-cycle-2019-blockchain/>*** *[Accessed 22 May 2023]*

(76) *W. Vota, 2017. Ten Concepts Everyone in ICT4D Should Know. [online] available at:* ***<https://www.ictworks.org/ten-concepts-everyone-in-ict4d-should-know/>*** *[Accessed 22 May 2023]*

(77) *McKinsey & Company, 2023. What is generative AI? [online] Available at:* ***<https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai>*** *[Accessed 22 May 2023]*

(78) *F. Lardinois, 2023. Google launches a smarter Bard. [online] Available at:* ***<https://techcrunch.com/2023/05/10/google-launches-a-smarter-bard/>*** *[Accessed 22 May 2023]*

(79) *World Intellectual Property Organisation. What are frontier technologies? 6th factsheet. [pdf Available at:* ***<https://www.wipo.int/about-ip/en/frontier_technologies/pdf/frontier-tech-6th-factsheet.pdf>*** *[Accessed 22 May 2023]*

(80) *UN’s Department of Economic and Social Affairs, 2018. World Economic and Social Survey 2018: Frontier Technologies For Sustainable Development. [online] Available at:* ***<https://www.un.org/development/desa/dpad/publication/world-economic-and-social-survey-2018-frontier-technologies-for-sustainable-development/>*** *[Accessed 22 May 2023]*

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> [...] renewable energy technologies and efficient energy storage systems are already enhancing environmental sustainability, allowing countries to "leapfrog" over existing technological solutions, [and] new technologies have enhanced access to medicines and improved the wellbeing of the most vulnerable as mobile technologies and innovations in digital finance have made financial services accessible to millions in developing countries.

The publication, however, does recognise also that frontier technologies present policy challenges. For example, "as advances in automation, machine learning (ML) and AI increase productivity, they are also transforming labour markets, [and] technology is already being held responsible for many job losses in developed economies[(81)]". With automation replacing physical labour and AI taking over many analytical functions, achieving one of the targets under SDG 8 (Promote full and productive employment and decent work for all) will become increasingly difficult[(82)]. Unless policies are in place to redistribute some of the gains from automation, the process of skills polarisation will exacerbate income inequality further and make the realisation of SDG 10 (Reduce inequality within and among countries) even more daunting[(83)].

Heeks (2019) underlines the fact that the "digital-for-development" paradigm is associated with a reproduction, diffusion, mutation and intensification of the dominant mode: of the competitive markets and hierarchical controls associated with capitalism and with traditional state-citizen relations". But it also recognises that, simultaneously, the paradigm is also associated with growing examples and opportunities for an alternative economics and an alternative politics.

To conclude, we believe that further research is needed to explore the specific strategies and policy frameworks that can effectively address the challenges (and maximise the opportunities) presented by ICT4D 3.0. This is crucial given that some of the key technologies of Web 3.0 (AI, ML, blockchain, etc.) have been subject to various (ethical) controversies and numerous governments are looking for remedies and regulation policies to mitigate the future risks. Additionally, there is a need to investigate the potential impacts (short, medium, and long-term) of emerging Web 3.0 technologies on development outcomes and societal well-being, particularly in the Majority World. This is of utmost importance considering that there is empirical evidence that some of these technologies have caused harm in damaging some of the most vulnerable groups of society (O'Neill 2016; Golumbia 2016; Eubanks 2018; Benjamin 2019; McQuillan 2022). Lastly, examining the dynamics of power relationships, their distribution and exercise, between various actors such as governments, non-governmental organisations, bilateral agencies – and particularly corporations and consulting industry, which are shaping and driving the Web 3.0 technological hype – within the digital-for-development paradigm, would provide insights into the risks and opportunities for alternative[(84)] economic and political models to thrive in the context of development and international cooperation.

(81) *Ibid.:2*

(82) *Ibid.:2*

(83) *Ibid.:3*

(84) *In "Rethinking technology, ICTs and Development: why it is time to consider ICT4D 3.0" (2014) Anna Bon and Hans Akkermans, bring forward a new theoretical framework and actionable approach to "develop new ICTs that really work and can be adopted by rural communities in their regreening endeavour" in a development context. Their theoretical framework to understand ICT4D is based on complex adaptive systems, studying the dynamics of adoption of new technologies within social networks and their mechanisms of diffusion. Whereas, the approach, labelled by the researchers as ICT4D 3.0, provides an actionable and practical framework for a more equitable ICT4D, in which the development objectives and the problem definition are not externally controlled and defined, at international level, but by the people and communities concerned.*

Critiquing ICTs: limitations and challenges

In "The Question Concerning Technology" Heidegger (1977: 4) begins by noting that "We ask the question concerning technology when we ask what it is". Heidegger's question seeks to explore the essence of technology. And his answer to it is the following: "One says: Technology is a means to an end. The other says: Technology is a human activity. The two definitions of technology belong together. For to posit ends and procure and utilise the means to them is a human activity."

But the relationship between technology and human activity is more complicated and sometimes conflicting. Herbert Marcuse, in his book "One Dimensional Man" (1964) defined advanced industrial society as a "technological universe" which is inherently based on economic and political rationality. For Marcuse the 'rationality' served to stabilise society through productive growth, culture, regulated freedom and participation and safe public life: "Technology serves to institute new, more effective, and more pleasant forms of social control and social cohesion" (Marcuse 1964: xlvi). This is what Marcuse defined as "one-dimensional man", that is a universe of thought and behaviour, in which aptitude and ability for critical thought and oppositional behaviour fades away.

While ICTs present an enormous potential to advance society, they also are utilised as dispositifs[85] of power. This radical ambiguity is evident in various instances. It is unsettling to consider how certain governments in the Global North contract corporations to develop technologies specifically designed to target and persecute vulnerable people[86]. Similarly, when such technological dispositifs are sold to regimes, they are further employed to oppress and repress civil society activists and journalists[87]. This contradiction and exploitation of technology by human activity will be explored next by briefly touching upon some of the key critiques of ICTs.

Techological Solutionism

In the article "Perils of Perfection" Evgeny Morozov defined solutionism as following:

> [...] an intellectual pathology that recognises problems as problems based on just one criterion: whether they are "solvable" with a nice and clean technological solution at our disposal." [...] Solutionists do not limit themselves to fixing the problems of individuals; they are as keen to fix the problems of institutions[88].

Morozov goes as far as classifying it as "pervasive and dangerous ideology." Others have considered technological solutionism "as a smokescreen for deep structural problems in the technology industry"[89]. Many large organisations, including government entities, often resort to solutionism as a means to "solve" the challenges they face.

Morozov's argument is that bold focus on finding technological solutions has replaced the complexities of the world with simplified fixes. Fixity, to paraphrase Ruha Benjamin (2019: 151), is an innovation that constrains. This fetishistic approach to technology falls short in not only addressing systemic issues and root causes of problems, but it also neglects the underlying social, political, cultural, geographical, economic, and ethical issues.

Technological solutionism is driven by the hype cycles. In the early 2000s, as a response to solve some of the challenges addressed by MDGs, projects like One Laptop Per Child, PlayPump, or Millennium Villages Project ambitiously wanted to demonstrate that some of the world's most pressing challenges can be resolved through the application of technology. However, the reality proved to be more complex. In the post-

(85) *The term dispositif is used in the Foucaultian sense, referring to the various institutional, physical, and administrative mechanisms and knowledge structures which enhance and maintain the exercise of power within the social body.*

(86) *Frenkel Sh., 2019. Microsoft Employees Protest Work With ICE, as Tech Industry Mobilizes Over Immigration. [online] Available at: <https://www.nytimes.com/2018/06/19/technology/tech-companies-immigration-border.html> [Accessed 30 May 2023].*

(87) *Marczak B., et al, 2023. Triple Threat. NSO Group's Pegasus Spyware Returns in 2022 with a Trio of iOSs 15 and iOS 16 Zero-Click Exploit Chains, [online] Available at: <https://citizenlab.ca/2023/04/nso-groups-pegasus-spyware-returns-in-2022/> [Accessed 30 May 2023]*

(88) *Morozov E., 2013. Perils of Perfection. [online] Available at: <https://www.nytimes.com/2013/03/03/opinion/sunday/the-perils-of-perfection.html> [Accessed 30 May 2023]*

(89) *Schwartz O., 2019. Deepfakes Aren't a Tech Problem. They're a Power Problem. {online] Available at: <https://www.theguardian.com/commentisfree/2019/jun/24/deepfakes-facebook-silicon-valley-responsibility> [Accessed 30 May 2023]*

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MDG period, with the coming to birth of SDGs, other initiatives such as UNICEF's QOWA[(90)] have fallen short in achieving their promises through technology. With the rise of more sophisticated technologies such as AI, blockchains, etc.—the intensification and amplification of solutionism in the development contexts will further accelerate. For example, the Trace the Face program[(91)] by the International Committee of the Red Cross (ICRC) uses facial recognition technology that searches for missing persons using photos provided by the families of missing migrants of either the missing migrants themselves or their blood relatives[(92)]. Kaurin references an interview with a refugee to point out the chilling fact that some refugees "are running away from the war, but some [others] are also running away from family or someone who wants to hurt them' (Kaurin 2019: 9).

(The politics of) digital divide

One of the outpouring themes in the discourse of ICT4D is the digital divide. It is often portrayed as an obstacle for the distribution of ICT4D initiatives and accompanied by statistics, for instance "the fact that half of the world population has yet to make its first telephone call, or that the density of telephone lines in Tokyo exceeds that of entire continent of Africa" (Campbell 2001: 19, as cited in Pieterse [2001] 2010: 166). But according to Jan Nederveen Pieterse the digital divide is a 'deeply misleading discourse':

> [...] The divide is not digital but socioeconomic, but representing the divide in technical terms suggests technical solutions. [...] Since digital capitalism doesn't go where profit margins are low such as rural areas and developing countries, the rationale of bridging the digital divide is that development intervention can make up for market imperfections and jumpstart connectivity on nonprofit basis. [...] Efforts to bridge the digital divide may have the effect of locking developing countries into a new form of dependency on the West. The technologies and "regimes" (international standards governing ICTs) are designed by developed country entities for developed country conditions' (Nederveen [2001] 2010: 167, 169).

The critique of Nederveen, of course, is not new. When telecentre projects, whose main goal was to bridge the digital divide, started to pop up in the Majority World, many have criticised the approach. Nederveen's critique, however, should be split into two domains.

The first domain recognises ICTs as a capital-intensive sector being at the 'forefront of Transnational Corporation (TNC) operations' [(93)], [and] it is a prime terrain for transnational mergers and acquisitions and mega corporations such as WorldCom, Vodaphone, Viacom, MCI, and Mannesmann (Nederveen [2001] 2010: 173). Still today, the dominance of the ICT sector is occupied by a handful of companies known as Silicon Valley's Big Five: Alphabet (Google), Amazon, Apple, Meta (Facebook), and Microsoft. In other words, Nederveen locates ICTs as an inherent part of neoliberal logic. And so, drawing from Nederveen's framework, one can argue that the neoliberal logic not only determines the production and distribution of these technologies but also shapes their deployment in the Majority World. This influence manifests in the way these technologies are introduced, marketed, and adopted, often prioritising profit-driven motives over local needs and sustainability. Consequently, the technological infrastructures in these regions may become more aligned with the interests of the dominant corporations rather than addressing the unique challenges and aspirations of the local communities. This could lead to a potential perpetuation of existing inequalities, with technology acting as a tool of economic imperialism rather than an enabler of genuine development.

The second domain of the Nederveen's critique deals with the "D" of the ICT4D. In Nederveen's words: "ICT4D is digital capitalism looking south – to growing middle classes, rising educational levels, vast cheap labour pools, and yet difficult regulatory environments. It is about market expansion and converting unused capacity into business assets on the premise that new technology is the gateway to hope" (Nederveen [2001] 2010: 173).

(90) *Ma Zh., 2014. Learning From Failures. [online] Available at:* ***<https://www.unicef.org/innovation/stories/learning-failures-part-1>*** *[Accessed 30 May 2023]*

(91) *International Committee of the Red Cross. Trace the Face - Europe. [online] Available at:* ***<https://familylinks.icrc.org/ttf-europe>*** *[Accessed 30 May 2023]*

(92) *Kaurin D., 2019. Data Protection and Digital Agency for Refugees. [pdf] Available at:* ***<https://www.cigionline.org/documents/1635/WRC%20Research%20Paper%20no.12.pdf>*** *[Accessed 30 May 2023]*

(93) *In the 1990s typically up to a third of American TNC investments in developing and emerging markets from Mexico to Russia went to the telecom industry (Schiller 1990, as cited in Nederveen [2001] 2010: 173)*

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What Nederveen is claiming here can be explained, metaphorically, through the scene of Ernst Lubitsch's classic film "Ninotchka" (1939). A man enters a cafe and requests a cup of coffee without cream. This apparently innocent request is met with the following response from the waiter: "I am sorry sir, but we only have milk. May I please bring you some coffee without milk instead?".

This scene humorously highlights the emptiness of the distinction; the end result is the same - plain coffee. The real difference lies in the framing of the absence - whether it's cream or milk that's missing.

Drawing a parallel to the ICT4D discourse, the digital divide is presented as a 'problem' that needs addressing, with the promise of bridging the gap as a solution. However, much like the coffee scenario, the real substance (or lack thereof) is obfuscated by rhetoric. The digital divide and the purported solutions to it become the "empty signifiers" in the discourse.

This empty promise or "empty signifier" is packaged and sent from the North to the South with the pretense of bridging the digital gap. But in reality, this intervention often does not address the root causes of the divide or bring substantial benefits to the intended beneficiaries. Instead, the introduction of these technologies often results in extracting local value, whether it's in the form of data, labor, or resources. This extracted value is then repackaged and sent back to the North, thereby enriching the entities in the North at the expense of the South.

In essence, what may appear as benevolent interventions to bridge the digital divide can, upon closer examination, reveal themselves as mechanisms that perpetuate and even exacerbate existing inequalities. The true beneficiaries are often not the communities in the South, but rather the corporations and entities in the North that leverage these interventions for profit and dominance. It's a cycle of extraction masked under the guise of development, much like offering coffee without milk when there's no cream.

An example of such a mechanism is Facebook's "Free Basics" mobile app, rolled out in 2015 to help bridge the digital divide in developing countries. In spring 2017, a group of citizen media and activist group Global Voices and digital rights experts in Colombia, Ghana, Kenya, Mexico, Pakistan and the Philippines set out to answer a simple question: how well does the Free Basics app serve local interests and needs? The research "Free Basics in Real Life: Six case studies on Facebook's internet "On Ramp" initiative from Africa, Asia and Latin America" (2017) found out that:

- The promises of the Free Basics app promotes cultural imperialism of Northern culture by not meeting the linguistic needs of the local population. According to the research, even in heavily multilingual countries including Pakistan and Philippines, the app is offered in only one local language. While users in Kenya could choose an interface in either English or Kiswahili, nearly all of the services offered were in English only.

- Free Basics featured little local content, but plenty of corporate services from the US and UK. Free Basics includes a relatively small amount of content relevant to local issues and needs, lacking public service sites and independent news sources. Even when a local content was sourced it was done in a biased way: for instance, the only local news site offered for Colombia was El Tiempo, the national newspaper with the largest circulation in Colombia and the flagship publication of media group Casa Editorial El Tiempo (CEET), which is primarily owned and led by Colombian businessman Luis Carlos Sarmiento Angulo, who is the richest person in Colombia.

- Another finding relates to the users' data collection. Facebook's Free Basics program collects metadata about all user activities, not just the activities of users who are logged into Facebook. It provides Facebook with previously untapped streams of data about online behaviour of users. The centralised infrastructure of the system allows the company to capture data about Free Basics users, regardless of whether they have accounts with Facebook or not.

- Ultimately, the research underlines that Free Basics violates net neutrality principles, by offering "a fundamentally imbalanced incentive structure for third-party services to participate in the program by setting unique technical requirements that are difficult for some developers to meet (particularly those with limited resources) and by requiring that user traffic be routed through Facebook's

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> proxy servers, which allow the company to collect profitable metadata." This may create a disincentive for Facebook's competitors, as consequence Free Basics does not offer products from any of Facebook's major competitors in the social media landscape.

As Nederveen argues ([2001] 2010: 179) the real challenge of development and the core problem of ICT4D is to disembed technology from capital. This can be achieved by bypassing the WTO's regime of intellectual property rights and patent laws, while simultaneously moving towards free open-source technology and systems. Nederveen identifies these domains as the major tipping points, representing the true frontier of ICT4D, where major corporations, governments, and international institutions are grouped on one side (the Global North) and most developing countries on the other.

Data colonialism

Various 'Data for Good' initiatives have emerged in recent years to promote and organise efforts to use new computational techniques to solve societal problems (Aula, Bowles 2023). Along with these initiatives a new scientific discourse emerged which was based on the vocabulary of "big data", "data science", "data mining", "machine learning", "predictive analysis", "predictive models", etc..

The idea behind this discourse is simple: as more people become connected online, a greater amount of data points are generated. If this data is collected, cleaned, and then utilised through mining techniques to uncover patterns and relationships, it is assumed that some societal problems can be easily resolved or predicted using algorithmic models trained on that data. The data revolution has seemingly spread worldwide. David Brooks anticipated this in his opinion piece "The Philosophy of Data"[(94)] where he writes:

> If you asked me to describe the rising philosophy of the day, I'd say it is data-ism. We now have the ability to gather huge amounts of data. This ability seems to carry with it certain cultural assumptions – that everything that can be measured should be measured: that data is a transparent and reliable lens that allows us to filter out emotionalism and ideology; that data will help us do remarkable things – like foretell the future . . . The data revolution is giving us wonderful ways to understand the present and the past.

Brooks' claim that "everything that can be measured should be measured" becomes problematic if we contextualise the existing technological ecosystem. We should thus ask: Who collects the data? What are the motivations behind? For what purposes they are used? Who owns them?

With coverage in over 62 countries and growing, as well as the ability to reach over 2.5 billion consumers[(95)] – data broker companies like Acxiom personify the logic of "measuring everything" and offer a large number of products based on people's data. Acxiom is only one data broker company, and there are many others who collect data, including Big Tech companies. Organisations, companies, even political parties can buy people's data in a data marketplace and use that data for advertising and marketing, elections, or other purposes.

As the slogan "Data is the new oil of the 21st century" suggests, data represents value for extraction, but it also holds value for social control. The former is associated with colonial logic of appropriations through data extraction practices, while the latter serves as a reminder of how online tracking and surveillance practices can be as pervasive and dangerous as manipulating elections (even in mature democracies), and repressing civil society activists.

Mirca Madianou[(96)] uses the concept of "technocolonailism" to "analyse and capture how the convergence of digital developments with humanitarian structures and market forces reinvigorates and reshapes colonial relationships of dependency" between South-North. In February 2019, the United Nations World Food Programme (WFP) signed a US$45 million partnership with Palantir Technologies[(97)], the US software firm known for its association with CIA and Cambridge Analytica and its work on predictive policing, advanced biometrics, and immigration enforcement (Madianou 2019: 1). The signing of this deal raised many concerns about whether Palantir will have access to the sensitive data or metadata of the 91.4 million people served by WFP each year, prompting 65 civil society organisations and individuals to write a letter to David Beasley, WFP's executive director, asking for "concrete steps to mitigate the serious harm arising from the agreement" and full transparency which is essential for

(94) *Brooks D., 2013. The Philosophy of Data. [online] Available at:* ***<https://www.nytimes.com/2013/02/05/opinion/brooks-the-philosophy-of-data.html>*** *[Accessed 02 June 2023]*

Critiquing ICTs: limitations and challenges

meaningful accountability (Madianou 2019: 1).

But this partnership is part of a larger phenomenon in development and humanitarian sectors. According to recent estimates, there are over 1,500 apps for migrants and refugees (Leurs & Smets, 2018, as cited in Madianou 2019), most of which are hardly used. Most of these apps are the outcomes of the hundreds of hackathons which have taken place since 2015 in response to the refugee crisis. This phenomenon can be read through the lens of data extraction as "refugees produce value through their data which is then extracted to justify the funding of aid projects." (Madianou 2019: 8).

If in the previous chapter we looked at how The 2030 Agenda for Sustainable Development is grounded around the discourse of human rights, human dignity, equality and non-discrimination, the issue of digital colonialism, the partnerships such as the one between WFP and Palantir become utterly bewildering. If one of the core problems of the ICT4D is to disembed technology from capital, one of the core challenges of the development and humanitarian sector is to disembed itself from 'technocolonial' practices (of value extraction and appropriation) and the logic of competitive marketisation.

(95) *Acxiom Global Data. Reach over 2.5 billion of the world's marketable consumers.[pdf] Available at:* ***<https://marketing.acxiom.com/rs/982-LRE-196/images/Acxiom%20Global%20Data.pdf>*** *[Accessed 02 June 2023].*

(96) *Madianou, M. (2019). Technocolonialism: Digital Innovation and Data Practices in the Humanitarian Response to Refugee Crises. Social Media + Society, 5(3).* ***https://doi.org/10.1177/2056305119863146***

(97) *In a 2009 essay for the Cato Institute, the company's co-founder, Peter Thiel, wrote, "I no longer believe that freedom and democracy are compatible." The essay is available at:* ***https://archive.ph/p2yrX.*** *He later financially backed the controversial AI surveillance and tracking app, ClearviewAI, which major media outlets around the world have linked to the far-right movement in the United States. More information at:* ***https://www.huffpost.com/entry/clearview-ai-facial-recognition-alt-right_n_5e7d028bc5b6cb08a92a5c48?6p8***

CHAPTER 03

From ICT4D to ICT4SDG

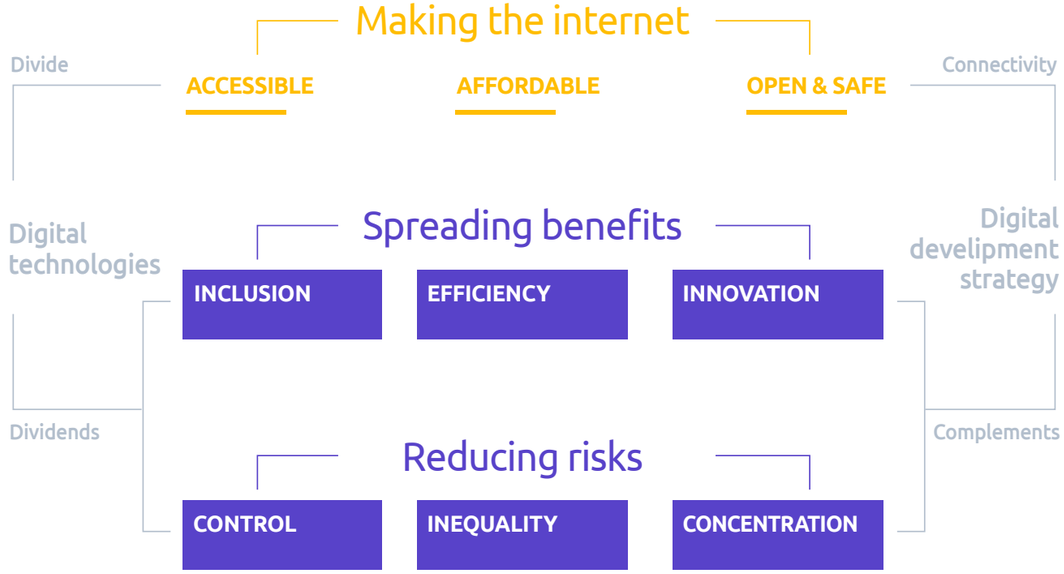
From digital dividends to data for better lives

In September 2015, the head of states and high-representatives of United Nations' member states adopted the 17 SDGs, as part of the 2030 Agenda for Sustainable Development which set out a 15-year plan to achieve the Goals. The aim of SGDs is to set the objectives for driving forces all over the world to tackle the world's largest challenges such as fighting poverty, eliminating inequalities and achieving sustainable economic growth, and in contrast to the MDGs the SDGs are binding for all countries, developed and developing[(98)].

SDGs came to life during the period of digital revolution, with digital technologies rapidly spreading across much of the world. The number of internet users has more than tripled in a decade–from 1 billion in 2005 to an estimated 3.2 billion–at the end of 2015[(99)]. With the development of high-end technologies and the increasing number of internet and mobile phone users, accompanied by the significant production of data—the SDGs sought to leverage the potential of ICTs. Simultaneously, ICTs aimed to expand their applicability for societal and economic benefits in countries of the Majority World.

A year after the SDGs were adopted, the World Bank's World Development Report "Digital Dividends" set up the narrative about the potential of digital technologies to provide significant benefits and opportunities for development. The overarching argument of the report is that while the potential and opportunities of digital technologies are enormous, nonetheless, the "digital dividends—the broader development benefits from using these technologies—have lagged behind, [because] their aggregate impact has fallen short and is unevenly distributed" (WDR 2016: 2). The report identifies two main reasons why digital dividends are not spreading across the world. First, nearly 60 percent of the world's people are still offline and can't participate in the digital economy in any meaningful way. Second, some of the perceived benefits of digital technologies are offset by emerging risks (WDR 2016: 2, 3).

Figure 3.1: Why digital dividends are not spreading rapidly–and what can be done © WDR 2016 team.



(98) *Min Tjoa, S. Tjoa 'The Role of ICT to Achieve the UN Sustainable Goals (SDG)' (2016)*

(99) *'Digital Dividends. General overview' (2016) World Bank*

From digital dividends to data for better lives

In order for digital dividends to be maximised, it depends on, what the report calls as, ”analog complements” including appropriate policies and regulatory frameworks, competition, accommodating bureaucratic processes for start-ups, and strong and inclusive education. In other words, for digital dividends to succeed, the following three key spheres, according to the report, should have strong foundations:

① **Regulations** that create a vibrant business climate and let firms leverage digital technologies to compete and innovate;

② **Skills** that allow workers, entrepreneurs, and public servants to seize opportunities in the digital world;

③ And accountable **institutions** that use the internet to empower citizens.

The report’s call to action is clear: a global priority remains to bridge the digital divide, and simultaneously harmonising regulations that fosters business innovation and competition, investment in human capital through upskilling initiatives and setting up accountable institutions that respond to citizens' needs and demands.

The underlying logic and narrative that the report puts forward is the neoliberal economic model proposed for governments of the Majority World as a way forward to participate in the digital revolution. The report underlines the importance of creating a 'vibrant business climate' that fosters innovation and competition. This translates into market-oriented policies, including deregulation, elimination of price controls, and reduced state influence in the economy. In some respects, the narrative of the report can be seen as a call for a 'Washington Consensus 2.0' model. Exploring the actual impact of the report's recommendations on Majority World would have been highly valuable, but due to the scope and length of this research, it cannot be further extended.

The same narrative is echoed by the International Telecommunication Union (ITU). In the special edition of the ITU News Magazine titled “How ICTs are accelerating the SDGs” (2017), the publication outlines several steps that are necessary to overcome the challenges of digitalisation. This includes ensuring widely accessible the reliable physical and digital infrastructure to bridge the digital divide; implementing changes in education and vocational training that can build new skills in areas such as mechatronics, digital medicine, precision agriculture, robot design, and encouraging small and large enterprises to transition from “centralised” to more “decentralised” production, in which a product might use intelligent machinery to communicate what needs to be done, instead of simply being “processed”.

But, drawing also from the previous chapter’s section on critique of ICT4D, we should ask: is bridging the digital divide and making connectivity accessible for everyone enough? Further, is it enough asking governments to create business-friendly policy frameworks and climate, without first focusing on strengthening human rights standards and democratic mechanisms as safeguarding principles?

From digital dividends to data for better lives

Data for better lives? The curious case of India's "Aadhaar" programme

In the 2021 World Development Report "Data for Better Lives" published by the World Bank, five years after the previous 2016 publication on digital dividends, the narrative has shifted from the overarching theme of digital revolution and its benefits to the importance of data. Data, as the report claims (2021: 3), can improve social and economic outcomes, but only if they are used systematically in ways that create information that generates insights that improve lives. The report identifies two categories of data collection for development impact:

- **Public intent** data which hold great potential for designing, executing, and evaluating public programs and policy;
- **Private intent** data which are collected and curated by the private sector as part of routine business processes and are done so for commercial purposes.

Drawing from this, we can consider India's "Aadhaar" programme as an initiative that belongs to the category of public intent data. Coincidentally, WB's World Development Report (2016) and ITU's "How ICTs are accelerating the SDGs" (2017), uses India's "Aadhaar" programme as an example of transformational potential of digital technologies.

"Aadhaar" (in Hindi "foundation") is the world's largest biometric ID system, initiated by the Indian Government. This massive centralised database was initially launched in 2009 and enrolled over 950 million people (WDR 2016: 194). By 2019 almost 90% of India's population was enrolled in the system. The system provides to every Indian resident a unique identity number by linking it to an individual's biometric details – for instance, their [facial] photograph, all 10 of their fingerprints and [two] iris scans (Weinberg 2016, as cited in Chaudhuri, König 2017). Each person received a unique 12-digit identification number that could be used to access a range of services. The data is collected by the Unique Identification Authority of India (UIDAI), a statutory authority established in January 2009 by the Government of India, under the jurisdiction of the Ministry of Electronics and Information Technology, following the provisions of the Aadhaar (Targeted Delivery of Financial and other Subsidies, benefits and services) Act, 2016.

WB's report identifies "Aadhaar" as an example where "technology can be transformational" (2016: 2). ITU's publication positioned the project as India's "route to financial inclusion". Both publications evidence the positive impact of Aadhaar in two spheres. The first relates to the efficient management of social and welfare programs:

> The programme is also beneficial for the government which uses the information on Aadhaar as a ledger through which to clean benefit delivery system databases of duplicate and fake accounts. Every year, the government conducts roughly 1.5 billion individual credit transactions for LPG (gas), with the 120 million eligible citizens receiving 12 gas cylinders a year. After linking LPG gas direct benefit transfers with Aadhaar cleaning out the database, the government made a saving of INR 20 thousand crores (teen million) in one year – twice the cost of Aadhaar. (ITU 2017: 6)
>
> [...] in India's fuel subsidy program, implementing cash transfers to Aadhaar-linked bank accounts to buy liquified petroleum gas (LPG) cylinders saved about US$1 billion per year when applied throughout the country. This is just one of many subsidy programs in India that are being converted to direct transfers using digital ID, potentially saving over US$11 billion per year in government expenditures through reduced leakage and efficiency gains. (WB 2016: 195)

The second sphere where Aadhaar is having a positive impact is the financial inclusion through transformation of digital payment. Despite having the 7th-highest GDP (Gross Domestic Product) in the world, India still had some 233 million unbanked citizens as of 2015 (ITU 2017: 4). "Aadhaar" thus represented a potential to be harvested:

> India's central bank saw the potential for Aadhaar to transform banking. It developed an electronic procedure so that commercial banks could verify a new customer's identity instantly through the Aadhaar database. These biometric checks reliably verify the identity of the holder, thus reducing the likelihood of false identities and fraudulent claims. An ambitious financial development policy (Pradhan Mantri Jan Dhan Yojana) was launched to provide a bank account to all households in India. In just one year, 166 million people had opened accounts as part of the program. The number had risen to almost 384 million by 2019[100].

(100) *Carriere-Swallow Y., Haksar V., Patnam M., 2021. Stacking up financial inclusion gains in India. [online] Available at:* ***<https://www.imf.org/external/pubs/ft/fandd/2021/07/india-stack-financial-access-and-digital-inclusion.htm>*** *[Accessed 30 May 2023]*

From digital dividends to data for better lives

In practice, the government of India has interlinked three infrastructures to progress its vision for cashless society under the JAM (Jandhan Yojana, Aadhar, and Mobile) scheme which consists of:

1. Jandhan Yojana accounts, ensuring access to financial services, namely, basic savings and deposit accounts, remittance, credit, insurance, pension in an affordable manner.
2. Aadhaar cards, ensuring personal verification through the unique biometric ID system.
3. Mobile numbers of Indian citizens.

Under the JAM scheme, certainly many have benefited, for instance "street vendors and small traders without a bank account could receive payments for goods or services through a digital wallet"[(101)]. Moreover, as ITU's publication (2017) states "Aadhaar's platforms are inclusive, offering multiple options for people to make payments such as: smartphone users can make payment via Unified Payment Interface (UPI); Unstructured Supplementary Service Data (USSD) is available on a feature phone; and those without mobile phone or payment cards can make payments through AadhaarPay".

Despite this applauded success by international organisations such as World Bank, ITU and International Monetary Fund (IMF), numerous academic research and journalistic reports have raised controversies on the "Aadhaar" programme. A 2017 report[(102)] evidences how citizens are being denied welfare services, and children are unable to receive school lunches, school uniform or school bag and cap due to lack of Aadhaar Card.

Additionally, the report provides insights into bureaucratic challenges for schools to enrol parents and children in the Aadhaar programme so as to make them eligible for benefits. Another report[(103)] states that "even though the Aadhaar Act 2016 specifies clearly that Aadhaar is voluntary, the government is making the unique identity (UID) an integral part of every aspect of being a resident/citizen of the country." This aspect of "Aadhaar" is controversial as it reinforces the mechanisms of biopower from state to individual bodies, disabling the citizens of their absolute right over their bodies, prompting thus numerous reactions[(104)] from Indian activists and intellectuals.

Other research (Khera 2017) suggests that far from being inclusive and reducing corruption, Aadhaar is becoming a tool of exclusion, with little evidence of an impact on corruption in India's welfare programmes such as National Rural Employment Guarantee Act (NREGA) and the Public Distribution System (PDS) and pensions, etc.. While a ruling of Supreme Court in India has been the clearest indication that Aadhaar, is in fact, not compulsory or mandatory, many private services in India still require Aadhaar Card, and numerous Government welfare schemes and subsidies, including other government services such as filing income tax, require the citizen to possess an Aadhaar Card.

While Aadhaar programme represents an ambiguous example that seeks to encourage efficiency, saving, and inclusion of citizens in financial/welfare programmes – and perhaps, with all its good intentions – programmes such as this one, if not safeguarded by bold human rights standards and several layers of democratic checks, it may turn out as a technological dispositif of exclusion and control, solidifying dominant relations of power. While some may benefit, those most in need may be left behind. Therefore, if the core discourse of the 2030 Agenda for Sustainable Development is centred around universal values of human rights, equality, and non-discrimination—we should therefore ask: should budgetary savings and efficiency in the service of meeting basic needs receive priority? Perhaps, prioritising human rights standards and mechanisms before cutting-edge, large-scale technological innovations is not the most intriguing approach, but it ensures that no one is left behind in the process.

(101) *Idem*

(102) *Chowdhury Sh. R., 2017. By Making Aadhaar Mandatory, Delhi's Government Schools Are Shutting Their Doors to Migrant Children. [online] Available at:* ***<https://scroll.in/article/834418/by-making-aadhaar-mandatory-delhis-government-schools-are-shutting-their-doors-to-migrant-children>*** *[Accessed 21 June 2023]*

(103) *A. Chakraborty, 2017. With Aadhaar, government shows it wants to push India down a dark hole. [online] Available at:* ***<https://www.dailyo.in/politics/aadhaar-card-pan-link-uid-surveillance-privacy-biometrics-17033>*** *[Accessed 21 June 2023].*

(104) *A story curated with reactions is available here:* ***<https://www.dailyo.in/variety/aadhaar-pan-uid-mukul-rohatgi-biometrics-shyam-divan-16974>*** *[Accessed 21 June 2023].*

How are ICTs accelerating SDGs?

According to a report[(105)] published by the Earth Institute (Columbia University) and Ericsson (2015), ICTs can accelerate SDGs five major ways:

① Rapid diffusion of ICT: The adoption of mobile phones, computers, the Internet, and social media has been the fastest in human history, reaching billions of users worldwide and covering a large portion of the global population.

② Cost reduction: ICT enables the deployment of new services at lower costs, revolutionising sectors like healthcare, education, and finance, and bringing essential services to low-income countries.

③ Accelerated public awareness: Information about new technologies spreads quickly through the Internet, social media, and other digital channels, creating global awareness and demand for innovative services and solutions.

④ Rapid upgrading of applications: National and global information networks facilitate the rapid improvement and upgrading of technologies, with ICT applications becoming open source and inter-operable, fostering collaboration and knowledge exchange.

⑤ Low-cost online training platforms: ICT provides platforms for online training, such as Massive Open Online Courses (MOOCs), enabling access to high-quality educational resources and in-service training for workers, particularly in the use of ICT applications for SDG-oriented service delivery.

The report boldly underlines that "governments and policy makers more broadly have a special responsibility to ensure that key public sector agencies, institutions and policy frameworks are reformed to support ICT-enabled transformation." The crucial role of the public sector is further emphasised by the recommendation of seven key precepts as mitigation measures, acknowledging that government bureaucracies are rarely at the forefront of disruptive technologies.

Figure 3.2: Seven key precepts recommended by The Earth Institute, Columbia University & Ericsson
© The Earth Institute, Columbia UNiversity & Ericsson

1 Achieving the SDGs will require the rapid toll-out of ICTs throughout the public sector, including in e-governance, public administration, and the provision of ICT-supported public services including health, education and infrastructure;

2 Governments should establish timelines for universal broadband connectivity of public facilities and public services no later than 2020 to achieve the SGDs by the target date of 2030.

3 Public services should be ICT-enables so that businesses and citizens can interact with the public administration online for purposes of payments, transfers, tax administration, vital registrations, documents, and other purposes.
This e-governance will lower the cost of public services, reduce the opportunities for corruption, and create a flow of "big data" that can be collected, processed, and analyzed to improve public service delivery and to support evidence-driven policymaking.

4 Government should partner with the universities to scale-up ICT training programs and to create innovation hubs to develop new ICT applications;

5 Givernments should foster Public-Private Partnerships to accelerate the development and uptake of locally designed and targeted ICT applications;

6 Governments should upgrade STEM (science, technology, engineering, and mathematics) education in primary and secondary education to build long-term skills and technology readiness.

7 Governments should create national online and open databases that incorporate the big data from public service provision (e.g. the data collected in schools and clinics) and from satellites, remote sensors, and other connected devices in the Internet of Thigns. This real-time online datawill be a critical resource for achieving the SDGs, and for promoting investments by private sector.

While governments play a crucial role in implementing policy reforms, regulatory frameworks, and ICT-enabled infrastructure and services, collaboration with academia and civil society is essential. The private sector, on the other hand, assumes the role of the "innovator" in disruptive technologies.

However, alongside the enthusiasm for ICT's contribution to SDGs, it is important to acknowledge the potential downsides and risks, such as internet or power grid failures, cyber warfare, surveillance, automation of jobs, the displacement of human labour by robots, and more. With this understanding, and with awareness of the downsides associated with ICTs, the upcoming section will explore specific case studies that exemplify how ICTs have made significant contributions to advancing SDGs 1 (No poverty), 2 (Zero hunger), 3 (Good health and well-being), 5 (Gender equality), and 10 (Reduced inequalities) in diverse contexts.

(105) *Sachs D. J., et. al., 2015. How Information and Communications Technology Can Achieve the the Sustainable Development Goals. (pdf) Available at: **<https://onestoneadvisors.com/wp-content/uploads/2017/09/ICT-and-the-SDGs.pdf>** [Accessed 21 June 2023]*

ICT for SDG 1 (No Poverty): Nkalô - Agricultural market analysis tool for African farmers

The SDG 1 (No Poverty) aims to end poverty in all its forms everywhere by 2030. It is necessary, however, to emphasise that extreme poverty, the most severe form of poverty, is defined as income of less than on less than US $1.25 a day. Given current trends, 575 million people (nearly 7% of the world's population) will still be living in extreme poverty in 2030 compared to 800 million in 2015 (or 10.8%), and eradicating extreme poverty will be particularly difficult in sub-Saharan Africa and conflict-affected areas(106). All the progress achieved since the adoption of SDGs in 2015 has been erased by the Covid-19 global pandemic, wars such as the one in Ukraine, and the rising inflation.

Small producers are vulnerable to price fluctuations due to market volatility and limited access to information. The Nkalô initiative – established by the French NGO Rongead and its partner ETC Terra in Burkina Faso – aimed at responding to this need by providing information services designed to support African farmers by providing them with timely and relevant agricultural advice and information to all players of the value chain, promoting and ensuring a first level of fair trade that extends beyond just – and limited to – niche markets.

The initiative utilises mobile technology to deliver agricultural information directly to farmers, helping them improve their farming practices, increase productivity, and enhance their livelihoods. The service utilises a combination of voice messages, SMS alerts, and interactive voice response (IVR) systems to reach farmers in remote areas who have limited access to traditional agricultural extension services. Nkalô's services cover several sectors including cashew, sesame, maize, onion, shea, peanuts. Between 2009 and 2011, nearly 13,000 cashew producers, along with hundreds of traders, received information and advice from N'kalô.

Box 3.1: How does Nkalô's system work?

First, the organisation makes a thorough study of the particular commodity sector [for example, cashew, sesame, cacao, etc.]. It then makes contact with a network of informants representing the range of actors in the value chain. These informants are not paid in cash: they provide information in exchange for information they are interested in. For example, a trader will tell N'kalô what his current prices and volumes are in exchange for information on the international price. CTA has supported the training of three specialists, one in each country, in gathering and analysing such information.

N'kalô calls or meets these informants each week to gather quantitative and qualitative information on each market segment. The information then goes to an analyst who processes, checks and consolidates it into a bulletin and summary text messages.

This summary is disseminated through various channels: text messages to mobile phones, radio programmes, email and blogs. Over the last 2 years, CTA has supported the production of 73 unique SMS messages, each distributed to an average of 47,500 recipients, along with and 211 bulletins.

N'kalô also sends out information on the weather, good agricultural practices, and technical guides about collective sales, marketing, certification, traceability, etc.. This information can be sent via text messages where farmers, for example in Côte d'Ivoire, can get the text messages by subscribing to "7818", a service created by Orange, a mobile phone operator.
Such messages help farmers decide when to sell and to whom; they no longer feel they have to sell to the first trader who comes along. The newsletters go to local buyers, processors, exporters and international buyers. They are interested in different types of information: they may want to manage their risk in marketing the crop, make good marketing decisions, design new approaches, assure supplies, learn about market trends and forecast the future. They may want to anticipate problems before they occur and stabilise their cash flow. N'kalô responds to ad-hoc requests for information and advice(107).

(106) *UN's Department of Economic and Social affairs. Goal 1 - End poverty in all its forms everywhere. [online] Available at:* ***<https://sdgs.un.org/goals/goal1>*** *[Accessed 21 June 2023]*

(107) *For more in-depth information, please read the publication "Cashew on your phone" published by the Technical Center for Agricultural and Rural Cooperation, available at:* ***<https://publications.cta.int/media/publications/downloads/2000_PDF_J1Lc1oL.pdf>*** *[Accessed 26 June 2023].*

ICT for SDG 1 (No Poverty): Nkalô - Agricultural market analysis tool for African farmers

Nkalô plays a significant role in contributing to SDG 1, which aims to eradicate poverty in all its forms. By providing valuable agricultural information and advice, the initiative helps farmers enhance their productivity and income levels. Access to timely and accurate information on crop cultivation techniques, weather patterns, market prices, and pest management enables farmers to make informed decisions, optimise their yields, and improve their economic conditions. By empowering farmers with knowledge and tools, Nkalô contributes to reducing poverty and creating sustainable livelihoods in rural African communities.

While Nkalô brings substantial benefits to African farmers, it is important to acknowledge some of the main limitations associated with the initiative:

- **Staff retention:** According to Zeug et. al. (2017) the initiative considers the 'human factor' to be critical to the collection of food price data; therefore, retention of staff is a critical challenge. The local analyst must build a solid and trusted network with various members of the value chain. Development of skills in market analysis requires training and capacity development. Well-qualified staff can be attracted to work for other organisations; loss of staff to competitors is a great loss of human capital.

- **Limited access:** The effectiveness of Nkalô is contingent upon farmers having access to mobile phones and reliable network coverage. In areas with inadequate infrastructure, some farmers may not be able to fully benefit from the service.

- **Technological dependency:** Nkalô relies heavily on mobile technology, which can be susceptible to disruptions, such as power outages or network failures. These technological dependencies can limit the consistent and uninterrupted delivery of information to farmers. Furthermore, sourcing and maintaining an IT service provider, setting up a subscription system and obtaining a short number and authorisations for server installation, proved to be challenging—especially when the subscription system went down and the service lost more than 80% of its users; getting users back was not easy (Zeug et. al. 2017: 32).

ICT for SDG 2 (Zero Hunger): Smart greenhouses in Laikipia County

End hunger, achieve food security and improved nutrition, and promote sustainable agriculture are the main targets of the SDG 2 (Zero Hunger). According to the United Nations[(108)] 1 in 10 people worldwide are suffering from hunger, as well as nearly 1 in 3 people lack regular access to adequate food. Furthermore, projections show that by 2030, approximately 670 million people will still be facing hunger – 8% of the world's population, the same as in 2015.

The situation globally has been worsened by a number of events. The war in Ukraine has contributed to food shortage for the world's poorest people. Ukraine and the Russian Federation supply global exports of 30% of wheat, 20% of maize, and 80% of sunflower seed products[(109)]. Other events that triggered food shortages and instabilities include Covid-19 pandemic, rising inflation, climate change-related disasters, and growing inequalities.

Laikipia County, located in northern Kenya, is a semi-arid region experiencing the dramatic effects of climate change. Agriculture remains a culturally marginalised occupation primarily entrusted to women. Consequently, the experimentation of innovative technological solutions for local agriculture can have a significant impact in various areas, including food security, economic sustenance, climate resilience, and women's empowerment.

"The Smart Greenhouse" project, implemented by the CELIM ("Centro Laici Italiani per le Missioni") organisation and supported[(110)] by "Innovazione per lo Sviluppo" programme, focuses on sustainable food production and agriculture in Laikipia County. The project includes a wide range of partnerships between Italy and local partners in Kenya aiming to strengthen the resilience of Masai agro-pastoral communities in Laikipia County by evaluating the effectiveness of the FarmShield technological solution developed by Synnefa Green Limited, an agritech company in Kenya. The partnership features a close collaboration with Laikipia Permaculture Centre (LPC), a local trust that promotes agroecology and the enhancement of several production chains in which Maasai communities in Laikipia County are involved: honey, aloe, cactus, moringa.

By harnessing innovative technologies and climate control systems, the project has successfully increased crop production, ensuring year-round cultivation and substantially improving crop yields. This achievement has played a crucial role in addressing food scarcity and alleviating hunger within the Maasai community. Moreover, the project has placed a strong emphasis on enhancing nutritional access for the community by prioritising the cultivation of diverse and nutrient-rich crops.

The implementation of smart technologies within the greenhouses has also led to improved water and resource efficiency. Through the integration of automated irrigation systems and precise climate control mechanisms, the project has minimised water wastage and optimised the utilisation of resources. This emphasis on sustainable agricultural practices not only ensures the long-term viability of the project but also reduces its environmental footprint. By conserving water and efficiently managing resources, the initiative contributes to the broader objective of sustainable development.

By leveraging innovative technologies, the project has made substantial contributions to SDG 2 (Zero Hunger), addressing food insecurity and promoting sustainable agricultural practices.

(108) *UN's Department of Economic and Social affairs. Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable growth. [online] Available at:* ***<https://sdgs.un.org/goals/goal2>*** *[Accessed 26 June 2023]*

(109) *Idem.*

(110) *It should be noted that the project's implementing partner, "CELIM," has previous experience with similar projects. In 2021, CELIM collaborated with organizations like "Istituto Pace Sviluppo Innovazione ACLI," CAP Holding Milano, Laikipia Permaculture Centre, and the University of Milan's Department for Food, Nutrition, and Environment. Supported by the Italian Agency for Development and Cooperation, they implemented a project called "Cultivate the Future." This project focused on building an infrastructure for smart agritech initiatives. Additionally, the project introduced various aloe-based products, such as shampoos, conditioners, creams, soaps, and aloe flower herbal teas. This contributed to achieving Sustainable Development Goal 1 (No Poverty) by creating new income-generating opportunities.*

ICT for SDG 2 (Zero Hunger): Smart greenhouses in Laikipia County

Box 3.2: Four-phase approach

One interesting feature of the project "Smart greenhouses" is the ability of partners to work in a long-term perspective which helped them establish solid foundations for the project. As "Innovazione per lo Sviluppo", the programme that supported and incubated the initiative, documented, the project involved four main phases over a period of almost two years:

1. **Field Study on Beneficiaries, Territory, and Needs (October-November 2021)**: Synnefa Green Limited, in collaboration with the active local NGOs, conducted two field visits to gather data on existing greenhouses, environmental characteristics of the territories, soil and water tests, production outputs, and challenges. This action, except gathering first-hand evidence of the context, ensured close collaboration with the NGOs that have been working in the area for years.

2. **Business Acceleration for the Innovator (October 2021-January 2022):** Sote Hub trained and assisted Synnefa Green Limited, one of the project's partners, in developing context-specific digital training materials, devising an efficient digital marketing strategy, improving their online presence, and revising the business plan.

3. **Installation of 5 Smart Greenhouses (December 2021-March 2022):** Upon verifying the findings from Phase 1 and making any necessary strategy adjustments, the project constructed one new 8m x 15m metal greenhouse at the Laikipia County centre, equipped with a water tank and irrigation system. The FarmShield sensor system was installed in this greenhouse as well as the four existing greenhouses located in the target groups of Nabulu, Osuguroi, Twala, and Naatum. Additionally, seeds, fertilisers, and agricultural materials have been procured for all five greenhouses. The project also considers introducing drip irrigation systems and tanks in three of the existing greenhouses, where water availability is allowed based on previous well drilling.

4. **Training, Monitoring, and Data Collection (March-June 2022):** Synnefa Green Limited, the agritech company and project partner, conducted eight training sessions for the Laikipia County representatives and the four target groups on smart greenhouse management. The NGOs provided periodic technical assistance throughout the various stages of cultivation, from nurseries to harvesting, and collected data on crop yields, comparing them, whenever possible, with previous data. Furthermore, they collaborated with Synnefa Green Limited to systematise the data collected with FarmShield, building a reference database for the microclimatic conditions in Laikipia.

While the project's comprehensive approach, combining smart agricultural technologies, capacity-building, and community engagement, aimed to empower the Maasai community to become self-reliant and create a pathway towards sustainable development, nonetheless, it is crucial to consider the cost implications, technological dependencies, and other social, political and economic factors associated with such initiatives to ensure their long-term viability and effectiveness in supporting sustainable development goals.

(111) *Innovazione per lo Sviluppo, 2021. Serre intelligenti in Kenya. [online] Available at:* ***<https://innovazionesviluppo.org/call/serre-intelligenti-kenya/>*** *[Accessed 26 June 2023].*

ICT for SDG 3 (Health and Well-being): Integrated Refugee Health Information System (iRHIS)

The state of health worldwide has been immensely challenged by the Covid-19 pandemic. According to UN data[(112)], Covid-19 pandemic infected over 500 million people worldwide (until mid-2022), led to 15 million deaths, disrupted essential health services in 92% of countries, and halted progress on universal health coverage. Additionally, 22.7 million children missed the basic vaccines in 2020, 3.7 million more than in 2019, causing thus a regress in children's overall health. Ultimately, for the first time since 2005, tuberculosis-related deaths rise to 1.2 million in 2019 and 1.3 million in 2020.

Health sector has been one of the earliest sectors which leveraged cutting-edge technologies to advance health systems, particularly in the Majority World. Firstly, ICT enables efficient and accessible health information systems, facilitating the collection, storage, and analysis of health data. This data-driven approach allows for evidence-based decision-making, improved disease surveillance, and targeted interventions. Additionally, ICT enhances healthcare delivery through telemedicine and remote patient monitoring, enabling virtual consultations and timely interventions, particularly in remote or underserved areas. Mobile health applications and wearable devices promote self-care, health education, and prevention, empowering individuals to actively manage their health.

The iRHIS (Integrated Refugee Health Information System) is an innovative initiative implemented by the United Nations High Commissioner for Refugees (UNHCR). It was developed in response to the growing need for a comprehensive and efficient health information system to support refugees worldwide. In refugee operations, information systems are often forced to operate in difficult environments. A lack of coordination, rapidly evolving operational environment, uncertain access and communication, and rapid turnover of staff all contribute to disrupted gathering and flows of health information[(113)]. The project commenced in 2015 with the aim of addressing the challenges faced in managing healthcare data and providing quality health services in refugee settings.

The iRHIS is a digital platform designed to collect, store, and manage health data of refugees in a streamlined and accessible manner. It utilises a web-based and mobile application that allows healthcare providers, field staff, and policymakers to input, retrieve, and analyse data related to the health status of refugees. The system captures various health indicators such as disease prevalence, immunisation coverage, maternal and child health, and healthcare service utilisation. It also incorporates features for tracking medical supplies, monitoring disease outbreaks, and facilitating communication among healthcare teams.

Box 3.3: Four ways that iRHIS helped refugees to receive care

The implementation of iRHIS has had a significant impact on supporting refugees worldwide. However, four main areas have benefited by implementation of iRHIS:

1. Firstly, it has improved **the efficiency and effectiveness** of healthcare delivery in refugee camps and settlements. By providing accurate and real-time health data, the system enables healthcare providers to identify and respond to emerging health needs promptly. It also enhances coordination among different stakeholders involved in refugee healthcare, leading to better resource allocation and more targeted interventions.

2. Secondly, it improved **coordination and collaboration** among healthcare providers, NGOs, and other stakeholders involved in refugee healthcare. The system allows for seamless sharing of health data, including medical histories, treatment plans, and diagnostic reports, ensuring continuity of care and avoiding duplication of services. This integrated approach has led to better healthcare outcomes for refugees.

3. Thirdly, **it enhances access to care,** as the system ensures that accurate and up-to-date health records are available for each individual, regardless of their location or mobility within refugee camps.

4. And, fourthly, it improved **health monitoring and evaluation** by providing robust health monitoring and evaluation in refugee settings. The system generates comprehensive reports and analytics, allowing UNHCR and partner organizations to assess the impact of healthcare interventions, identify gaps in service provision, and make data-driven decisions to improve the quality and effectiveness of healthcare programs.

(112) UN's Department of Economic and Social affairs. Goal 3 - Ensure healthy lives and promote well-being for all at all ages. [online] Available at: <https://sdgs.un.org/goals/goal3> [Accessed 26 June 2023]

(113) UNHCR, 2021. IRHIS Training Manual - Web and Mobile Applications. [pdf] Available at: <https://his.unhcr.org/home> [Accessed 26 June 2023].

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ICT for SDG 3 (Health and Well-being): Integrated Refugee Health Information System (iRHIS)

Refugees remain among the most vulnerable groups who are exposed to multiple discriminations, difficult living conditions, and with numerous rights denied and/or violated. Having the opportunity to receive healthcare in a refugee setting means also having access to the fundamental human right of universal healthcare. Therefore the iRHIS has played a crucial role in accelerating the achievement of SDG 3 (Good Health and Well-being) in refugee populations. It has contributed to the improvement of health outcomes by ensuring better access to essential healthcare services, including primary healthcare, reproductive health, and immunisation. The system has facilitated the monitoring and evaluation of health programs, enabling evidence-based decision-making for effective interventions. Additionally, iRHIS has strengthened disease surveillance and early warning systems, allowing for timely response to disease outbreaks and prevention of further spread.

Despite its notable success and benefits that brings among refugee populations worldwide, the iRHIS has also certain limitations. One major challenge is the need for reliable internet connectivity in refugee settings, as limited infrastructure and unstable networks can hinder data collection and transmission. Another limitation is the requirement for sufficient training and capacity-building for healthcare staff to effectively utilise the system. Many external organisations are designing online training and other capacity building activities to train health workers in using iRHIS. Ensuring data privacy and security is another critical concern that needs to be addressed to protect sensitive health information. Only last year (2022) the International Red Cross Committee's servers hosting personal data belonging to more than 515,000 people worldwide were hacked in a sophisticated cyber attack[(114)]. Regardless of these limitations, the iRHIS serves as a promising model for leveraging technology to address the health needs of vulnerable populations worldwide.

(114) *International CCommittee of the Red Cross, 2022. Cyber Attack on ICRC: What we know. [online] Available at:* ***<https://www.icrc.org/en/document/cyber-attack-icrc-what-we-know>*** *[Accessed 26 June 2023]*

ICT for SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities): The SolarSister social enterprise in Africa to empower women through clean energy

WHO's report "Violence against Women Prevalence Estimation" (2018) stated that the violence against women remains "a global public health crisis of pandemic proportions." The UN's recent data[(115)] indicates that more than 1 in 4 women (641 million), older than 15 years old, have been subjected to intimate partner violence at least once in their lifetime. When it comes to political representation of women, women's share in national parliaments has seen marginal progress, increasing from 22.4% in 2015 to 26.2% in 2022, a pace which would require 40 years for women and men to share equal representation in national parliaments.

The SDG 5 (Gender Equality) aims at achieving gender equality and empowering all women and girls by ending all forms of discrimination, eliminating all forms of violence in the public and private spheres, eliminating all harmful practices, such as child, early and forced marriage and female genital mutilation, etc..

On the other hand, SDG 10 (Reduced Inequalities) aims to reduce inequality within and among countries. Certainly, the utopic tone of this SDG is challenged by Covid-19 pandemic which caused the first rise in between-country income inequality in a generation[(116)]. Additionally, by mid-2022, one in 251 people worldwide was a refugee, the highest proportion ever documented.

ICT plays a pivotal role in promoting gender equality by eliminating barriers and providing equal opportunities for women and girls. Through connectivity, ICTs facilitate equal access for women to markets, education, training, and employment, creating pathways to sustainable livelihoods and enhancing overall opportunities. When it comes to reducing inequalities, ICTs can play the role of enablers to break the barriers in education, enhance employment opportunities, increase participation in social, cultural and political life, thus enabling social and economic advancement.

However, ICT-based projects to close the gender divide gap and empower women are mainly organised into three main overarching themes:

① Projects that aim to build and enhance technical competencies among women. These projects are delivered in the form of residential or online learning courses where women come closer to STEM disciplines. Such projects have a great appeal among funders and they are relatively easy to implement.

② Another theme is health, where women, particularly in vulnerable environments, receive health services such as mammography, reproductive health-related services, etc.. These projects are cst-expensive and they take the form of 'mobile hospitals'.

③ The third theme relates to women's safety to address the problem of violence against women. Projects such as this one are mainly implemented in the form of mobile applications allowing women to report rapidly providing features like emergency alerts, GPS tracking, and access to helplines. Online-counselling or virtual legal aid services are also popular approaches to gender-based violence.

④ Finally, financial inclusion of women is another popular theme under which many projects and initiatives are taken-off. Projects under this umbrella are shaped around small and medium enterprises supported by microcredit institutions. Additionally, other initiatives include social enterprises in forms of e-commerce platforms that support's women artisan work, digital platforms and applications for employment, etc..

(115) *UN's Department of Economic and Social affairs. Goal 5 - Achieve gender equality and empower all women and girls. [online] Available at:* ***<https://sdgs.un.org/goals/goal5>*** *[Accessed 26 June 2023]*

(116) *UN's Department of Economic and Social affairs. Goal 10 - Reduce inequality within and among countries. [online] Available at:* ***<https://sdgs.un.org/goals/goal10>*** *[Accessed 26 June 2023]*

ICT for SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities): The SolarSister social enterprise in Africa to empower women through clean energy

The pioneering Solar Sister social enterprise is a prime example of how to tackle multiple SDGs through one-off efforts. Faced with numerous local challenges such as lack of access to energy, gender inequalities, as well as the occurrence of the hazards of conventional home energy use—the enterprise, created in 2010 in Uganda, aims to empower women by giving them economic opportunities "through last mile distribution of clean energy products (starting with solar-powered technologies and later adding clean cookstoves). It was replicated in Nigeria in 2012 and in Tanzania in 2013"[(117)]. According to Petersen (2012: 2) each solar sister is equipped with a "Business in a Bag" containing about ten different solar products to be sold in her respective community. [...] When compared with kerosene all solar products are superior, but when compared with each other there is definitely a hierarchy of products. Such products include phone charging, various types of LED lights, PV panels, etc.. From the time Solar Sister began in 2010, the organisation has recruited, trained, and supported over 5,019 women entrepreneurs who have sold 402,626 solar lamps and related clean energy products to 1,765,304 people living in rural Africa.

Box 3.4: Targeting multiple SDGs with one initiative

Impact on SDG 5: Gender Equality

Solar Sister's impact on SDG 5 (Gender Equality) is profound. By training and empowering women as "Solar Sister Entrepreneurs", Solar Sister challenges gender norms, enabling women to become agents of change in their communities. These empowered women entrepreneurs not only gain financial independence but also contribute to decision-making processes, challenging traditional gender roles and fostering women's leadership. Through Solar Sister, women gain a set of competencies and skills, confidence and self-esteem, and a platform to advocate for their rights, driving progress towards gender equality.

Impact on SDG 10: Reduced Inequalities

The enterprise, through its innovative approach, contributes immensely in reducing inequalities (SDG 10), specifically among women living in rural zones. Solar Sister addresses social and economic inequalities by creating income-generating opportunities for women in underserved communities. By bridging the energy gap, it reduces disparities between rural nd urban areas, promoting inclusivity and reducing inequalities.

Impact on other SDGs:

SDG 1 (No Poverty): Solar Sister contributes to poverty alleviation by empowering women entrepreneurs to generate income and support their families. Access to affordable clean energy improves productivity, expands economic opportunities, and lifts communities out of poverty.

SDG 7 (Affordable and Clean Energy): Solar Sister contributes to SDG 7 by increasing access to clean energy solutions in rural communities, reducing reliance on fossil fuels and improving energy affordability and sustainability.

SDG 13 (Climate Action): By promoting the use of clean energy alternatives, Solar Sister mitigates climate change by reducing greenhouse gas emissions. Solar products replace kerosene lamps and diesel generators, reducing carbon footprints and improving environmental sustainability. Additionally, it contributed in reducing and mitigating the hazards from conventional home energy use such as kerosene and wood (or wood derivatives).

While Solar Sister has made significant strides in addressing inequalities, some challenges remain. These include limited access to capital and resources, particularly in rural areas, which hampers the scalability of SolarSister's operations. Securing funding for training, expanding product lines, and reaching more communities remains a challenge. Market reach is another challenge as reaching remote and isolated communities with limited infrastructure poses logistical challenges, hindering the distribution and adoption of solar products. Additionally, deep-rooted social-cultural norms and barriers, as well as gender inequalities may impede the full participation of women in Solar Sister's entrepreneurial activities.

(117) *SEED, 2011. Solar Sister: Empowering women in Africa through clean energy solutions. [pdf] Available at:* ***<https://seed.uno/articles/case-studies/case-study-solar-sister>*** *[Accessed 26 June 2023].*

ICT4SDG landscape in Italy: policy and practice

Information and Communication Technologies for Sustainable Development Goals (ICT4SDG) have become crucial tools in addressing social, economic, and environmental challenges. Italy, with its rich technological landscape and commitment to sustainable development, has made significant strides in leveraging ICTs to achieve the United Nations' Sustainable Development Goals (SDGs). In this section we will explore the policy framework by mapping some of the key policy documents in Italy's ICT4SDG landscape. Additionally, we will look more in-depth at the “Innovation for Development” programme, as a long-term effort in helping achieve numerous SDGs both in Majority Countries and in Italy.

Policy Mapping

“Towards the Gigabyte Society”

Italy has established a robust policy framework to harness the potential of ICTs in achieving the SDGs. The National Strategy for Ultra Broadband known as “Towards the Gigabyte Society” aims to ensure widespread high-speed broadband connectivity, bridging the digital divide and enabling access to digital services across the nation[118]. While the strategy itself does not explicitly address the UN' Sustainable Development Goals (SDGs), its focus on improving digital infrastructure and connectivity has significant implications for several SDGs, such as:

- **SDG 3 (Good Health and Well-being):** according to the strategy (2021: 14) the “Connected Health System” ("Sanità Connessa") measure aims to provide ultra-wideband connectivity at 1 Gbit/s to about 12,280 health facilities across the country. The total cost of the intervention is estimated at 501 million euros. Of the total number of facilities, about 4,700 buildings (based on the latest 2020 mapping) will need to support the roll-out of networks capable of providing the aforementioned level of connectivity. The new network will consist of active and passive elements (including fibre off and active equipment). Once connected to the new network infrastructure, health facilities will benefit from ultra-wideband connectivity services, technical support, and maintenance service. Health facilities will also receive the terminal equipment (modem/router) needed to connect to the network.

- **SDG 4 (Quality Education):** reliable and high-speed internet connectivity is one of the crucial components for promoting quality education. The availability of broadband networks can enhance access to educational resources, facilitate e-learning platforms, and enable remote education, especially in underserved areas. Therefore, the "Connected Schools" (“Scuole Connesse”) measure aims to complete, with the same intervention model launched in 2020, the Plan for ultra-wideband coverage of all school buildings in the country, with a total cost estimated at 261 million euros. Specifically, the plan includes coverage with 1 Gbit/s connectivity and the provision of operation and maintenance services (2021: 13).

- **SDG 10 (Reduced Inequalities):** the objective of “The Voucher Plan”, which has a total allocation of more than 1 billion euros, is to promote and incentivise demand for ultra-wideband connectivity services in all areas of the country, with the aim of expanding the number of households and businesses that take advantage of digital services using high-speed networks at least 30 Mbit/s. As the strategy itself states, “the intervention, therefore, does not have a purely welfarist purpose, but aims to incentivise the use of more advanced technologies and services by increasing the propensity to use the Internet and and reducing the digital skills gap that, as evidenced by the relevant Digital Economy and Society Index, still penalises [Italy].” The measure, hence, is divided into two phases: the first, already launched in 2020, in favour of households with income less than 20,000 euros to which a contribution of 500 euros is allocated (200 euros for connectivity and 300 euros for tablets or PCs on loan for use), responded to the need to cope, in the first phase of the Covid-19 pandemic, with the effects of the health emergency and to guarantee suitable connection services to give continuity to the school and work activities of households; the second phase, on the other hand, concerns other households and small and medium-sized businesses.

(118) *Ministry for Technological Innovation and Digital Transition, 2021. Verso la Gigabit Society. [pdf] Available at:* ***<https://assets.innovazione.gov.it/1622021525-strategia-bul.pdf>*** *[Accessed 23 June 2023]*

ICT4SDG landscape in Italy: policy and practice

"Digital Agenda"

The Italian government's "Digital Agenda" was launched in 2012 and sets out a comprehensive strategy for the development of the digital economy and society in Italy. The agenda includes a range of initiatives related to ICT4D, such as the promotion of e-government services, the development of digital skills, and the use of ICTs to support social innovation.

In its "Three-Year Plan for Information Technology in Public Administration" (updated version 2022-2024), the document lies down its guiding principles which safeguard the plan's implementation:

- **digital & mobile first (digital and mobile first option):** public administrations must implement primarily digital services;
- **digital identity only (exclusive access through digital identity):** public administrations must exclusively adopt digital identity systems defined by legislation;
- **cloud first (cloud as first option):** public administrations, when defining a new project and developing new services, shall primarily adopt the cloud paradigm, taking into account the need to prevent the risk of lock-in;
- **inclusive and accessible services:** public administrations must design digital public services that are inclusive and meet the diverse needs of people and individual territories;
- **public data a common good:** the public administration's information assets are a fundamental asset for the country's development and must be enhanced and made available to citizens and businesses, in an open and interoperable form;
- **interoperable by design:** public services must be designed to operate in an integrated and seamless manner throughout the single market by exposing appropriate APIs;
- **security and privacy by design:** digital services must be designed and delivered securely and ensure the protection of personal data;
- **user-centric, data-driven and agile:** administrations develop digital services by providing agile ways of continuous improvement, starting with the user experience and based on continuous measurement of performance and usage;
- **once only:** governments should avoid asking citizens and businesses for information that has already been provided;
- **cross-border by design (designed as cross-border):** public administrations must make relevant digital public services available across borders;
- **open code:** public administrations must prefer to use software with open code and, in the case of software developed on their behalf, the source code must be made available.

Some of the principles, to a certain degree, contribute to the Sustainable Development Agenda. For example, the principle *"Digital and mobile first"* promotes the development and implementation of digital services by public administrations. This enhances technological infrastructure, fosters innovation, and contributes to the development of robust and accessible digital ecosystems, aligning with SDG 9 (Industry, Innovation, and Infrastructure). The principle "Inclusive and accessible services" by prioritising inclusivity and accessibility, public administrations can contribute to reducing inequalities (SDG 10) in access to services, ensuring that all individuals, regardless of their background or location, can benefit from digital advancements. The *"Public data a common good"* principle promotes transparency, accountability, and strengthens institutions, aligning with SDG 16 (Peace, Justice, and Strong Institutions) - and SDG 17 (Partnerships for the Goals).

However, other principles may need to be reconsidered in order to better align them with the Sustainable Development Agenda. The *"Cloud first"* principle, while promoting the adoption of cloud technologies, should consider the environmental impact and potential risks associated with data storage, as well as energy and water consumption. Additionally, a strong emphasis should be given in terms of intersection between cloud infrastructure and privacy, that is, who builds and owns the cloud infrastructure, particularly in cases of Private-Public Partnerships? The *"Digital identity only"* principle, which exclusively adopts digital identity systems defined by legislation, should be implemented with caution to avoid potential biases or discrimination. This guiding principle can potentially have negative implications for certain Sustainable Development Goals (SDGs):

ICT4SDG landscape in Italy: policy and practice

- **SDG 1 (No Poverty):** Requiring exclusive digital identity systems might marginalise those who lack access to such systems, exacerbating poverty. People without digital identities might lose access to essential services or benefits, pushing them further into poverty.

- **SDG 4 (Quality Education):** If educational resources or opportunities are gated behind digital identity systems, those without such identities—often the most vulnerable—might be denied access, hindering inclusive and equitable quality education.

- **SDG 5 (Gender Equality):** In many regions, women might be less likely to have digital identities due to societal norms, lack of access to technology, or other barriers. This could lead to further gender inequality as women are denied access to services and opportunities.

- **SDG 10 (Reduced Inequalities):** The exclusive adoption of digital identity systems can widen the gap between those with access to such systems and those without. This can perpetuate inequalities, particularly in regions where digital access and literacy are not universally available.

- **SDG 16 (Peace, Justice, and Strong Institutions):** The mandate for exclusive digital identity might be perceived as an infringement on personal freedoms or privacy. If not implemented transparently and inclusively, it could lead to mistrust in institutions. Additionally, there's a risk of misuse of centralised digital identity data, leading to potential human rights violations.

- **SDG 17 (Partnership for the Goals):** Collaboration can be hindered if certain groups or entities lack the required digital identity to engage in partnerships or access shared resources.

Care and human rights-based approach, therefore, must be taken to ensure that digital identity systems do not perpetuate gender-based and other inequalities or exclude individuals from key services such as health, education, welfare, etc., who may face challenges in accessing digital identification.

ICT4SDG landscape in Italy: policy and practice

"National Strategy for Artificial Intelligence"
This strategy, launched in 2021, aims to promote the development and adoption of artificial intelligence (AI) technologies in Italy for the three-year period between 2022-2024.

The strategy includes "24 policies to accelerate, over the next three years, innovation and the potential of AI in the economic and social fabric of the country."[(119)].

The strategy consists of the three main components which are synthesised briefly in the following table:

Table 3.1. Synthesised overview of the main components of the Government of Italy's "National Strategy for Artificial Intelligence"

Objectives	Priority Sectors	Strategic areas of intervention and policies
Objective 1. Advance frontier research in AI	Education system.	1. Talent and Skills: development of human resources with AI skills
Objective 2. Reduce AI research fragmentation	Education system.	2. Research: research initiatives focused on both fundamental and challenge-driven AI.
Objective 3. Develop and adopt human-centred and trustworthy AI	Culture and tourism.	3. Applications: innovation initiatives, aimed at accelerating AI adoption in priority sectors and at strengthening the AI technology production ecosystem.
Objective 4. Increase AI-based innovation and the development of AI technology	Health and wellbeing.	
Objective 5. Develop AI-driven policies and services in the public sector	Environment, infrastructure and networks.	
Objective 6. Create, retain and attract AI talent in Italy	Banking, finance, and insurance.	
	Public Administration	
	Smart cities, areas. and communities.	
	National Security	
	Information Technologies.	

While these three components pave the way for the adoption and implementation of numerous AI-related initiatives and policies, the strategy also incorporates five guiding principles aimed at safeguarding the adoption and implementation of AI-driven policies and interventions.

Figure 3.1: Guiding principles © Italian Government's Strategic Programme on Artificial Intelligence (2022-2024)

(119) *Governo Italiano, Dipartimento per la trasformazione digitale, 2021. Intelligenza Artificiale: l'Italia lancia la strategia nazionale. [online] Available at:* ***<https://innovazione.gov.it/notizie/articoli/intelligenza-artificiale-l-italia-lancia-la-strategia-nazionale/>*** *[Accessed 30 June 2023].*

ICT4SDG landscape in Italy: policy and practice

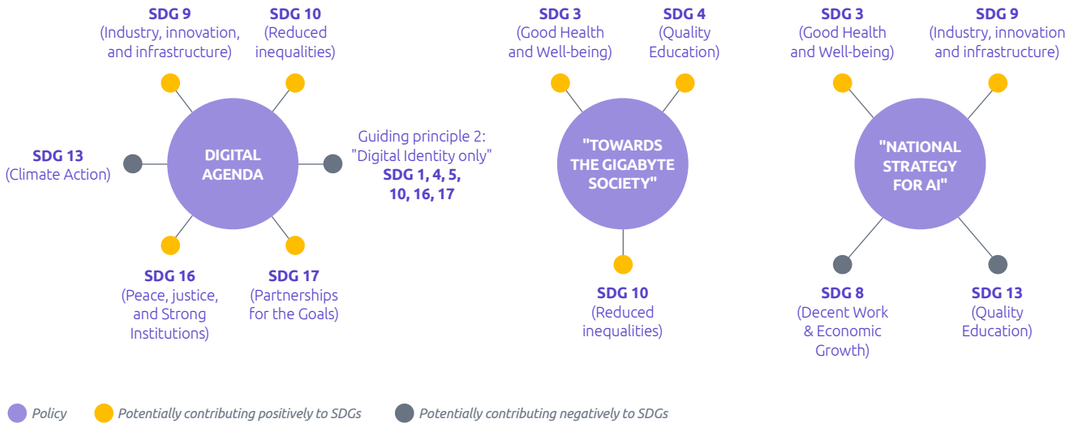
The strategy reflects the enthusiasm surrounding AI, similar to other European countries' national strategies. The primary focus is on funding research, developing and retaining talent, and integrating AI into public services to enhance efficiency and reduce costs. Like most other strategies, this one also highlights the importance of developing human-centred (sometimes referred to as "human-in-the-loop"), trustworthy, and sustainable AI. However, it is worth noting that in international debates, such terminologies are often seen as rhetorical devices used to camouflage the negative aspects of AI, known as 'AI washing.[(120)]'.

It is important to recognise the contradictions that arise when aligning the guiding principles of the strategy with some of the SDGs. One such contradiction is found in guiding principle number 3, which emphasises the development of human-centred, trustworthy, and sustainable AI. While the principle aims to promote inclusive and sustainable growth, the infrastructure required to support and operate AI-driven technologies consumes significant amounts of energy and water[(121)(122)], contributing negatively to SDG 13 (Climate Action).

As discussed in the previous chapter, AI can be considered part of the emerging paradigm known as “Digital for Development” or “ICT4D 3.0”. It is currently experiencing a boom in hype. Advocates tout the immense potential and advantages of AI, claiming that the development sector can greatly benefit from it[(123)]. Contrary to this, critics argue that the damages and risks associated with AI are empirically proven, and it is often the vulnerable groups that will be most impacted (O’Neill 2016; Eubanks 2018; Benjamin 2019; Perez 2019, McQuillan 2022).

The Italian Government's "National Strategy for Artificial Intelligence" brings forth significant components and guiding principles that aim to shape the adoption and implementation of AI-driven policies and interventions. While there are positive aspects aligned with the SDGs, such as the emphasis on inclusive growth and improved public services, there are also challenges and contradictions that need to be addressed to ensure a sustainable and responsible integration of AI in achieving the SDGs.

Figure 3.2: Policy mapping and their contributions to SDGs



(120) *Goldin M., 2017. How to Recognize (and Avoid) 'AI Washing'. [online] Available at: <https://www.infoworld.com/article/3227164/how-to-recognize-and-avoid-ai-washing.html> [Accessed 30 June 2023].*

(121) *Heikkilä M., 2022. We're Getting a Better Idea of AI's True Carbon Footprint. [online] Available at: <https://www.technologyreview.com/2022/11/14/1063192/were-getting-a-better-idea-of-ais-true-carbon-footprint/> [Accessed 30 June 2023]*

(122) *Singh M., 2023. As the AI industry booms, what toll will it take on the environment? [online] Available at: <https://www.theguardian.com/technology/2023/jun/08/artificial-intelligence-industry-boom-environment-toll> [Accessed 30 June 2023]*

(123) *For more in-depth understanding of the use of AI for Sustainable Development, please see: Ferili S., et. al., 2021. L'Intelligenza Artificiale per lo Sviluppo Sostenibile. ISBN (digital version): 978-88-8080-460-4*

ICT4SDG in-practice: the case study of the "Innovation for Development" programme

Above we mapped, albeit briefly, the policy infrastructure of the Italian Government and identified ways that help achieve various SDGs. In this section, we will explore more the role and the impact of the "Innovation for Development" programme, as a philanthropic initiative fostering innovation in the field of international development cooperation.

The "Innovation for Development" programme was co-designed and co-funded by the Fondazione Cariplo and Fondazione Compagnia di San Paolo ("Foundations" thereafter) and launched in 2016. Its aim is to promote innovation in the field of international development cooperation and targets "Italian international development cooperation bodies, for the specific purpose of facilitating cross-fertilisation with the innovation sector" (Bersanetti, Caramia, Masciadri, Toscano 2022: 2). As the authors explain:

> Guided by the United Nations 2030 Agenda, which identifies innovation as a focal point in SDG 9, the Foundations [Cariplo and Compagnia San Paolo] recognise the value that product, process and methodological innovation can bring to Italy's international development cooperation sector and its partnerships. The potential of this cross-fertilisation is also supported by an increasingly mature and dynamic social and entrepreneurial fabric in the global south, as substantiated by recent local innovations capable of solving major development challenges.

Initially, the programme functioned as a pilot initiative whose main intervention were structured through four main pillars:

1. **Digital manufacturing**
2. **Open innovation**
3. **Data for Development**
4. **Training, information, capacity building**

Numerous pilot initiatives were supported and implemented across four pillars between 2016-2018, including "Coopen beta", an open-innovation web platform where civil society organisations (CSO) could launch challenges relating to specific issues found in the target countries, and collect possible innovative solutions from the private sector, start-ups, etc.. The four pillars were re-structured, after the lessons learnt from the pilot initiatives which were implemented between 2016-2018 which helped define the key themes and priority actions for the three year period 2019-2021, as following[(124)]:

1. **Pillar 1** "Open Innovation": focused on creating opportunities for collaboration between Italian civil society organisations (CSOs) and the innovation sector in Italy and Africa, through two parallel instruments: 'the Technologies for Sustainable Development' call (aimed at deploying innovative products and services or the replicability of solutions already tested in the field) and 'the Coopen participatory process', representing the evolution of the beta version of the platform described above.

2. **Pillar 2** "Training and Capacity Building": has delivered training programmes involving 17 technical partners since 2016. The training courses were aimed at developing skills in data science (data collection, management and display), monitoring and evaluation, civic technologies, theory of change (ToC), mapping, digital manufacturing, project management, process innovation, impact investing and leadership. Support has also been provided for training opportunities such as first-level university Masters courses and events focusing on ICT for development and social entrepreneurship.

3. **Pillar 3** "Events and Networking": focused on the continuous exchange of best practices within the framework of cycles of public events and meetings, both online and face-to-face.

(124) *The three pillars were described as written in the paper "Coopen: an open innovation process triggering the collaboration between NGOs and innovators in Africa. The case of Fondazione Cariplo and Fondazione Compagnia di San Paolo"*

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From the three pillars, the most dynamic one in terms of ‘innovation for good’ is pillar 1 “Open innovation”. It consists of two[125] main instruments/programmes:

Ⓐ “the Technologies for Sustainable Development” call which, process-wise, is a more of traditional call for non-governmental organisations (NGOs) interested in implementing impactful projects in Africa. Two cycles of calls were launched in 2020 and 2021 under the two overarching themes: projects that are based on mature technologies, the result of frugal, low-tech and low-cost innovation, designed within virtuous relationships with the local innovation world (startups, universities, fablab, designers, creative people); and and data-driven projects such as ICT applications, platforms and solutions, mobile and cash transfer, blockchain, artificial intelligence, Internet of Things (IoT), machine learning, open source solutions.

Ⓑ “Coopen” programme, which aims to bridge the gap between non-profit organisations (NGOs) and the innovation sector in addressing development challenges. “Coopen” is shaped as a dynamic open innovation platform whose approach is participatory bringing in the same table a large part of partners from Italy and Africa. While the design of the programme itself was shaped in a way that contributes in SDG 17 (Partnerships for Goals), the programmatic focus of “Coopen” is placed into three main SDGs: food and sustainable agriculture (SDG 2), good health and well-being (SDG 3), circular economy (SDG 12).

AICS and “Innovation for Development”: complementing each other

In the realm of Italian development and cooperation, two significant initiatives, the Italian Agency for Development and Cooperation (AICS) and "Innovation for Development," play distinct yet complementary roles. AICS has long been—and continues to be—a cornerstone in the Italian development landscape, operating both domestically and across its 22 priority countries. It embraces a multi-sectoral strategy, tackling a wide array of developmental challenges, from poverty and education to health, agriculture, climate change, governance, and gender equality. AICS recognizes the intricate interplay of these issues and seeks comprehensive solutions. Its collaborative efforts extend to partner countries, international organizations, civil society, and diverse stakeholders in project implementation.

Conversely, "Innovation for Development" is a dedicated program fostered by Fondazione Cariplo and Fondazione Compagnia di San Paolo, two prominent Italian banking foundations. While AICS functions as the national agency overseeing development cooperation, "Innovation for Development" has a distinct focus: nurturing innovation and catalysing synergy between CSOs and the innovation sector within international development cooperation. This program aims to harness innovation's potential, along with technology and digital solutions, to address developmental challenges and contribute to Sustainable Development Goals (SDGs) attainment. It supports initiatives promoting open innovation, digital manufacturing, data-driven development, capacity building, and stakeholder networking.

It's crucial to underline that AICS and "Innovation for Development" are symbiotic in their approach. On one hand, AICS adopts a holistic developmental outlook, often operating in the role of traditional grant-making, spanning multiple dimensions and sectors. On the other hand, "Innovation for Development"

(125) *For the sake of clarity, it is essential to emphasise that the Foundations have designed a third 'transversal' program called "Call SPRINT." This program is a consequential extension of the first two, aimed at providing further support to projects that have already been incubated by the "Technologies for Sustainable Development" or "Coopen" programs and require additional consolidation. "Call SPRINT" serves as a gateway exclusively for project proposals that have undergone the process of either of the two programs. However, it allows for the inclusion of a third-party entity, be it an NGO or a private company, that was not previously involved but sees an opportunity to further develop, scale, and/or replicate the project. This aspect enhances the concept of 'open innovation'; nonetheless, it may pose certain limitations in cases where the project's initiators may not feel comfortable with the idea of involving a third-party entity midway through the project.*

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concentrates on leveraging innovation and digital solutions for international development, transcending the conventional grant-making role. It has evolved into a facilitator/developer of more extensive processes, as seen in the Coopen program. AICS operates at a national level, both in Italy and other priority countries, orchestrating and executing development projects through its in-country offices. Meanwhile, "Innovation for Development" represents a specific initiative within the broader landscape of Italian development cooperation, concentrating its efforts in Italy and eight east and west African countries: Ethiopia, Kenya, Rwanda, Uganda, Burkina Faso, Mali, Niger, and Senegal.

By complementing each other's objectives, agendas, and methodologies, these approaches contribute collaboratively to Italy's pursuit of sustainable and inclusive development goals, both domestically and internationally.

Coopen: Fostering Innovation and Collaboration for Sustainable Development

Due to its unique characteristics and strategic focus, "Coopen" stands out as a pivotal component within the "Innovation for Development" programme. Next, we will explore more the "Coopen" programme, examining its impact, effectiveness, and potential for scaling up innovative solutions.

"Coopen" is an innovative, participatory programme that aims to create impactful solutions between Italy and Africa. Its thematic focuses are three: 1) Sustainable food and agriculture (SDG 2); 2) Good health and well-being (SDG 3); 3) Circular economy (SDG 12). Whereas the regional focus involves the following areas: 1) East Africa (Ethiopia, Kenya, Rwanda and Uganda); 2) West Africa (Burkina Faso, Mali, Niger and Senegal).

The selection of these three SDGs is based on two main criteria. Firstly, both Foundations have a longstanding experience in SDGs 2 and 3, dating back to 2008 when their partnership and involvement in international cooperation began. Additionally, the choice of SDGs 2 and 3 is influenced by the fact that the majority of Italian NGOs engaged in international cooperation focus primarily on food and agriculture, as well as health-related projects. Secondly, the decision to include SDG 12, the circular economy, is driven by the vibrant nature of this area, where most innovations originate from the private sector, start-ups, and other entities.

Regarding the selection of the eight target countries, a careful evaluation was conducted based on two criteria: ensuring equal representation between two macro-regions, East and West Africa, and taking into account the high presence of Italian NGOs operating in those countries. Furthermore, the chosen countries offer great potential for harnessing the creativity of the innovation ecosystem[(126)].

One of the characteristics of the "Coopen" programme is the ability to build partnerships within the programme itself by making it more participatory, but also externally with other stakeholders in supporting their needs and initiatives. This is how authors of the paper "Coopen: an open innovation process triggering the collaboration between NGOs and innovators in Africa. The case of Fondazione Cariplo and Fondazione Compagnia di San Paolo" explain it:

> By looking at the best practices for identifying, selecting, accelerating and incubating technological solutions, Coopen has sought to match the needs identified by NGOs with potential solutions from the innovation ecosystem[(127)].
> By building non-conventional partnerships, Coopen aims to guide and support NGOs, which operate mainly in international development cooperation, in the transition to operational models and projects that combine many years of field experience alongside local communities, with new tools and approaches that are typical of technological and digital innovation (tools, services, organisational processes). On the basis of cross-cutting goal 17 of Agenda 2030, the aim is to implement a vision of greater collaboration and interaction between non-profit organisations, social innovators, technology experts and certain companies with an interest in sustainable development and inclusive business models (Bersanetti et al. 2022: 4).

There are two elements that require further reflections. Firstly, in terms of partnership, we see two layers of partnership being integrated within the programme. One layer consists of partnerships within the "Coopen" programme itself where in order "to manage and implement such a complex process, [...] specific technical partners were involved:

(126) *Information presented regarding the selection of SDGs and the macro-regions were explained during the interviews with Alessandro Masciadri, Program Officer at Fondazione Cariplo and Fulvio Bersanetti, Program Officer at Fondazione Compagnia San Paolo.*

(127) *The term "innovation ecosystem", according to both Program Officers, is used as an overarching terminology that includes private sector, start-ups, and individuals working in the technological innovation sector.*

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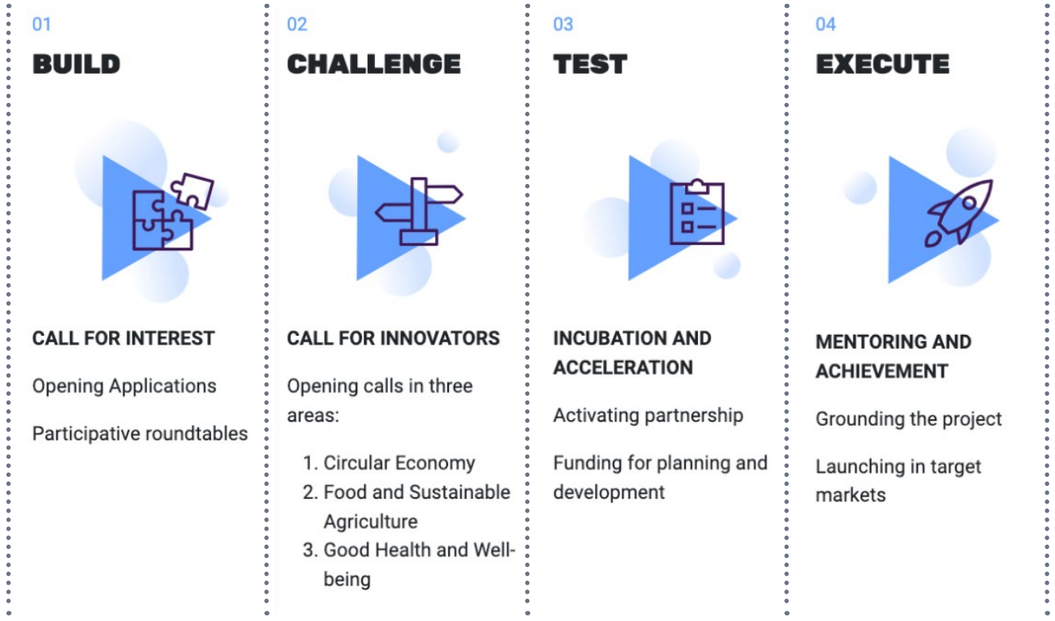
Cariplo Factory [...], JengaLab, Fondazione Avsi and BeEnterpreneurs, [as well as other] organisations with expertise in ICT for social good, African entrepreneurship and international development cooperation” (Bernatti et al. 2022: 4).

And the second layer involves the partnerships that the “Coopen'' programme triggers between NGOs and the innovation ecosystem with an interest in sustainable development and inclusive business models. This is done through the four stages process:

Figure 3.2: The Four Stages of “Coopen” programme © Innovazione per lo Sviluppo



The stage 1 ‘Build’ aims to identify NGOs operating in one of the eight target countries in East and West Africa and who have first-hand experience and expertise in the fields of interest, that is, circular economy, food and sustainable agriculture and good health and well-being. In this stage, NGOs interested in getting involved respond to the “Call for Interest” by describing: a) their experience in the field of interest that they would like to work; b) their experience in the target country where they would like to implement the project; c) their level of readiness to work (within)in innovation processes.

The selected applications are invited in the Participatory Forum which consists of roundtables where the selected NGOs, facilitated by the Coopen’s technical team, work together to identify the local needs of the communities where they are involved, and transform them into comprehensive project challenges using techniques of design thinking and information architecture. Once the challenges are identified, shaped and finalised[(128)], the next stage kicks in.

The stage 2 ‘Challenge’ aims to find “the best innovative solutions, whether digital or frugal, and with high or low technological content, with a Technology Readiness Level (TRL) of between 3 and 6, as defined in the Annex of the European Commission’s Horizon 2020 work Programme 2014-2015” (Bersanetti et al: 5). Once the challenges are finalised and published, entities from the innovation ecosystem can show their interest by applying for one or more challenges and proposing their technological interventions.

Coopen’s technical team evaluates the proposals from the actors of the innovation ecosystem and starts the process of matching them with the NGO that proposed the challenge. After the matching process, the NGO and the entity from the innovation ecosystem officially enter into a partnership and together they develop the challenge into a project proposal, which is then presented to the Foundations for financial support. This marks the transition to stage 3.

In the stage 3 ‘Test’ the projects officially begin with a three to six-months period of incubation/ acceleration phase. Although the incubation/ acceleration phase was specifically foreseen

(128) *It should be noted that for each of the three fields of interest, more than one challenge is identified.*

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for the innovation entity, numerous times NGOs themselves have expressed interest in attending the phase to learn and contribute to the process. The incubation/acceleration phase, however, does not stop the project from simultaneously implementing other project activities such as, for example, research and feasibility studies, context analysis, and more. After the incubation/acceleration phase is completed, the project moves to the final stage of project implementation.

The stage 4 ‘Execute’ represents the final stage where the project partnership begins its implementation. If necessary and requested by the partnership, specific expertise and mentorship are provided to fill in any skill gaps that may appear in the project. All projects are concluded with comprehensive data collection to evaluate the project's impact.

Box 3.5: “Waste To Value”: Low-tech solution for international cooperation

In Kampala, approximately 28,000 tons of waste were collected and dumped in landfills each month, representing about 40% of the city's total waste. The remaining portion was illegally dumped at various sites, posing environmental and public health challenges. However, the organic fraction of household waste, roughly 480 tons per day, presented an opportunity for reuse in feed and fertiliser production. On the other hand, the availability of quality and affordable agricultural inputs was scarce in Uganda, leading to low productivity among small-scale farmers and herders, impacting food security and income generation.

The "Waste to Value" project, implemented by Fondazione AVSI in collaboration with Marula ProTeen Ltd, took place in Kisubi, Uganda, in the central region. The initiative focused on circular economy principles, aiming to transform organic waste into valuable resources using the larvae of black soldier flies. Marula ProTeen Ltd played a crucial role in converting organic waste into food and fertiliser by employing black soldier fly larvae, known for their rich protein and fat content.

The intervention focused on two areas of action. The first area involved strengthening the business model of Marula Proteen Ltd through an acceleration service. The second area aimed to make the business inclusive, ensuring its products and services reached vulnerable populations and creating employment opportunities for young people.

The "Waste to Value" project, supported by the “Coopen” initiative under “Innovation for Development” programme, exemplifies a successful circular economy approach. By harnessing black soldier fly larvae, this innovative project effectively converted organic waste into valuable resources, addressing waste management issues while boosting agricultural productivity and sustainability. Through this collaborative effort, Fondazione AVSI and Marula ProTeen Ltd contributed to achieving Sustainable Development Goals 1, 12, and 17, fostering sustainable development in Uganda.

“Coopen”: towards tribrid model of development

One of the “Coopen'' program's achievements is to “bring and connect together worlds that are distant to each other”[(129)]- NGOs operating in the field with in-depth knowledge about local needs and challenges, and actors from the innovation ecosystem with skills, resources, and expertise in integrating innovation models, processes, and solutions to address those needs.

The ICT4D sector has often suffered from the separation between three worlds, or intellectual disciplines: information systems, computer sciences, and development studies. To paraphrase Richard Heeks, in order to move away from the failures of past ICT4D experiences, especially during the period between the '70s and early 2000s, we need new, broader worldviews guiding the new generation of ICT4D projects. Heeks calls this a 'tribrid model' of ICT4D. Instead of separating and isolating the three intellectual disciplines of ICT4D, this model brings them together organically, providing "a more balanced approach to ICT4D strategy; an innovative approach that pulls its plan of action from an amalgam of the key questions each domain can answer" (Heeks 2008: 13):

- What is possible with digital technology? (from computer science)
- What is feasible with digital technology? (from information systems)
- What is desirable with digital technology? (from development studies)

As we have seen above, the "Coopen" program's participatory process creates spaces for each discipline's inquiries to be raised, and together - involving NGOs, innovation actors, subject-experts, the technical team, and other stakeholders - they find the best possible answers that materialise into concrete projects.

Another positive element of the "Coopen" approach is its emphasis on 'open innovation' as a way to foster partnerships and maximise resources. This aligns well with the Principles of Digital Development, specifically Digital Principle "Use of Open Standards, Open Data, Open Source, and Open Innovation." It would be of even greater benefit if this Digital Principle gets

(129) *This quote is taken from the interview with Fulvio Bersanetti, Program Officer at Fondazione San Paolo.*

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better formalised within the Coopen process to strengthen all aspects of it.

Despite this, the "Coopen" program does have its own constraints that may jeopardise the process or the success of projects. First of all, it should be highlighted that the process is very resource-intensive, requiring a significant amount of resources in terms of funding, time, and expertise. Sustaining the methodology over the long term may pose challenges if resources are shortened.

Second, "Coopen'' brings together multi-layer partnerships that can lead to complex dynamics and varying expectations. Balancing the interests, motivations, and capacities of different actors requires effective communication, negotiation, expectation management, and coordination. Managing these dynamics can be challenging, particularly in diverse and multicultural contexts.

And third, the strong emphasis in ensuring scalability and replication beyond the pilot phase can be challenging and may fall into the trap of 'design-reality gap' (as discussed in chapter 2 of this research). Factors such as limited resources, regulatory barriers, and local contextual differences may hinder the wider adoption and sustainability of successful projects.

It would be, however, interesting for the "Innovation for Development" programme to explore new horizons of innovative processes in the international cooperation focusing on hyper-local, non-scalable, non-replicable projects that can:

- Integrate the principles of Arthuro Escobar's 'Design for Pluriverse' concept.
- Have the qualities of 'Light Communities' as conceptualised by Enzo Manzini.
- Experiment with ideas of 'Small Tech' as a way that prioritises human needs, ethical considerations, and sustainability.

Ultimately, all hyper-local, non-scalable, non-replicable projects can be brought together in a form of 'Cooperation Fediverse'[130] that fosters peer-to-peer learning, sharing, and networking. By combining intellectual constructs with values of international cooperation, which are global and universal, with experiments of hyper-local, non-scalable, non-replicable initiatives, which are local and singular, yet universally transmittable, perhaps this approach can breathe new life into the global social innovation landscape.

(130) *The term 'fediverse' refers to a network established by software utilising the OStatus protocol. One of the noteworthy examples of a decentralised social media platform within this concept is Mastodon. Unlike conventional social media platforms such as Facebook or Twitter, where the company operates and hosts the servers, Mastodon allows both individuals and organisations to independently host their own servers. Drawing inspiration from this notion, it is intriguing to contemplate the establishment of a development ecosystem akin to a 'cooperation fediverse.' This envisaged platform could serve as a convergence point for diverse hyper-local projects.*

CHAPTER 04

The use of ICTs for SDGs in Italian development programmes in 22 priority countries

As we could see from the previous chapter, Information and Communication Technologies (ICTs) have emerged as powerful tools – yet sometimes struggling with the complexities, challenges, and occasional failures – in advancing the 2030 Agenda for Sustainable Development across the globe. Their potential to address the United Nations' Sustainable Development Goals (SDGs) by enhancing communication, increasing access to information, and improving service delivery is increasingly recognised. The Italian NGOs, in alignment with these global aspirations, have been engaging with ICTs to bolster its efforts in addressing complex development challenges.

In this chapter, we delve into the utilisation of ICTs within the Italian development cooperation landscape, specifically focusing on the engagement of Italian non-governmental organisations (NGOs) in harnessing ICTs for sustainable development in 22 priority countries [(131)] as identified by the Ministry of Foreign Affairs and International Cooperation. The study aims to shed light on the extent to which Italian NGOs employ ICTs, the SDGs they prioritise, and their perceptions regarding the impact of these technologies on international cooperation.

Methodology

Our research sought to engage a representative sample of Italian NGOs actively involved in development cooperation. To build a comprehensive database of organisations, we meticulously aggregated data from various sources, including the Italian Agency for Development Cooperation (AICS) website, OpenAID, and other reputable online sources, including manual scoping and aggregation of data. This extensive database included information about the organisational focus, geographic presence, and development priorities.

Out of the 195 Italian NGOs initially identified and contacted, 26 organisations responded to our questionnaire, providing valuable insights into their engagement with ICTs and development cooperation. While we had hoped for a higher response rate, the willingness of this subset of the Italian NGO community to contribute to our study is greatly appreciated and reflects the willingness of a subset of the Italian NGO community to contribute to our study. The data collected through questionnaires reveal on the extent to which these organisations leverage ICTs for development purposes, the specific ICT tools employed, and their perceptions regarding the impact of these technologies on international cooperation.

Ultimately, the questionnaire's main objective was to map, research and analyse the use of ICTs for SDGs 1, 2, 3, 4, 5, and 10 by Italian NGOs operating in 22 priority countries between the period of 2019-2022.

Results

SDGs Prioritisation

Understanding the primary areas of focus for Italian NGOs is pivotal to comprehending the alignment of their initiatives with the global agenda for sustainable development.

The responses reveal a diverse spectrum of SDGs that the NGOs are primarily working on. These SDGs reflect the multifaceted nature of sustainable development and the varied challenges that demand attention. Here is an overview of the prominent SDGs and the percentage of organisations actively engaged with them:

- **SDG 1:** No Poverty (46.2%): Nearly half of the surveyed organisations are committed to addressing the eradication of poverty, a foundational goal for sustainable development.
- **SDG 2:** Zero Hunger (50%): Half of the organisations have chosen to tackle the critical issue of ensuring food security and ending hunger.
- **SDG 3:** Good Health and Well-being (61.5%): A significant majority place a strong emphasis on improving health and well-being, reflecting the significance of healthcare in development.
- **SDG 4:** Quality Education (73.1%): Education emerges as a top priority, with over three-quarters of organisations dedicated to achieving quality and equitable education.

*(131) It should be emphasised that for the period of 2021-2023, the Ministry of Foreign Affairs and International Cooperation has included 20 countries in its priority list (**https://www.esteri.it/it/politica-estera-e-cooperazione-allo-sviluppo/cooperaz_sviluppo/**), whereas the Italian Agency for Cooperation and Development has 22 (**https://sviluppa.aics.gov.it/paesi-prioritari/**). Given that the differences are minimal and would not affect the research, we have selected the latter.*

- **SDG 5:** Gender Equality (53.8%): Over half of the organisations are actively working to promote gender equality, recognizing its fundamental role in development.

- **SDG 10:** Reduced Inequalities (65.4%): A substantial percentage is committed to reducing inequalities within and among countries, addressing disparities that hinder progress.

Geographical Presence

Our research uncovers a diverse geographic presence of NGOs across the 22 priority countries. While some countries have a higher concentration of organisations, it is evident that Italian cooperation extends across various regions, including Africa, Latin America, and Asia. The following breakdown shows the higher and lower presence areas of the NGOs:

Higher Presence	Lower Presence
Senegal (34.6%): Senegal emerges as a key focus for Italian development efforts, with over one-third of the organisations operating in this West African nation.	**Niger (3.8%):** Niger in West Africa has a lower representation.
Kenya (34.6%): Kenya, in East Africa, shares the spotlight with Senegal, also receiving significant attention from Italian development organisations.	**Pakistan and Bosnia and Herzegovina (0.0%):** These countries currently have no NGOsoperating within them, according to our survey
Mozambique (34.6%): Mozambique, located in Southeast Africa, is another prominent destination for Italian development initiatives, mirroring the engagement levels seen in Senegal and Kenya.	
Ethiopia (23.1%): Ethiopia, in the Horn of Africa, is a notable country where Italian organisations are actively contributing to development efforts.	
Lebanon (23.1%): In the Middle East, Lebanon serves as a key location for NGOs' activities.	

The Use of ICTs

At first sight, the NGOs who participated in the research showed a strong inclination towards adopting ICTs in their operations and projects. A remarkable 96.2% of the respondents confirm the integration of ICTs within their initiatives/ programmes, underscoring the pervasive nature of technology adoption within the sector.

However, a more in-depth analysis of data reveals the fact that when it comes to the types of ICTs they utilise—the category of social media emerges as the leading choice, with a staggering 96% of organisations utilising these platforms to enhance their development initiatives. Mobile applications are adopted by 40% of respondents, followed by data visualisation tools, chosen by 32% of organisations, illustrate a concerted effort to make data more accessible and comprehensible.

The emerging technologies of Web 3.0, including blockchain, machine learning and big data, open sensors, and virtual realities, are shaping a new paradigm in development known as 'Digital for Development,' as analysed and reviewed in Chapter 2. However, it is noteworthy that none of the NGOs participating in our research indicated the use of these technologies[(132)] in their development and international cooperation efforts.

(132) *It is of interest to underline that only two respondents have indicated the use of AI. Although we have tried to reach out to both respondents to learn more about the ways that they used AI, only one of them responded. According to written exchanges the research team had with Federico Bastia, Chief Operating and Strategy Officer at NGO "Punto Sud", he confirmed that in recent months they have started to experiment with integrating AI technologies in their work. Thai includes: the use of large language model (LLMs) tools such as ChatGPT in preliminary research, text simplification, and translation tasks. Other AI tools like Meet Tome are highlighted for their utility in creating clear and intuitive presentations.*

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The breakdown of specific ICT tools and their adoption rates is as follows:

- **Crowdmapping:** 4% of the organisations employ crowdmapping techniques.
- **Internet of Things (IoT):** 4% utilise IoT technologies to connect and collect data from physical devices and sensors for real-time monitoring and/or decision-making.
- **Artificial Intelligence (AI):** 8% responded that they utilise AI.
- **Social Media:** An overwhelming 96% leverage social media platforms.
- **Virtual Reality (VR):** VR technology is not in used among, according to respondents.
  Blockchain: No organisations reported the adoption of blockchain technology for secure and transparent transactions and data management.
- **Big Data and Machine Learning:** Similar to blockchain, these advanced data analytics methods were not indicated as tools in use.

ICT Strategy and Expertise

The presence of a well-defined ICT strategy and dedicated personnel within an organisation can significantly influence its ability to leverage ICTs effectively for sustainable development. An ICT strategy serves as a roadmap for organisations, outlining how they intend to utilise technology—and the type of technologies—to achieve their goals.

Interestingly, despite the widespread adoption of ICTs, a majority of the surveyed organisations (80.8%) do not currently have an established ICT strategy. This suggests that while ICTs are widely used, formalised strategies to guide their deployment are less common. Furthermore, a significant portion (57.7%) of the organisations lack dedicated ICT personnel, potentially indicating room for capacity building in this domain.

A further breakdown of responses regarding the presence of an ICT strategy can be seen below:

- **No ICT Strategy**: A significant 80.8% of organisations stated that they currently do not have an ICT strategy in place. This indicates a potential area for growth and development in terms of integrating ICTs into their operations and projects.
- **Yes, ICT Strategy Exists:** 15.4% of the surveyed organisations have already established an ICT strategy, demonstrating a proactive approach to leveraging technology.
- **Not Yet, but Planned:** A smaller portion, 3.8%, indicated that they do not have an ICT strategy at present but have plans to develop one in the future. This forward-looking approach suggests an awareness of the importance of strategic ICT planning.
- **Depends on Projects:** Another 3.8% mentioned that the presence of specialised ICT personnel depends on the specific projects they undertake, implying flexibility in staffing based on project requirements.

These findings provide valuable insights into the current state of ICT strategy and personnel within the NGOs. One hypothesis that we put forward, and which may require further research, is that the absence of specialised ICT personnel appears to be a critical factor contributing to the lack of ICT strategies among Italian development organisations. The vast majority lacking such strategies may benefit from capacity building and expertise in the field of ICT4D. This would not only aid in the formulation of effective strategies but also enable these organisations to tap into the full potential of ICTs for advancing sustainable development goals.

The Use of ICTs for SDGs

One of the fundamental aspects of our research is to understand the extent to which Italian NGOs have harnessed (ICTs) to contribute to specific SDGs, namely: SDGs 1, 2, 3, 5, and 10, between the period of 2019-2022.

Our findings reveal that 42.3% of the surveyed Italian development organisations have undertaken projects that leverage ICTs to contribute to SDGs 1, 2, 3, 5, and 10 during the specified period.

- **SDG 1: No Poverty:** Surprisingly, none of the respondents reported targeting SDG 1 (No Poverty) in their ICT-driven projects during the period under consideration.

- **SDG 2: Zero Hunger:** 30% of the organisations focused on SDG 2 (Zero Hunger) in their projects, highlighting efforts to address food security challenges.

- **SDG 3:** Good Health and Well-being: A substantial 60% of the organisations directed their ICT initiatives towards achieving SDG 3. This underscores the significance of technology in healthcare and public health programs.

- **SDG 5: Gender Equality:** 40% of respondents integrated ICTs to advance SDG 5, reflecting a commitment to empowering women and promoting gender equity.

- **SDG 10: Reduced Inequalities:** A noteworthy 50% of organisations incorporated ICTs to address SDG 10, signalling a dedication to bridging societal gaps through technological interventions.

While these figures suggest a significant commitment to utilising technology for targeted development outcomes, a more detailed analysis of the types of ICTs used and the specific contexts of their deployment is suggested.

Impact of ICTs for Development and International Cooperation

The evaluation of the impact of Information and Communication Technologies (ICTs) on international cooperation is a crucial aspect of understanding their effectiveness in advancing sustainable development goals.

When asked to evaluate the impact of ICT tools and technologies on international cooperation, respondents provided a range of responses on a five-point scale, with 1 indicating "no positive influence" and 5 signifying "significant positive influence." The distribution of responses is as follows:

1. **No positive influence: 3.8%**
2. **Limited positive influence: 3.8%**
3. **Moderate positive influence: 38.5%**
4. **Substantial positive influence: 42.3%**
5. **Significant positive influence: 11.5%**

The data shows that a significant portion of NGOs perceive ICT tools and technologies as having a positive influence on international cooperation efforts. A considerable 42.3% rated this impact as "substantial," while 38.5% considered it to be of "moderate" influence. This suggests that these organisations recognise the value of ICTs in enhancing their cooperation initiatives, albeit to varying degrees.

Digital Principles

'The Principles for Digital Development' known shortly as Digital Principles are a set of nine guidelines for integrating best practices into technology-enabled development programs for international development and cooperation. They were initiated in 2009 when UNICEF launched their Principles for Innovation and Technology Development. Over 200 organisations worldwide endorsed the new Principles for Digital Development, recognising them as a tool for helping organisations to facilitate and deploy ethically-driven ICT initiatives.

Our survey revealed a significant gap in the awareness of digital principles among the NGOs. A striking 73.1% of the respondents indicated that they were not familiar with digital principles. This finding highlights the need for greater awareness and education within the sector regarding the fundamental principles that underpin successful ICT4D initiatives.

The adoption of digital principles is a crucial factor in ensuring that ICT4D efforts are aligned with best practices and ethical considerations. However, our data indicates that there is room for improvement in this regard. Only 19.2% of the organisations reported having adopted some of the digital principles during the implementation of ICT tools, technologies, or initiatives. This suggests that a significant proportion of Italian development organisations have yet to fully integrate these principles into their ICT-driven projects.

Additionally, a small minority (3.8%) mentioned having an alternative approach, while another 3.8% indicated not knowing whether digital principles were adopted or not.

Navigating discrepancies and gaps: a meta-reflection on results

Within the landscape of Italian development cooperation, our research has uncovered a series of intriguing discrepancies and gaps that shed light on the complex interplay between intentions, actions, and outcomes in the realm of ICT4D/ICT4SDG. These nuanced observations reveal the multilayered nature of efforts to harness technology for sustainable development, where divergent paths and unanticipated tensions may arise. Below, we identified four key discrepancies and gaps, as well as explored and elaborate on these disparities, offering insights into the dynamics of ICT adoption, strategic planning, and the alignment with SDGs among Italian NGOs who participated in the research.

① **High ICT Adoption Rates vs. Lack of ICT Strategies**

One of the most notable paradoxes lies in the high adoption rate of ICTs among Italian NGOs (96.2%) contrasted with the low presence of formalised ICT strategies (80.8%). This paradox suggests two things. First, that while ICTs are widely embraced, there is often no strategic roadmap guiding their deployment. Second, the prevalent use of social media channels by NGOs may play the proxy role for the high adoption of ICTs. The absence of well-defined strategies raises questions about the extent to which ICTs are harnessed strategically to achieve development goals. The research indicates that despite the pervasive use of technology, many organisations may be operating without a structured framework for its effective utilisation and specialised staff.

② **Positive ICT Impact vs. Lack of Emerging Technologies**

The research indicates that a considerable number of organisations (42.3%) perceive a positive impact resulting from their utilisation of ICTs. However, a paradox emerges when we consider the absence of emerging technologies of Web 3.0 like blockchain, virtual realities, and machine learning in these organisations' projects. Given the current hype around these technologies, and their adoption by the international development actors, as well as the contrast between the perceived positive impact of existing ICTs and the absence of these advanced technologies raises pertinent questions: is there a gap in awareness or capacity that hinders the integration of emerging technologies? Are organisatiaons exploring collaborations with academia and the private sector to explore best use of such technologies? Addressing these questions becomes essential in ensuring that the Italian development sector remains at the forefront of technological innovation, harnessing cutting-edge solutions to address complex global challenges.

③ **SDG 1 (No Poverty) vs. ICT Utilisation**

While the survey indicates that 46.2% of Italian NGOs are actively working towards addressing poverty eradication as part of their broader development efforts, there is a striking absence of any indication that these organisations are leveraging Information ICTs to advance SDG 1. This discrepancy raises several thought-provoking questions about the strategies and priorities of Italian NGOs engaged in development cooperation.

Are there specific challenges or barriers that deter organisations from incorporating ICTs into their anti-poverty initiatives? Is there a lack of awareness about the potential of technology to amplify the impact of poverty reduction efforts? Or could it be that organisations are primarily focusing on traditional approaches for SDG 1 and have yet to explore the transformative possibilities of ICTs? Exploring the reasons behind this gap becomes essential.

④ **Digital Principles Awareness vs. ICTs Adoption**

The research highlights a significant gap between awareness of Digital principles and high adoption of ICTs within the NGOs. Remarkably, 73.1% of surveyed organisations indicated no awareness of these principles, signalling a critical need for education and awareness-building regarding the ethical guidelines that underpin the responsible and effective use of technology in development initiatives. This gap implies that many organisations may not be fully integrating ethical considerations into their technology-enabled development programmes. Closing this awareness-adoption gap is not solely about increasing awareness but also about cultivating a culture of responsible and ethical technology use within the sector. This, in turn, can enhance the impact and sustainability of ICT4D/ICT4SDG initiatives, mitigate potential risks and harms when deploying ICT in some of the world's most vulnerable environments, and contribute significantly to the broader goals of sustainable development.

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One of the requests from the respondents to the questionnaire was to submit an initiative that utilised and deployed ICTs for one of the five targeted Sustainable Development Goals (SDGs) under this research. A total of 14 initiatives were submitted. However, only two initiatives were selected for further exploration and examination due to their topics being incompatible with the focus of this research.

The research employed qualitative interviews with representatives from the selected case studies to collect first-hand insights. Additionally, an extensive literature review was conducted, which included reports, internal documents, academic articles, and other relevant sources.

Introduction

ICT4D aims to harness information technology to advance various human development objectives. From education to agriculture, ICT4D initiatives are increasingly becoming an integral part of development projects. In many low-resource and low-infrastructure settings, the lack of infrastructure, trained personnel, and adequate facilities exacerbate healthcare challenges. ICT4D offers solutions to these barriers through innovations like telemedicine, electronic medical records, and data analytics.

It was 2005 when Dr. Mario Marsiaj, who had spent his life at Saint Luke's Hospital in Angal, Uganda, first approached a group of computer scientists from Veneto region (who would later become the founders of the volunteer-led NGO "Informatici Senza Frontiere" / "ICT Without Borders") to express the need for a simple, free hospital management software (HIS - Health Information System and EMR - Electronic Medical Record) suitable for the real needs of a rural African hospital. Thus was born Open Hospital (OH), a project supported, developed, and implemented by Informatici Senza Frontiere.

The Open Hospital (OH) project was conceived in response to the pronounced gaps in healthcare delivery systems in the Majority World. Specifically, OH aims to integrate technology into healthcare services to enhance efficiency and accessibility. This focus is particularly relevant for low-infrastructure and rural settings, where OH targets small-to-medium-sized hospitals with fewer than 250 beds. Such hospitals are large enough to necessitate a robust health information system software.

The primary objective of the OH is to improve healthcare delivery by integrating efficient and cost-effective ICT solutions, such as: streamlining patient management, improving data analytics, vaccines database, therapy management, SMS patient's reminder, pregnancy management, pharmacy management, laboratory module, malnutrition control management, enhancing remote healthcare services, and more. Built on open-source technologies, the OH system is designed to be scalable, secure, and easily customizable. It incorporates modules for patient registration, electronic medical records (EMR), billing, and reporting.

The project enables the involvement of a wide range of stakeholders, including healthcare providers, local communities, government bodies, and international organisations focused on healthcare and development.

ICT4D in-practice within the OH project

OH initiative is committed to using open-source software which serves as the backbone of the project. Using open-source software, in rural and low-infrastructure contexts, proves to be successful and efficient in many ways, such as:

- **Cost-Effectiveness:** Traditional proprietary software often comes with high licensing fees, making it unaffordable for healthcare institutions in low-resource settings. Open-source software mitigates this barrier by offering a cost-effective alternative.
- **Community Collaboration:** Open-source projects benefit from a community of developers who contribute to the codebase. This collective[133] intelligence accelerates innovation and problem-solving, crucial for ICT4D initiatives.
- **Customizability:** Open-source software can be tailored to meet specific needs, enabling healthcare providers to adapt the system according to local requirements, languages, and medical practices.
- **Transparency and Accountability:** With the code being publicly available, there's a higher level of transparency, which is particularly important in healthcare settings where data sensitivity is a concern.

(133) *Based on an interview with the OH team member (Maurizio Bertoldi) and internal documents that our research group had access to, only in 2020, 33 contributors from around the world dedicated over 1000 hours of work, completing 176 tasks, helping to make two major releases: version 1.9.1. (March 2020) and version 1.10.0 (June 2020). Latest stable release 1.13.0 released in June 2023.*

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Other technological solutions[134] employed includes:

- **Mobile phone integration:** Mobile phone integration facilitates real-time updates and communication between healthcare providers and patients. This is particularly beneficial for remote and rural communities lacking easy access to healthcare facilities.

- **Data Analytics:** Advanced data analytics analyse healthcare data to offer quick and easy overview of patient's health situation, helping medical professionals make informed decisions.

The OH project integrates and makes use of numerous Principles for Digital Development:

- **Design with the User and Accessibility:** Open Hospital aims for universal accessibility, taking into account the digital divide that often exists in low-resource and rural settings. The system has a user-friendly, multilingual interface and operates efficiently even on low-end hardware. Open Hospital has been crafted with the end-user in mind. Its user-friendly interface and the capacity-building programs for healthcare workers are indicative of a user-centric design approach.

- **Build for Sustainability:** Open-source software, by its nature, fosters a community that can maintain and update the software. In the specific case of the OH, this ensures the project's sustainability and growth is done without relying heavily on external funding. Use Open Standards, Open Data, Open Source, and Open Innovation: Open Hospital is built on open-source technologies, allowing for greater customization, transparency, and collaboration. It aligns with the principle of using open standards and data.

- **Be collaborative:** The project involves a range of stakeholders, including healthcare providers, government bodies, and international organisations, exemplifying a collaborative approach. Beyond mere participation, it emphasises genuine power-sharing among stakeholders, ensuring that all voices are not just heard but have influence in decision-making. Further, its open-source nature opens the door for a worldwide community of developers to contribute to its code.

- **Reuse and Improve:** The open-source nature of the project encourages the reuse of code, reducing duplication of effort and fostering continuous improvement.

In order to increase the accessibility of the platform to local communities, alongside the software, OH provides extensive training modules and workshops for healthcare providers and administrators. This not only improves the system's usability but also builds local expertise. The capacity building component includes:

- **Training programs:** Targeted at healthcare workers, these programs cover various aspects of using the Open Hospital system effectively.

- **Community workshops:** These workshops aim to educate the community about the availability and benefits of new healthcare services enabled by the OH project.

OH's contributions to SDGs

The OH project aligns with the SDGs, making multidimensional contributions to sustainable development. OH's impact transcends healthcare to touch various facets of sustainable development. By making healthcare more affordable and accessible, the project indirectly contributes to poverty alleviation, aligning with SDG 1 (No Poverty). Additionally, OH's training modules and workshops promote lifelong learning opportunities for healthcare providers, contributing to SDG 4 (Quality Education).

OH aims to bridge healthcare disparities by focusing on low-infrastructure and rural settings, thereby contributing to SDG 10 (Reduced Inequalities). Finally, the project has fostered multi-stakeholder partnerships, including collaborations with international organisations and volunteers worldwide, in line with SDG 17 (Partnerships for the Goals).

However, the major contribution of the project is to SDG 3 (Health and Well-being), which is also one of the foci of this research. We identified four areas that OH contributes to SDG 3:

(134) *When asked why 'cloud computing' infrastructure had not been deployed, Alessandro Domanico, the product manager at OH, told us, "The reason cloud computing technology has not been employed so far is that, in many emerging countries, internet access is still a politically and socially delicate issue that one cannot rely on for the critical delivery of services."*

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① **Improving Healthcare Accessibility**
OH aims to make healthcare services more accessible, particularly in low-resource settings. Through features like telemedicine and mobile applications, it extends the reach of healthcare services to underserved populations.

② **Enhancing Healthcare Quality**
By integrating comprehensive patient data and analytics, OH contributes to evidence-based medicine, thereby enhancing the quality of healthcare delivery.

③ **Data-Driven Decision-Making**
The system's analytics modules offer actionable insights into healthcare outcomes, enabling more informed decision-making among healthcare providers.

④ **Community Empowerment**
OH places a strong emphasis on community engagement and empowerment. Through its educational initiatives, it equips both healthcare providers and the community at large with the knowledge and skills needed for preventive healthcare and well-being.

By aligning its objectives and operations with the SDGs, OH serves as both a model healthcare ICT4D project and a multidimensional contributor to global sustainable development.

Challenges and obstacles

While the OH project has made substantial progress in various aspects, it also faces several challenges that need to be addressed for long-term success.

One significant challenge is the lack of governance capable of guiding the strategy and evolution of the project. This absence of strong leadership raises questions about the project's future direction and long-term viability. Financial sustainability is another pressing concern; the costs associated with maintaining and operating OH are not sustainable for ISF in the medium to long term, especially in the absence of funded projects. Furthermore, the current portfolio of projects and activities lacks the critical mass required to ensure the project's development and deployment. These challenges underscore the need for strategic planning, financial management, and stakeholder engagement to ensure the ongoing success of OH.

Additional challenges further may put in jeopardy the project's landscape. While OH is multilingual, its language support does not extend to numerous regions around the world, limiting its universal applicability and raising issues of linguistic inclusivity. Pitching the open-source nature of OH to governments has met with resistance. Governments often prefer the procurement of tenders and closed-source technologies, sometimes to benefit from opportunities for corruption, making the adoption of an open-source solution difficult and undesirable.

The project also faces cultural challenges. During the interview with OH team members, they described how an attempt to add a feature allowing patients to identify with non-binary genders led to confrontations with various actors. Medical professionals argued that healthcare should be prioritised over gender identification, while political and religious groups, particularly in regions with anti-LGBTQI* laws like Uganda, opposed the feature. This well-intended effort to strengthen freedoms for the LGBTQI* communities could inadvertently expose them to risk, particularly in regions with repressive governments.

Lastly, data privacy and security continue to be challenging aspects of the project. While the project's documentation is fully accessible online, facilitating the identification of system vulnerabilities, further risk mitigation efforts are required. Although the most recent release of the OH platform complies with the General Data Protection Regulation (GDPR), making it more privacy-friendly for users within the European Union (EU), the same standards may not apply in countries outside the EU where GDPR compliance is not mandated.

To conclude, OH stands as a relatively successful endeavour in the ICT4D landscape, addressing critical healthcare gaps in low-resource and rural settings. Through its comprehensive approach—encompassing cost-effective ICT solutions, open-source architecture, and stakeholder involvement—OH has had a positive impact, particularly in underserved rural communities. While it marks a leap forward in healthcare delivery, the project is not without its challenges, ranging from governance and financial sustainability to cultural and linguistic inclusivity. These issues serve both as learning opportunities for OH and cautionary tales for future ICT4D initiatives, underscoring the complexities inherent in leveraging technology for sustainable development.

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Conclusions

The exploration of ICT4SDG within Italian development and cooperation programmes in 22 priority countries has yielded several key findings and insights. These results provide a comprehensive overview of the current state of ICT adoption, the alignment with SDGs, the presence of ICT strategies, and the impact of these technologies on international cooperation among Italian NGOs.

Our research indicates a diverse array of SDGs being pursued by Italian NGOs. This diversity reflects the complex nature of sustainable development challenges. Key observations include the significant emphasis on SDG 4 (Quality Education), SDG 3 (Good Health and Well-being), and SDG 10 (Reduced Inequalities). These goals are pivotal in the pursuit of global sustainable development, and the commitment of NGOs' efforts is commendable.

The NGOs who participated in the study display a widespread geographical presence across the 22 priority countries. While some nations receive more attention, the dispersion across Africa, Latin America, and Asia underscores the comprehensive approach taken by these organisations. It's notable that countries like Senegal, Kenya, and Mozambique have attracted a substantial focus, while others like Niger, Pakistan, and Bosnia and Herzegovina currently lack the presence.

When it comes to the use of ICTs in general, the data reveals a strong inclination among NGOs toward adopting ICTs in their projects, with 96.2% confirming their integration. However, social media emerges as the leading choice among ICT tools, which may suggest that ICTs are understood narrowly in their potential, and social media represent only a small fraction of ICTs' potential for SDGs. Further, mobile applications and data visualisation tools received notable attention with 40% of respondents saying that they adopted mobile applications, and 32% saying that they utilise data visualisation tools. It is, nonetheless, to be further explored in what ways, contexts, and environments the mobile applications and data visualisations are utilised. However, the absence of emerging technologies like blockchain, machine learning, and big data in their projects indicates a potential area for exploration and innovation in the future.

While many organisations are integrating ICTs into their projects and operations, there is room for deeper analysis of the specific contexts in which these technologies are deployed to advance specific SDGs. Notably, none of the surveyed organisations reported projects targeting SDG 1 (No Poverty), suggesting a potential area for future engagement in addressing poverty through technology.

Despite the widespread adoption of ICTs, the majority of surveyed organisations lack formalised ICT strategies (80.8%) and dedicated ICT personnel (57.7%). This suggests room for growth in terms of integrating technology strategically into their operations. The absence of specialised ICT personnel may be a contributing factor to the absence of ICT strategies. Capacity building in this area could significantly enhance the effectiveness of ICT4D/ICT4SDG efforts.

A substantial portion of the NGOs perceive ICTs as having a positive influence on their international cooperation efforts, with 42.3% rating this impact as "substantial." This highlights the recognised value of ICTs in enhancing cooperation initiatives, but also suggests that there are variations in the perceived impact across organisations.

The study revealed a significant gap in the awareness of digital principles among NGOs. Greater awareness and education are needed within the sector regarding these fundamental principles that guide ethical and effective ICT4D initiatives. Only a minority of organisations reported adopting some of these principles.

In conclusion, Italian development NGOs are actively engaged in leveraging ICTs to contribute to the achievement of SDGs, with a notable focus on education, health, gender equality, and reduced inequalities. While there is widespread adoption of ICTs, there is room for growth in terms of formalised ICT strategies, specialised personnel, and the incorporation of newly emerging technologies. Additionally, increased awareness and adoption of digital principles can enhance the ethical and effective implementation of ICT4D initiatives.

Recommendations and suggestions

In an era defined by rapid technological advancement, harnessing the potential of ICTs for development and international cooperation stands as a pivotal endeavour, particularly in the context of sustainable global progress. The intersection of technology and international development, often referred to as ICT4D, offers innovative solutions to address some of the world's most pressing challenges.

The recommendations here are tailored to provide a roadmap for institutions such as the Ministry of Foreign Affairs and International Cooperation (MAECI) and the Italian Agency for Development and Cooperation (AICS) to seize this opportunity and make substantial contributions to global sustainable development efforts through ICT4D. The nature of these recommendations encompasses research, capacity building, collaboration, innovation, and international cooperation. Each domain is carefully designed to promote active involvement in leveraging ICT4D to achieve the United Nations' SDG) and foster digital inclusion, economic growth, and environmental sustainability.

By strategically investing in research projects, fostering the growth of ICT4D specialists, facilitating cross-sectoral partnerships, and promoting an environment conducive to experimentation and innovation, Italy can not only bolster its own ICT4D capabilities but also make meaningful contributions to global efforts to 'leave no one behind'.

Research

In the ever-evolving landscape of ICT4D, the importance of research cannot be overstated. This recommendation underscores the critical role of Research in advancing Italy's contributions to international cooperation and sustainable development. It outlines a multi-pronged approach to research that encompasses both long-term evaluations of ongoing ICT4D initiatives and proactive exploration of emerging technologies.

? **Invest in Mid and Long-term Research Initiatives:** Allocate funding for mid and long-term transdisciplinary research projects focused on assessing the impact of ICT4D interventions carried out by Italian NGOs, focusing on specific SDGs. These projects should emphasise comprehensive evaluations, considering both intended and unintended consequences, to inform future policies and strategies.

? **Leverage Academic Partnerships:** Collaborate with Italian universities and research institutions to establish research hubs dedicated to ICT4D. These partnerships can facilitate data-driven evaluations and generate evidence-based insights that inform the design of effective ICT4D initiatives.

? **Targeted research on ICT4SDG:** Encourage research initiatives that delve deeper into the specific contexts in which ICTs are deployed to advance specific SDGs, as well as identify innovative ways ICT4D can contribute to addressing poverty and other underrepresented SDGs.

? **Foresight analysis, speculative design and exploration of emerging technologies:** Incorporate foresight and speculative design as tools for anticipatory analysis of alternative futures in ICT4D research and practice. By using speculative design, envision and prototype possible, probable, and preferable futures related to technology deployment in development contexts. Explore potential future scenarios, emerging trends, and their implications on development and international cooperation. Anticipate challenges and opportunities that may arise in the rapidly evolving landscape of ICT4D.

Capacity Building

Building the foundations of a brighter, more connected future begins with nurturing the next generation of ICT4D experts and practitioners, or as Richard Heeks calls 'ICT4D Champions'. This recommendation underscores the critical importance of Capacity Building, highlighting three key pillars.

? **Support ICT4D Education:** Advocate for and invest in capacity-building initiatives that cultivate a new generation of professionals specialised in ICT4D. Prioritise offering scholarships to students from marginalised and underserved communities, ensuring diverse representation in this field. Facilitate training programs, workshops, and seminars that bridge the gap between theoretical knowledge and real-world application. Collaborate with academic institutions to design and promote courses and curricula that not only cover the theoretical underpinnings of ICT4D but also emphasise hands-on experiences,

case studies, and project-based learning. Engage industry experts and practitioners in these educational endeavors to provide students with mentorship opportunities and insights into the evolving challenges and innovations in the domain of ICT for development. Encourage interdisciplinary collaborations to ensure a holistic understanding of how technology intersects with various developmental goals and challenges.

- **Promote Knowledge Sharing:** Establish platforms or networks at national level where ICT4D experts, practitioners, and NGOs can share best practices, lessons learned, and emerging trends. Encourage Italian NGOs to actively participate in these knowledge-sharing initiatives.

- **Foster Youth Engagement:** Engage with the young talents and tap in on their creativity through mentorship programs, internships, and hackathon-like events focused on ICT4D. Encouraging a dialogue between young talents, public institutions and NGOs to contribute to innovative solutions can create a sustainable pipeline of experts in this field.

Collaborative Ecosystem for ICT4D Innovation:

In an era where innovation and technology play pivotal roles in shaping the landscape of international development, fostering collaboration and innovation is not just advantageous but essential. This recommendation emphasises the power of partnerships and experimental programs, aiming to accelerate progress towards achieving the SDGs through the strategic integration of emerging ICCTs.

- **Catalyse Public-Private Partnerships:** While it is essential to create mechanisms that foster collaboration between Italian NGOs, academia, and the private sector, it's crucial to approach these partnerships with care. Encourage these collaborations to center on the application of emerging technologies, such as Web 3, to address specific SDGs and spur innovation. However, ensure that these partnerships do not inadvertently deepen existing power relationships or inequalities. It's vital that the private sector's involvement does not lead to further monopolization or exploit the development agenda for disproportionate gains. Attract private funding and sponsorships for ICT4D initiatives, but also provide incentives to companies that genuinely support projects aligned with SDGs without ulterior motives. As we develop public-private funding models for sustainable development, continuous oversight and ethical considerations must be at the forefront to ensure equitable and just collaborations.

- **Establish ICT4D Pilot Programme:** Set up a 'pilot programme' – in similar fashion to 'venture models' for businesses – for NGOs, social start-ups, innovators and researchers to test new 'out-of-the-box' ideas, take strategic risks, build evidence of what works, and advance the best practices in the field of ICT4D. The programme embraces the concept of 'risk at early stages and mitigates risk at later stages', ensuring that funding is targeted to the most cost-effective innovations that can improve people's lives.

Towards new paradigm of 'Digital for Development':

The realm of 'Digital for Development' (D4D) represents a transformative approach to international cooperation, harnessing the potential of digital technologies for development and international cooperation. As articulated by Richard Heeks and discussed more in-depth in Chapter 2, D4D signifies a paradigm shift in how we address complex global challenges. It recognises that digital technologies, when thoughtfully integrated, can act as powerful catalysts for helping some of the world's most vulnerable areas.

- **Create ICT4D Regulatory Sandboxes:** Pilot the idea of regulatory sandboxes specifically tailored to international development. These sandboxes serve as controlled environments for experimenting with policies, products, and innovations. This approach ensures that new technological solutions, particularly those based on new emerging technologies, are thoroughly tested and ethically sound before widespread implementation.

- **Centralised Data Repository:** Establish a centralised database to collate comprehensive information on ICT4D projects and actors implemented by the Italian NGOs. This repository will serve as a valuable resource for NGOs, academia,

private sector partners, and policymakers. By centralising data, Italy can streamline collaboration, knowledge sharing, and monitoring and evaluation efforts, enhancing the effectiveness and impact of ICT4D initiatives.

? **Exploring Prototyping as a New Policy for ICT4D:** Embrace the concept of rapid prototyping as a policy approach for ICT4D initiatives. Drawing inspiration from agile methodologies and hacker culture, encourage NGOs, social start-ups, innovators, and researchers to rapidly develop and test ICT4D projects to address pressing development challenges. By shifting from traditional policy and funding approaches to a more agile and iterative prototyping model, ICT4D projects can adapt quickly to changing needs and maximise their impact. This approach aligns with the principles of net neutrality, open-source software, and participatory design, fostering community participation and empowerement, innovation and responsiveness within the ICT4D ecosystem, and ideally would be connected with the aforementioned recommendation "Establish ICT4D Pilot Programme".

? **Embrace the imperatives of 'Slow Development' and 'Pluriversal Design':** Emphasise the importance of 'slow development' imperative within ICT4D initiatives. This approach prioritises sustainable, community-led solutions over the rapid, potentially harmful, imperative of "Move Fast and Break Things". Simultaneously, encourage the tenets of 'pluriversal design' acknowledging the diversity of technological needs and solutions across different cultural, geographical, political and economic contexts, that is, "a world where many worlds fit" (A. Escobar [1995] 2012: xxviii). The ethos of pluriversal design recognises that there isn't a one-size-fits-all solution to development challenges. By doing so, it respects the nuances of different cultural, geographical, political, and economic backgrounds, ensuring that solutions are tailored to the unique needs of each community. In recognising and celebrating diverse knowledge systems, ontologies and ways of being in the world, the imperatives of 'slow development' and 'pluriversal design' would be centred on marginalised experiences, decolonisation and intersectionality, and eco-cultural restoration.

? **Technology, Ethics and Human Rights-Based Approach:** Encourage the integration of ethical considerations, such as the Principles for Digital Development, into the design and application of ICT solutions across all SDGs. It's essential to ensure that ICT-driven initiatives, funded by public grants, contribute positively to SDGs without inadvertently negatively impacting other goals. Principles of human rights such as inalienability, indivisibility, interdependence and interrelatedness should serve as core foundations vis-a-vis SDGs. In practice, this means that contributing to one SDG should not come at the expense of another. For instance, the rapid adoption of Web 3 technologies, such as Artificial Intelligence and Blockchain (particularly the latter's application to cryptocurrency), in agriculture, health, and other sectors often occurs without considering the substantial environmental footprint. This includes increased carbon emissions and the extraction of vital natural resources, such as large amounts of water required for data centres. Additionally, the human labour involved in tasks like labelling, annotating, and moderating vast datasets used to power AI-driven initiatives is frequently overlooked. Human rights-based approach is thus necessary to ensure that all SDGs are considered, taking into account their interconnections and the broader implications of technological advancements.

Assessment Framework for ICT4D projects

The field of ICT4D has witnessed remarkable growth and diversification in recent decades. Numerous projects and initiatives worldwide aim to leverage technology for positive social impact. The rapid rise of Web3 technologies and their adoption by development actors has brought new dilemmas and tensions into the debate about their possible effectiveness but also harm. Assessing, classifying and interpreting the diverse outcomes of ICT-driven initiatives may represent a challenge, often due to the lack of an assessment framework.

In response to this need, we introduce the "Assessment Framework for ICT4D Projects". This framework[(135)] is designed to provide a structured and coherent method for assessing and classifying ICT4D initiatives, regardless of their scale or scope.

At its core, the framework categorises projects into six distinct "Degree of Impact" levels, spanning from "Transformative" to "Detrimental." Each level is associated with specific criteria that delineate the nature and extent of the project's impact.

For instance, "Transformative" initiatives seek profound and substantial changes across various dimensions of society, while "Detrimental" projects cause harm or damage to communities. By systematically classifying projects into these categories, we aim to offer a common language and approach for assessing their impact.

This framework recognises the uniqueness of each project, allowing evaluators, stakeholders, and policymakers to gain a deeper understanding of the consequences of ICT4D initiatives. Whether identifying groundbreaking transformations or highlighting detrimental practices, this framework serves as a valuable tool for enhancing our comprehension of ICT4D project outcomes.

Table 5.1: Assessment framework for classifying ICT4D initiatives

Degree of Impact	Impact Level	Criteria
High	**Transformative** Transformative ICT4D initiatives are typically considered the most impactful as it aims to bring about substantial and profound changes across various aspects of society, including socio-economic, cultural, and political dimensions. It has the potential to revolutionise the targeted communities and their way of life.	• Substantial positive change in socio-economic or cultural aspects. • Significant increase in access to resources or opportunities. • Empowerment of marginalised groups and full recognition of their agency • Breakthrough adoption of innovative ICT or frugal solutions. • Sustainable (and scalable) impact.
Moderate to High	**Progressive** Progressive ICT4D initiatives focus on bringing about positive changes in specific areas, often resulting in noticeable improvements in quality of life for target communities. While not as extensive as transformative initiatives, they can have a meaningful impact.	• Noticeable improvements in specific areas (e.g., education, healthcare, agriculture). • Positive change in the quality of life for target communities. • Expansion of digital literacy and skills. • Effective use of ICT for social inclusion and development. • Moderate scalability, but yet sustainable
Moderate	**Reformist** Reformist ICT4D initiatives prioritise incremental changes in targeted sectors and may enhance service delivery or efficiency. While they may not lead to sweeping transformations, they still contribute to progress within specific domains.	• Incremental changes in targeted sectors. • Moderate enhancement in service delivery or efficiency. Introduction of ICT tools to streamline processes. • Collaboration with local authorities and stakeholders. • Limited scalability or sustainability challenges.
Low to Moderate	**Conformist** Conformist ICT4D initiatives are characterised by their alignment with established norms and practices, without aiming for substantial change. They maintain the status quo and may not lead to significant improvements.	• Maintenance of existing socio-economic and cultural norms. • Reliance on traditional practices and values. • Limited deviation from established norms. • Resistance to substantial changes or innovations. • Preservation of the status quo.
Low	**Conservative** Conservative ICT4D initiatives, by their nature, resist change and innovation. They prioritise the preservation of tradition and may not adopt digital technologies or new practices, leading to minimal or no impact on transformation.	• Strong resistance to change and innovation. • Emphasis on preserving tradition and heritage. • Reluctance to adopt digital technologies or new practices. • Minimal or no impact on socio-economic or cultural transformation. • Preference for maintaining established systems and values.
Negative	**Detrimental** Detrimental ICT4D initiatives cause harm or damage to communities, disproportionately affecting marginalised or vulnerable groups. They undermine local cultures or traditions and have a negative environmental impact, often due to inadequate risk assessment and mitigation strategies. These initiatives are considered (highly) detrimental and harmful to communities.	• Strong resistance to change and innovation. • Emphasis on preserving tradition and heritage. • Reluctance to adopt digital technologies or new practices. • Minimal or no impact on socio-economic or cultural transformation. • Preference for maintaining established systems and values.

(135) *This framework was inspired and has drawn some of its elements from the work of Tony Roberts (2015) "Critical Intent & Interests: A Typology of ICT4D Initiatives", presented at Proceedings of the 13th International Conference on Social Implications of Computers in Developing Countries, Negombo, Sri Lanka*

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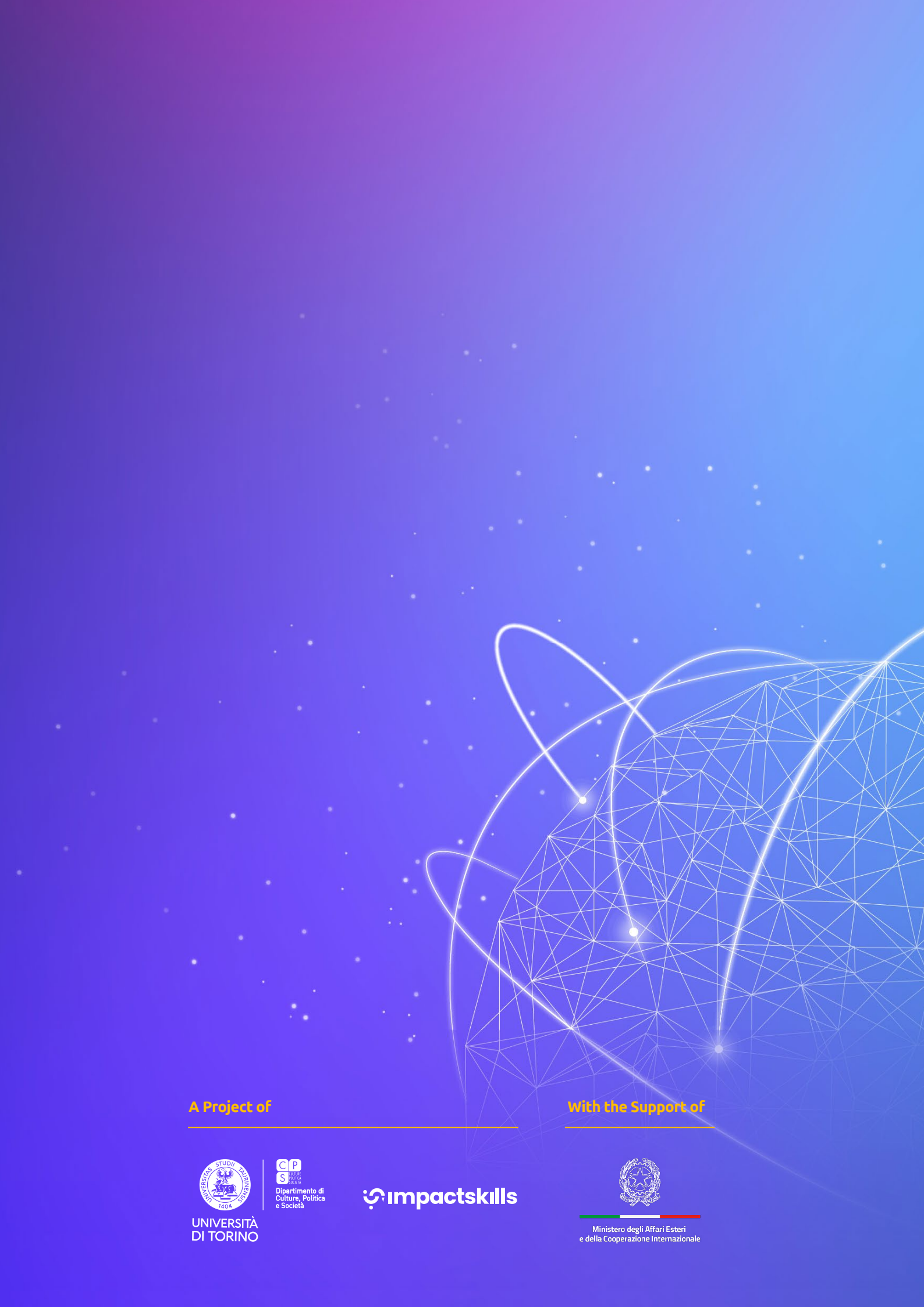

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