



# Leaving No-One Behind? A Research Agenda for Queer Issues in ICT4D

Katherine Wyers<sup>(✉)</sup> 

University of Oslo, Oslo, Norway  
katherwy@ifi.uio.no

**Abstract.** The ICT4D community, and the IFIP Working Group 9.4, is bound by a shared interest in social emancipation through digital technologies. The Sustainable Development Goals (SDG) are often evoked to highlight the many social, economic, and environmental arenas where we are active. However, a perspective centring on queer issues is notably absent from our various mission statements. In this paper, I present a research agenda for queer issues in ICT4D to address this absence. I examine the literature that presents such a perspective in information systems and ICT4D, exploring the challenges that the invisibility of queer issues leads to. For LGBTQ+ people, this absence causes barriers and hesitancy in engaging with public services, and worse, the perpetuation and amplification of systematic discrimination. As researchers, developers, and practitioners, we can and should adopt a more inclusive approach, building on past experiences with ICT to address the plights of marginalized groups.

**Keywords:** LGBTQ+ · Transgender · Queer · Information systems · ICT4D · Queering scholarship

## 1 Introduction

### 1.1 Overview

In this paper, I propose a research agenda to introduce a queer, trans-feminist, intersectional perspective in ICT4D research and practice. I aim to highlight the gaps in literature, discuss the issues that these gaps are having on a vulnerable population, and present a research agenda that the ICT4D community can use to approach these topics. I introduce some of the issues that emerge as information systems and ICT4D interventions continue to impact on the lives of LGBTQ+ populations, leading to challenges in accessing vital services, healthcare, housing, social protection and employment. I describe research streams conducted in related fields of technology, data-systems and data justice, and use these to highlight possible avenues to begin exploring this topic in ICT4D research. Finally, based on this I present a research agenda for queer information systems research within ICT4D.

**What We Talk About When We Talk About LGBTQ+ People.** There are certain challenges that arise when attempting to define communities that do not conform to socially-constructed norms of sexual orientation and/or gender identity and expression. There is no unequivocally agreed-upon term to describe such communities in a way that is sufficiently inclusive whilst recognising and respecting that western terms such as LGBTQ+ may not be universally accepted. The Fa’afafine people of Samoa do not have the same experiences as the Hijra populations in India, or the Two-spirit people of native America, or people across the Global North and beyond who identify as transgender men or transgender women. The communities of self-identified non-homosexual men who have sex with men (MSM) have different experiences than gay men. Likewise, intersex people have distinct experiences, separate from the experience of other LGBTQ+ communities. While many people within these communities do not identify with LGBTQ+, there are shared experiences across all these communities that are connected to cisnormativity and heteronormativity. Judith Butler shows us that language influences society, literature and philosophy since “its dimensions of dynamism enable humans to establish themselves as gendered subjects” [1]. Therefore, in presenting this paper, I spent significant time considering the use of language, and how to refer to a broad, diverse, globally-distributed population. To this effect, I have chosen the term “sexual orientation, gender identity and expression” (SOGIE) as a broad term to refer to the source of the violence and discrimination experienced by these communities, and “lesbian, gay, bisexual, transgender, queer, other” (LGBTQ+) as the broad term to refer to members of these communities. LGBTQ+ here includes populations such as the Hijra in India, men who have sex with men (MSM), Fa’afafine in Samoa, Two-spirit people in native American culture, and all other groups who do not identify with identities that in western countries are referred to as cisgender and/or heterosexual. While there are drawbacks to using such a term, not least that LGBTQ+ is a term originating from the global North and many communities do not identify as LGBTQ+, I have chosen this acronym because it is widely recognised in the research community and is broadly inclusive with the intent to highlight the issues that affect many of the people in these diverse, globally-distributed communities.

**Terminology.** In this paper, there are several terms that are commonly used within the LGBTQ+ community. For readers unfamiliar with these terms, Table 1 describes how I use these terms. While the issues raised are often broadly applicable to all members of the LGBTQ+ communities, at times throughout this paper, specific communities are highlighted to illuminate individual cases where issues are felt most acutely.

**The Intersectional Lens.** Intersectionality is a tool for analysing how our complex identities and group memberships overlap to form our whole selves. The term was coined by Kimberlé Crenshaw in 1990 [4], when she found that women of colour had fewer opportunities because of the combined disadvantages of their gender identity and race. Everyone has multiple identities, be it their race, gender identity, poverty-status, sexual orientation or another identity, and each identity has a positive or negative impact on the person’s experiences and opportunities in life. An intersectional lens allows the researcher to analyse each identity individually, and helps us to see how the combined effects of these identities interlock. The lens can help when discussing the diversity,

**Table 1.** Definitions of key terms used within the LGBTQ+ community

Cisgender	A person who is not transgender. A person who identifies with the gender assigned to them at birth
Cisnormative	The assumption that all human beings are cisgender
Intersectional (research perspective)	A research perspective that takes into account how people's social identities can overlap, creating different modes of discrimination and privilege [2]
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer, and others - Broad umbrella term used to describe a large population of people. The plus symbol is intended to be more inclusive, denotes people who are not heterosexual or cisgender but who do not identify as one of the labels of LGBTQ. For example, asexual or pansexual. As discussed earlier, the acronym LGBTQ+ is used in this paper to refer to Hijra, Two-spirited people, Fa'afafine, MSM and other communities who are not heterosexual and/or cisgender
Non-binary people	People assigned either male or female at birth who do not identify with either male or female
Queer (identity)	A term that was formerly considered a slur. It has been reclaimed and refers now to a way of living in which people consciously challenge cisgender heterosexual norms
Queer (research perspective)	A term that has broadly been associated with the study and theorisation of gender and sexual practices that exist outside of heterosexuality, and which challenge the notion that heterosexuality and cisgender is "normal". Queer theorists are often critical of essentialist views of sexuality and gender. Instead, they view these as socially constructed
SOGIE	Sexual orientation, gender identity and expression
Trans-feminist (research perspective)	This is a perspective that emerged from queer theory. It critiques queer theory and feminist theory for its focus on sexuality and lack of representation of transgender identities
Transgender	An umbrella term used to describe people whose gender identity or expression does not conform to that typically associated with the sex they were born as or assigned to at birth [3]
Transgender men	People assigned female at birth who identify as male
Transgender women	People assigned male at birth who identify as female

equality and inclusion within a group, and to build an equitable space where everyone has equal opportunities. Here, the intersectional lens is used to consider how LGBTQ+ identities interlock with other identities such as race, poverty-status and social status to create layers of oppression that lead to inequities. Within ICT4D, identities can be additionally complex as LGBTQ+ people have roles in technology development [5], international aid [6], and direct and indirect users of technology [7–9], often bringing people from different contexts together, across geographical and cultural borders.

**Queering Scholarship.** The “queering” of scholarship is a process of adjusting research methodologies to make queer identities visible. This approach, emerging from queer theory and feminist theory, seeks to subvert the taken-for-granted assumptions in society that invisibilise people with queer identities [10]. It assumes that sex, sexuality and gender identity are fluid, and it questions the societal assumptions that are based on stable, cisgender, heterosexual identities [11]. This fluidity of sex, sexuality and gender identity has implications for research, indicating that there is a greater degree of diversity than understood in the past. With this research agenda, I present how this understanding of gender identity, sex and sexuality can guide ICT4D research to reveal insights that, until now, have been rendered invisible.

## 1.2 SDGs and LGBTQ+ Communities

The Sustainable Development Goals (SDGs) are a major benchmark for development organisations and a framework often referred to in ICT4D literature. Their core mission is to “leave no-one behind”. However, seven areas within the SDGs have been identified where the lack of explicit inclusion of LGBTQ+ people risk their exclusion from development projects. These seven areas are (1) poverty, (2) health, (3) education, (4) gender equality and women’s empowerment, (5) economic growth and opportunity, (6) safe resilient sustainable cities and human settlements and (7) justice and accountability [12].

With regards to the poverty-related SDGs (SDG1 and SDG3), same-sex families are more likely to be poor than heterosexual families, and social protections are created around the heterosexual family structure, often excluding people who have different sexual orientations or gender expressions [13]. Within healthcare, there is a need to raise awareness about the health rights of people who are not cisgender or not heterosexual, beyond the scope of HIV-programmes and men who have sex with men [14]. There is a need for greater inclusion of LGBTQ+ relationships in sex education programmes, highlighting absences and active avoidance of these topics [12]. The gender-equality issues raised by SDG5 treat gender through the lens of cisnormativity and heteronormativity, and this should be broadened to incorporate transgender people in gender equality discourse [15]. Vandeskog et al. [16] have further critiqued the SDG5 for its failure to define gender, and for conflating the concept of gender with the term “woman”. To promote economic growth and opportunities for LGBTQ+ people, and to ensure safe access to accommodation, the SDGs should be expanded to promote workplace anti-discrimination laws for people who are not heterosexual and people who are not cisgender. This promotes stability and reduces the risk of poverty [12, 17, 18]. By promoting the abolition of discriminatory laws that actively cause emotional, physical and

economic harm to LGBTQ+ people, development organisations following the SDGs will be proactively helping LGBTQ+ people build better, safer and more dignified lives [12].

### 1.3 ICT4D and LGBTQ+ Communities: The Queer Divide

The ICT4D field aims to protect vulnerable people. Since early ICT4D studies in the 1980s, the field has been motivated by the interest in “developing countries”, and since 2001 the field has been increasingly concerned with the ethical motivations of engaging ICTs for socio-economic development [19, 20]. The SDGs, and the SDG agenda, have been used as benchmarks for many studies in the field. The lack of reference to LGBTQ+ communities in the SDGs should be cause for concern, as the SDGs are a major benchmark motivating research in ICT4D [21], and risks the “leaving behind” of a substantial population. If ICT4D is to understand the adoption, use and subsequent impact of ICTs in developing societies [22], the field needs a more thorough understanding of the vulnerable communities it engages, and an assessment of vulnerability that transcends the binaristic focus that the field has adopted so far.

Raftree [5] discusses how, within the global South, there is an emergence of the “queer divide”, where a divide appears to be emerging between LGBTQ+ people and people who are both cisgender and heterosexual. She suggests that this is as a result of people being forced to disengage from “normal” society so as to lead their authentic lives in safety.

Van Zyl and McLean [9] take a queer-feminist perspective in ICT4D, raising concerns about the impact of contact tracing on the privacy of LGBTQ+ communities, recommending that further research be conducted in ICT4D using “a critical intersectional feminist approach which account for the lived experiences of the most vulnerable, while critically considering the concentration of power over access to personal data”.

If ICT4D really is to “leave no one behind” it needs, in the first place, to deal with the binary and, arguably cisnormative assumptions that underpin its literature. Such assumptions are found even in the most recent landscape papers of the field: Walsham [20] poses the question of gender in terms of the advantages ICTs can bring for women. This binaristic understanding of the problem unfortunately silences queer perspectives, confining the analysis of socio-economic development advantages to traditional and crystallised gender roles. While recent works [9] and calls for papers [23] take such perspectives as the center of their attention, ICT4D lexicon still tends to be framed in binary terms that preclude the discussions made in this paper from happening, and LGBTQ+ communities to have a voice in the global agenda on “leaving no one behind”.

While there has been little discussion of LGBTQ+ issues in peer-reviewed ICT4D academic discourse, these issues have been discussed in other outlets. In 2015, the Technology Salon in New York held a conference on ICTs and LGBTQ+ rights to discuss the challenges and possibilities. Central to this discussion was the role of the Internet and mobile devices for building communities, and the concerns of surveillance and privacy that this increased connectedness creates. When LGBTQ+ issues are discussed in ICT4D, the focus tends to be on LGBQ people, omitting transgender and intersex people. Concerns were also raised at the conference by LGBTQ+ practitioners who gave a voice to the LGBTQ+ communities. This decision led to them “outing” themselves,

which they discovered was a trade-off that compromised the opportunities they had in their future careers. Therefore, there exists a paradox in ICT4D whereby LGBTQ+ practitioners are crucial to the ICT4D field to identify the issues, while at the same time their LGBTQ+ identities place them as personal risk, sometimes with grave consequences, due to the cultural and legal contexts of many countries where ICT4D work is conducted [5].

## 2 Motivation for Including Queer Issues in ICT4D

I have discussed the absence of a queer-feminist perspective in peer-reviewed ICT4D outlets. I now introduce my motivations in presenting a new research agenda to include queer issues in ICT4D. The section opens with an outline of discriminations experienced by LGBTQ+ communities, and how information systems influence this discrimination.

### 2.1 Discrimination of LGBTQ+ Populations

LGBTQ+ people account for a large percentage of the world's population, and a recent survey in the US indicates that the number of people identifying as LGBTQ+ is growing. The study revealed that 9.1% of those born between 1981 and 1996 identify as LGBTQ+, with the number increasing to 15.9% for those born between 1997 and 2002 [24].

Despite the growing number of LGBTQ+ -identifying people, these populations continue to experience discrimination, with high levels of social, legal, political and employment hostility, violent assault and healthcare discrimination [25]. This is a global problem, affecting people in the Global North and the Global South.

In the US, 41% of transgender people experience discrimination related to healthcare [26], with similar discrimination documented in Brazil [27]. In Indonesia, transgender populations experience rejection, misidentification, harassment, correction and bureaucratic discrimination [28]. In 2021, two transgender women in Cameroon were arrested and sentenced to five years in prison for “public indecency” simply for visiting a restaurant [29]. In India, transgender people are deemed “deviants” and are subject to victimisation and discrimination that manifests in name-calling, exclusion, rejection, outright harassment, and violence. This leads to physical and mental distress [30]. Despite Ireland's progressive LGBTQ+ rights, transgender discrimination leads a huge percentage (78%) of the transgender population considering suicide [31]. Despite the systematic discrimination of many transgender people [32], Shon Faye notes that the public debate on these issues has remained shallow, distracting from the core concerns experienced by LGBTQ+ people:

As trans people face a broken healthcare system – which in turn leaves them with a desperate lack of support both with their gender and the mental health impacts of the all-too-commonly associated problems of family rejection, bullying, homelessness and unemployment – trans people with any kind of platform or access have tried to focus media reporting on these issues, to no avail. Instead, we are invited on television to debate whether trans people should be allowed to use public toilets. [33]

## 2.2 Information Systems and LGBTQ+ Populations

Information systems risk the perpetuation of transgender discrimination and create challenges for LGBTQ+ communities. I have identified three sources where these challenges emerge from:

- (1) Digital Representation: the data models used to represent people,
- (2) Data-processing Systems: the technical systems used to collect, update, aggregate and analyse data,
- (3) Visibility: the impact of the inclusion of LGBTQ people in the data-sets.

One of the lenses used in the literature to examine our topic is that of data justice. Data justice is defined as “fairness in the way people are made visible, represented and treated as a result of their production of digital data” [34]. Taylor [34] argues that, for establishing the rule of law, a world in which people are datafied – meaning, converted into digital data – requires a concept of “data justice” beyond ordinary justice [35]. Data injustice can occur, as illustrated below, in ways that result in LGBTQ+ discrimination.

**Digital Representation: Data Models Used to Represent People.** Data is not just a set of facts for satisfying curiosity; it is the fundamental basis for decision making in modern organizations. The way data is represented has long been known to have impact on inclusion and exclusion [36]. Rendering gender non-conforming people illegible, thus invisible, and finally non-existent in data systems undermines their representation in data-driven processes. Johnson [8] noted that “as data-driven decisions become increasingly the norm, attention to values, building for pluralist rather than unitary purposes, and inclusivity in the design process will become critical elements of information systems design”. Milan et al. [37] similarly note how data injustice can result by omitting non-legible people from the provisions resulting from relevant systems, such as social protection and humanitarian aid.

The approach to representing gender within an information system can have serious implications for individual civil rights protection for people whose reality is shaped by the socio-technical systems that “manage and create what [transgender people] will be understood to deserve” [38]. This representation of gender as a binary is not just an issue of self-actualisation. It has practical consequences related to justice and access to services, with ramifications for the access of transgender people to healthcare services such as HIV testing [39]. Despite the pressing need to resolve these issues, the design of information systems has proved to be inadequate for dealing with gender-variance. Despite the social changes taking place in many countries, “information technology systems [...] remain inflexible for the purposes of recording multifactor gender information” [40].

The representation of gender and gender-diversity in an information system leads to several other manifestations of discrimination or ignorance. A study by Kirkland [38] reviewing complaints to healthcare providers highlighted how complaints that had arisen from transgender discrimination were miscategorised and silenced. Public health advertisements based on traditional gender representations create barriers for transgender men for cervical cancer screening [41] and breast-cancer screening [42]. These issues of binary gender representation are difficult to resolve. Even the most progressive information system designers are bound to the wider institutions of gender representation. In



2014, Facebook expanded its list of gender representation to 52. However, it received harsh criticism when it was discovered that they were aggregating this data to a binary representation in order to remain interoperable with marketing platforms [43].

**Data-Processing Systems: Technical Systems Used to Collect, Update, Aggregate and Analyse Data.** The design of a data-processing system impacts on LGBTQ+ people. Information systems are sites for political contestation and should be viewed as important loci for efforts to promote social justice. The technical systems embody political values and have the potential to be significant contributors to social injustices affecting groups of LGBTQ+ people [8]. For example, restricting the ease with which a gender-field can be updated in an information system leads to many barriers for the ability of transgender people to exist in public spaces and access vital services. In one recent example from 2020, the mismatches between identification documentation and personal gender presentation meant that 5 million transgender people in India could not access the funds and food rations made available as a response to the pandemic lockdown [44].

ICTs and digital identities impact on the ability of an LGBTQ+ person to access employment. Mismatches between gender presentation and digital identities create barriers to employment. In a case from Vietnam, a transgender person reported that they experienced discrimination when applying for employment. The gender indicated on their identity documents did not match with their gender presentation, and it was not possible to update the identity documents. As a result, the person could not access employment [45]. This reflects Heeks and Renken's [46] notion of structural data injustice, reflecting how structural injustices present in society tend to be crystallised and reflected in a datafied world.

The increased reliance of ICTs on facial recognition algorithms leads to issues for transgender and non-binary people, such as classification of images and their potential to reinforce binary gender structures. A recent study showed that a commonly used gender recognition algorithm was unable to correctly label non-binary people [47].

**Visibility - Impact of the Inclusion of LGBTQ+ People in Data-Sets.** SOGIE-related violence affects people's ability to access employment [45], healthcare [39] and other vital services [44]. As noted by Milan et al. [37], there is a strong thread of continuity between invisibilisation of people and data injustices perpetrated on them [48, 49]. LGBTQ+ people must be visible in national statistics so that governments can include them in planning decision for healthcare and public services. However, in most countries in the world, it is unsafe for an individual to be identifiable as being LGBTQ+. This leads to a paradox, whereby the population must be both visible for national statistics and invisible for the safety of the individual and the population. If population-based surveys do not include items that identify LGBTQ+ people, this limits public health surveillance and the ability to provide healthcare services [50].

If an information system exposes a person as being a member of the LGBTQ+ community, this can lead to discrimination and harassment. For example, within the healthcare domain, there is a move to include gender identity in electronic health records. However, many transgender and gender non-conforming people do not feel safe with this as they are concerned that it will lead to discrimination and harassment at the point of care, or if the information is shared or the data exposed [51]. There are concerns in other



areas, such as digital identity systems, where the status of a person's gender identity or sexual orientation can become exposed and lead to issues in employment, education or other services. While the increased visibility can lead to greater public awareness about the existence of LGBTQ+ populations, there are examples of how this visibility fuels a backlash and increased political opposition [33].

### 3 Approaches Being Explored in Related Fields

I have outlined key terminology, presented an overview of the sources of discrimination, and discussed how these issues relate to ICT4D. I now present some promising research being conducted in related fields that explore potential approaches for addressing some of the issues raised.

#### 3.1 LGBTQ+ Inclusion in the SDGs

In the Mills [12] report described earlier, the SDGs were critiqued for their lack of explicit inclusion of LGBTQ+ people. She makes several recommendations for how international development actors can develop a more inclusive understanding of the SDGs and implement them in a way that is more inclusive. She recommends that actors involve members of the LGBTQ+ communities when developing programmes, and that they should explicitly include LGBTQ+ communities in all programmes. Awareness should be raised among delivery partners and staff of the need to include LGBTQ+ communities to maintain the “leave no one behind” promise. When reporting on outcomes, report on SOGIE-related success stories and link the successes to the SDGs. International actors should use their influence to lobby for greater inclusion of LGBTQ+ communities in international development frameworks [12]. Vandeskog et al. [16] caution against the limited use of the term “gender” in the SDG agenda, arguing that the concept of gender is too often conflated with “woman”. They recommend a broader understanding of the term when applying the SDG framework.

#### 3.2 Embodiment of Prejudice in Information Systems

Queer bodies have traditionally been sites of both regulation and resistance in information systems. By adopting the use of queer theory, we can explore embodiment and affect beyond physical practices, pointing research practices to become better attuned to embodied and affective power dynamics. It allows researchers to “draw connections between bodies and feelings that necessarily factor into any information interaction” [52]. Studies in human-computer interaction are exploring how prejudices become embodied within systems. The inscription of LGBTQ+ prejudice within information systems often occurs unintentionally through a lack of awareness rather than through malicious intent. Despite the lack of an intent, this embodiment of prejudice leads to many challenges for LGBTQ+ people, perpetuating oppressions for many years and amplifying existing inequalities, reinforcing stereotypes and exposing vulnerable populations to discrimination [53].

### 3.3 Participatory Design

Several studies are exploring the role that queer, transgender and other LGBTQ+ communities can play in the design of ICTs. Haimson et al. [7] conducted studies to assess the effect of involving transgender people in the design process for ICTs. The study found that a number of novel solutions emerged during the design process, and concluded that there was a need for a community-based intersectional approach when developing technologies that affect transgender people. A recent study by Brulé and Spiel [54] explored how children with queer and disabled identities can be involved in the participatory design process. They find that participatory design allows participants to explore roles and identities and leads to solutions that better meet their needs. They also bring insight to the challenges for LGBTQ+ people who are conducting research. LGBTQ+ researchers are under heightened scrutiny when conducting research, and they are under pressure to reflect on their own convictions and how this could impact the participatory approach. Cisgender heterosexual people are not expected to reflect on their beliefs about gender identity or sexual orientation. This is despite the fact that cisgender heterosexual people also bring their individual normative identities and this can impact on the participatory process, such as assuming a participant is heterosexual and cisgender [54].

### 3.4 Algorithmic Bias

Algorithmic bias, a form of data injustice perpetrated by computer systems that create unfair outcomes, emerges across the studies reviewed here. In a study of transgender people in the UK who sought to correct the gender on their ID cards, Hicks [55] found explicit attempts to make it impossible to conduct such an operation through the UK government's computer systems. Beyond instances of transphobic algorithmic bias, the paper looks at people's resistance against them, resulting in the exposure and rediscussion of the system in point. By inscribing users into categories and targeting specific ones, algorithmic bias generates situations of systemic injustice for the affected people [56].

In their study of gender classification in commercial facial analysis and image labelling services, Scheuerman et al. [47] unpack algorithmic biases implicit in automated gender recognition. In studying how gender is encoded into such services, they find systemic worse performance on recognition of transgender individuals and universal inability to recognise non-binary genders. Their problematisation pertains to both classifiers and data standards: classification, they find, is systemically predetermined on binary terms, resulting into inability of systems to conceive non-traditional gender roles and account for them through data. This results again in the perpetuation of bias, with significant impacts on the lives of the affected individuals.

Spiel et al. [57] introduce a non-binary perspective in the field of human-computer interaction (HCI). Through the narration of "stylised slice-of-life" reports, they narrate encounters with technology that, ranging from software for university application to face recognition systems, can be marginalising and, to the extreme, violent and risky to non-binary people. Narrated instantiations span the fields of lived life (from visiting a shop to crossing an international border) to encounters occurred as non-binary researchers in the academic space. Proposing to "patch the gender bugs" of the HCI field, Spiel et al. [57]

illustrate how elements of contextualised technology, common to ICT4D, can represent risks for non-binary people that HCI research needs to tackle.

Relatedly, DeVito et al. [58] discuss routes to support LGBTQ+ researchers and research across different disciplines. Their work starts from the point that many disciplines, similarly to ICT4D, do not clearly tackle or give sufficient space to perspectives beyond the binary and cisnormative. They note how, differently from that, Queer HCI is becoming a substantial part of the broader field, and devise routes for other fields to openly embrace LGBTQ+ perspectives. In doing so, they focus on the creation of a Special Interest Group (SIG) in the core HCI conference, a proposal that other communities, including the ICT4D one, have the elements and ability to undertake.

### 3.5 Designing for Marginalised Populations

While illuminating the forms of data injustice detailed above, research also shows how technology can be designed for inclusive and, particularly, intersectional purposes, tackling diverse forms of oppression. This idea is reflected in Costanza-Chock's [59] notion of design justice, which conceives technology design as built towards collective liberation of oppressed community. Advocated, in Costanza-Chock's book "design justice", is a form of justice where design is oriented to challenging intersectional sources of domination.

One operationalisation of the notion of design justice is found in the work of Erete et al. [60]. Looking at established research on participatory design, they note how marginalised groups have historically not been taken into specific account in design processes. To explicitly engage communities at the margins, they propose a reflection on design for underserved communities, illustrating ways in which technology – rather than just producing injustice – can increase people's ability to challenge such sources of oppression. Resonating with these ideas, Rohm and Martins [61] devise routes through which technology can be adapted to voice LGBTQ+ communities during the COVID-19 pandemic.

### 3.6 Health Information Use Within LGBTQ+ Communities

Wagner et al. [53] explores the approaches to data use that transgender communities take. The study seeks to highlight the need for healthcare providers to work more closely with transgender people when designing information systems. These communities have data practices that have emerged from decades of oppression and persecution; practices that maintain privacy and anonymity and seek to protect members of the community. The study concluded that closer engagement with transgender people will lead health information system designers to create more inclusive systems that better serve the population.

### 3.7 Representation of Gender Variance in Digital Identities

In recent years, researchers have come to understand both gender and sex as a continuum rather than binary states of "male" and "female". While the concept of a gender

continuum is not new, it has been increasingly normalized over the past decade [62]. This shift towards a pluralist understanding of gender creates challenges for information systems designers, where gender has traditionally been represented as a binary. The gender binary system is a social construct, created to classify the gender and sex continua [63]. This classification leads to inaccuracies in the way individuals are classified and, therefore, represented. ‘There may not be gender categories available to adequately record the individual’s [gender identity], and there are often no [...] fields available to record gender information other than [gender identity]’ [40].

## 4 Queering ICT4D Scholarship: What Does It Look like?

I propose the introduction of a critical, queer, trans-feminist, intersectional perspective into ICT4D and IS research. This perspective will have an impact on several key areas. The trans-feminist, queer perspective highlights new issues experienced by a marginalised group who are exposed to discrimination through the design and use of information systems. Introducing this perspective into the ICT4D discourse would serve to highlight the unique needs that these communities have, and how design decisions impact on their ability to lead lives with dignity.

### 4.1 Serving LGBTQ+ Populations

By studying ICTs using a critical, queer, trans-feminist, intersectional perspective, the research efforts highlight new issues experienced by a large population who have been historically silenced. The perspective highlights the pitfalls that are experienced by neglecting these issues; pitfalls whereby large populations are under-served with health-care services and are exposed to discrimination. Using this lens, we can become more aware of the issues that exist. We can find solutions that lead to a reduction in the discrimination of this vulnerable population. This lens highlights unique socio-technical issues, exposing complex challenges and requiring novel approaches to the ethical and data-representation challenges faced by LGBTQ+ populations in ICT4D.

### 4.2 Serving Other Marginalised Populations

While many of the issues raised in this paper relate directly to the experiences of transgender and other LGBTQ+ communities, the challenges can also be broadly understood as issues related to serving other vulnerable, marginalised communities such as religious minorities and ethnic minorities. Many of the privacy and ethical issues experienced by LGBTQ+ people in relation to information systems are also experienced by other minorities. Groups such as ethnic minorities and religious minorities experience ongoing oppressions because of several of the challenges raised here. Using a queer, trans-feminist, intersectional perspective on research not only highlights issues experienced by queer populations. It also highlights issues experienced by other populations and has the potential to unearth novel solutions that are broadly applicable to other vulnerable populations.

### 4.3 Richer Understanding of Data

A queer, trans-feminist, intersectional perspective looks for the data that is absent as well as the data that is present. As Catherine Lord said of the analysis of historical records to identify LGBTQ+ people: ‘we find our archive between the lines’ [64]. The perspective assumes that LGBTQ+ people exist now and have existed in the past. By analysing historical data using this perspective, we can look for the people who we know existed, but who have been invisibilised through limitations in the design of data-collection systems, or through unintentional or malicious exclusion. By recognising queerness in historical data, these datasets can give richer insight into statistics, including healthcare analytics. For example, by recognising a patient as having been transgender, their diagnosis, treatment, healthcare service experience and health outcome can be better understood. This gives invaluable knowledge that can be used for treatment plans for other transgender patients.

## 5 Queer Issues in ICT4D: A Research Agenda

Despite the promise of the SDGs to “leave no one behind” [12], there is evidence to suggest that this promise is not being met for all populations on account of the absence of its reference to LGBTQ+ people and the impact this absence has. The field of ICT4D research is motivated by engagement with human socio-economic needs and should therefore be proactive in addressing the issues raised. The SDGs are a list of targets to achieve by 2030. The ICT4D field should not wait until the SDG time-period ends before it begins to address these issues. They are impacting people now, and the research should be conducted to determine how LGBTQ+ issues can be addressed within the field of ICT4D [16].

The research agenda outlined below proposes seven streams of research that ICT4D researchers can engage with to begin addressing these issues. It builds on the work taking place in related fields of research. It is informed by the SDG recommendations made by Mills [12], Matthyse [15] and Vandeskog et al. [16], encouraging ICT4D researchers and system designers to create strategies that are more inclusive of LGBTQ+ people, encouraging more research related to the unique needs of LGBTQ+ people and to tackle the experiences of populations who are being excluded based on SOGIE. While there are many areas of research that can and should be explored through a critical, queer, trans-feminist, intersectional lens, I proposed the following seven streams of research to begin exploring queer approaches to research in the field of ICT4D.

Stream 1 is concerned with the processes whereby prejudice manifests within ICT system design. Stream 2 explores the ethical and moral obligations that ICT developers have to limit the harm their systems cause to LGBTQ+ people. Stream 3 aims to ensure that queer voices are heard during ICT development. Stream 4 is concerned with how inequities created by ICTs affect LGBTQ+ people’s sense of self. Stream 5 seeks to expand ICT development to be inclusive by design, and explores how this can be achieved. Stream 6 aims to safely raise visibility of LGBTQ+ people. Stream 7 seeks to ensure that LGBTQ+ people working in ICT4D are safe from violence when carrying out their work.

### **Stream 1: How LGBTQ+ Prejudices Become Embodied Within Systems**

While many healthcare providers are not intentionally trans-exclusionary, the design of healthcare information systems rely on cis-normative values, thus excluding many [transgender and non-binary people] from accessing healthcare in comfortable and safe ways [53].

This area of research explores how LGBTQ+ prejudice becomes embodied within information systems. It investigates how cisnormativity and heteronormativity become established and maintained, and how these normativities influence the design decisions that are taken. It seeks to find approaches to information system design that limit the risk of embodiment of transgender prejudice and LGBTQ+ prejudice.

### **Stream 2: The Role of Information System Designers in Fighting Discrimination in the Global South**

Whatever our role, we are designers of information. Our choices alter the presentation and flow of human knowledge. We control how people find, understand, and use information in every facet of their lives. We must be very, very careful [65].

This topic explores the moral and ethical obligation that information system designers and developers have in ensuring that their systems do not perpetuate oppressions. It asks who should take the responsibility for resolving the issues that arise, and how these issues can be addressed. It investigates what role the system designers should take in affecting change, and what influence they should exert in the design and implementation of their systems to guide users towards a more equal information system and more equal society. It explores what role system designers have in ensuring that their systems are not used to embody prejudices and amplify inequalities. Within the ICT4D field, this topic deals with the ethics of knowledge-sharing between the global North and the global South. It explores the influence that system designers can and should have in pushing for better guidance in the use of their systems [66].

### **Stream 3: Involving LGBTQ+ People in ICT4D Participatory Design**

Nothing about us without us [67].

When designing information systems that will affect LGBTQ+ people, LGBTQ+ people should be involved in the design process. This stream of research explores the role that LGBTQ+ communities should play as value advocates in the design of information systems. It investigates what impact their involvement has on the system design and the wider impact that the system subsequently has on the perpetuation of discrimination and access to services. It explores the challenges of including LGBTQ+ populations in the design of systems within the ICT4D context, gathering their input while simultaneously ensuring that their identities remain private.

### **Stream 4: The Impact of ICTs on LGBTQ+ People's Sense of Self and Sense of Capacity to Achieve**

As transgender people, we do not expect that we can have a long-term marriage (Transgender person in Vietnam, quoted by Oosterhoff [45]).

This stream of research investigates the role that ICTs have on the capability of LGBTQ+ people to envision a future where they lead lives with dignity. It explores how ICTs influence members of the LGBTQ+ communities in their vision for what they can achieve in their lives. People can only know what they can achieve if they are aware that it is achievable and available to them [68]. There are many countries where access to legal gender recognition is only available if a person has completed a set of medical interventions such as hormone replacement therapy or surgeries. People's sense of self becomes entangled in their ability to access these medical interventions, leaving people in limbo and "dehumanised" as the glacial process of access to these interventions proceeds [69]. In many countries, the access to legal gender recognition necessitates completing a set of these medical interventions. The barriers in healthcare and ongoing discrimination lead to people restricting what they allow themselves to believe they can achieve [68]. These processes disempower LGBTQ+ people, removing their agency and impacting negatively on their sense of self. This stream of research explores the role that ICTs play within this disempowerment. It explores how the design of an information system influences what an LGBTQ+ person believes their future can be and what they allow themselves to aspire to.

### **Stream 5: Seeking "Inclusion by Design"**

Lack of standardised survey items on population-based surveys to identify transgender respondents limits existing public health surveillance [50].

This stream of research explores the implications of "inclusion by design" with regards to exposing individuals to discrimination. Exposing LGBTQ+ identities within an information system must be done with care to reduce the risk of exposing the individual to discrimination. We must find approaches that allow the information about LGBTQ+ people to be stored within information systems. We should seek "inclusion by design". However, subjective inclusiveness raises a host of challenges and ethical dilemmas, and there is a need for research and discussion of these dilemmas, and how the ICT4D community can include LGBTQ+ populations without exposing them to further discrimination. The inclusion of LGBTQ+ people should be the default within a system's design, and the decision to exclude this population should only be through a process of actively enabling the exclusion. Such an approach to design could involve taking active steps in the development of technology to be broadly inclusive. Within the context of gender representation, this could be achieved by incorporating predefined lists of gender identities. However, such an approach can lead to unintended consequences related to the inclusion of vulnerable populations in information systems.

### **Stream 6: Building better data-sets on LGBTQ+ People**

To facilitate better programming for ICT4D projects, there is need for greater insight into the lives of LGBTQ+ people and how ICTs lead to inequities for these marginalised communities. By building these datasets, ICT4D projects can be better planned to accommodate their needs and ensure that services are made available in an equitable manner. LGBTQ+ communities are marginalised and highly vulnerable. Members may be fearful of their safety as a direct result of their LGBTQ+ identities, living in countries where these identities are criminalised, and/or actively persecuted. Therefore, data about these



populations must be ethically sourced, securely anonymised, and follow best practices to ensure that the members are not at risk of exposure to discrimination.

### **Stream 7: Reducing the risk of exposing LGBTQ+ people to violence when they conduct ICT4D work**

LGBTQ+ researchers and practitioners are in a superior position to be inclusive and highlight the issues related to LGBTQ+ people due to their awareness, exposure and experience. At the same time, much ICT4D work takes place where LGBTQ+ people could be severely discriminated against and be in serious risk of violence. Measures and safeguards are needed to ensure members of the LGBTQ+ communities can conduct their work in ICT4D free of such risks. However, these are complex issues and they must be understood on a deep level to ensure the correct measures and safe-guards can be developed so that LGBTQ+ people are safe when conducting ICT4D work.

## **6 Conclusion**

This paper stemmed from the recognition that, while the objectives of the ICT4D field are closely intertwined with the “Leaving No One Behind” agenda of the SDGs, the field is indeed leaving many people behind by silencing queer issues. This is not only a contradiction, but also a condition that makes the field unliveable for LGBTQ+ researchers [57] and makes us inadequate to elaborate recommendations for technologists, as these recommendations may end up producing binaristic, cisnormative, heteronormative systems that put LGBTQ+ people into precarious, vulnerable positions.

In response to this problem I have reviewed approaches to queer issues taken from other fields, cognate of ICT4D. With the purpose of learning from such fields, I have delineated a queer ICT4D agenda, exploring how biases are embedded in our systems and, vice versa, how technologies for socio-economic development can be designed towards inclusive, liberating purposes for LGBTQ+ people.

Firstly, I find that engagement of ICT4D with queer issues is a necessary step towards refocusing the field’s agenda on the world it faces. While the field presents some attention to gender, the binaristic focus found in landscape papers up until recent days [20] is inadequate to represent the real world, and more dangerous given the enhanced vulnerabilities suffered by queer communities [9]. As a result, with this paper I want to openly incorporate queer issues in the field, delineating a path towards active measures for voicing queer issues in ICT4D forums. The track on “Feminist and Queer Approaches in ICT4D” in the IFIP 9.4 Virtual Conference, as well as the Queer HCI group created in HCI, are examples of such measures.

Secondly, I think it is crucial that a queer agenda inspires the engagements of ICT4D researchers with practice. This is important to avoid an absence of queer perspectives to be reflected in socio-economic development systems [57], resulting in technologies that deny queer identities and put LGBTQ+ users at risk of violence, threat or marginalisation. Producing technologies that caution against such bias is inevitably a concerted effort of researchers and practitioners, in which the researcher has the responsibility to formulate recommendations that caution against bias. It is in the light of this responsibility that this paper’s agenda has been devised.

While a history of binarism, cishnormativity and heteronormativity affects ICT4D, other fields, such as STS [70] and HCI [58], demonstrate the urgency of incorporating a queer agenda into pre-existing fields. When such fields engage vulnerable people, as ICT4D intends to do since its early days, such an urgency is even more pronounced. LGBTQ+ issues in ICT4D have been raised in the past outside of the peer-reviewer ICT4D discourse. However, there has been little discussion of the issues within peer-reviewed ICT4D academic discourse. I hope, with this paper, to have made further steps towards a conversation the field must have, to devise an agenda that makes LGBTQ+ issues a priority topic of ICT4D research.

**Acknowledgement.** I would like to show my gratitude to Dr. Johan Ivar Sæbø, Assistant Professor at the Department of Informatics, University of Oslo, for his support and encouragement, and for his contributions to the structure of this paper. I would also like to thank Dr. Silvia Masiero, Assistant Professor at the Department of Informatics, University of Oslo, for her guidance through the literature on data justice, for her comments, and for the encouragement she gave me throughout the preparation of this research agenda.

## References

1. Yaghoubi-Notash, M., Mohammad, V.N., Soufiani, M.: Language, gender and subjectivity from Judith Butler's perspective. *Philos. Investig.* **13**, 305–316 (2020)
2. Crenshaw, K.W.: *On Intersectionality: Essential Writings*. The New Press, New York (2017)
3. Mayer, K.H., Bradford, J.B., Makadon, H.J., Stall, R., Goldhammer, H., Landers, S.: Sexual and gender minority health: what we know and what needs to be done. *Am. J. Public Health* **98**, 989–995 (2008). <https://doi.org/10.2105/AJPH.2007.127811>
4. Crenshaw, K.: Mapping the margins: intersectionality, identity politics, and violence against women of color. *Stanford Law Rev.* **43**, 61 (1991)
5. Raftree, L., Kumar, M.: An Understanding of LGBTQI Rights and Technology for Development. Technology Salon Discussion at the Intersection of Technology Development (2015). <https://technologysalon.org/an-understanding-of-lgbtqi-rights-and-technology-for-development/>. Accessed 10 Apr 2022
6. Kumar, M.: Digital Security of LGBTQI Aid Workers: Awareness and Response. The European Interagency Security Forum, EISF 2020, 13 (2020)
7. Haimson, O.L., Gorrell, D., Starks, D.L., Weinger, Z.: Designing trans technology: defining challenges and envisioning community-centered solutions. In: *Proceedings of 2020 CHI Conference on Human Factors in Computing Systems*, pp. 1–13. ACM, Honolulu (2020). <https://doi.org/10.1145/3313831.3376669>
8. Johnson, J.A.: Information systems and the translation of transgender. *TSQ Transgender Stud. Q.* **2**, 160–165 (2015). <https://doi.org/10.1215/23289252-2848940>
9. van Zyl, I., McLean, N.: The Ethical Implications of Digital Contact Tracing for LGBTQIA+ Communities. (2021)
10. Browne, K., Nash, C.J., (eds.) *Queer methods and methodologies: intersecting queer theories and social science research*. Ashgate, Farnham (2010)
11. Thiel, M.: Queering scholarship? LGBT politics as an analytical challenge for political science and international relations. In: Bosia, M.J., McEvoy, S.M., Rahman, M. (eds.) *The Oxford Handbook of Global LGBT and Sexual Diversity Politics*, pp. 119–135. Oxford University Press (2020). <https://doi.org/10.1093/oxfordhb/9780190673741.013.5>

12. Mills, E.: 'Leave No One Behind': Gender, Sexuality and the Sustainable Development Goals (2015). [https://doi.org/10.1163/2210-7975\\_HRD-0148-2015071](https://doi.org/10.1163/2210-7975_HRD-0148-2015071)
13. Galang: How Filipino LBTs Cope with Economic Disadvantage. IDS, Brighton (2015)
14. Müller, A.: Teaching lesbian, gay, bisexual and transgender health in a South African health sciences faculty: addressing the gap. *BMC Med. Educ.* **13**, 174 (2013). <https://doi.org/10.1186/1472-6920-13-174>
15. Matthyse, L.: Achieving gender equality by 2030: transgender equality in relation to sustainable development goal 5. *Agenda* **34**, 124–132 (2020). <https://doi.org/10.1080/10130950.2020.1744336>
16. Vandeskog, H.O., Heggen, K.M., Engebretsen, E.: Gendered vulnerabilities and the blind spots of the 2030 Agenda's 'leave no one behind' pledge. *Crit. Policy Stud.* 1–17 (2021). <https://doi.org/10.1080/19460171.2021.2014342>
17. Swank, E., Fahs, B., Frost, D.M.: Region, social identities, and disclosure practices as predictors of heterosexist discrimination against sexual minorities in the United States. *Sociol. Inq.* **83**, 238–258 (2013). <https://doi.org/10.1111/soin.12004>
18. Botti, F., D'Ippoliti, C.: Don't ask don't tell (that you're poor). Sexual orientation and social exclusion in Italy. *J. Behav. Exp. Econ.* **49**, 8–25 (2014). <https://doi.org/10.1016/j.socec.2014.02.002>
19. Avgerou, C.: Theoretical framing of ICT4D research. In: Choudrie, J., Islam, M., Wahid, F., Bass, J., Priyatma, J. (eds.) *Information and Communication Technologies for Development*, vol. 504, pp. 10–23. Springer, Cham (2017). [https://doi.org/10.1007/978-3-319-59111-7\\_2](https://doi.org/10.1007/978-3-319-59111-7_2)
20. Walsham, G.: ICT4D research: reflections on history and future agenda. *Inf. Technol. Dev.* **23**, 18–41 (2017). <https://doi.org/10.1080/02681102.2016.1246406>
21. Heeks, R.: Future priorities for development informatics research from the post-2015 development agenda. *SSRN Electron. J.* (2014). <https://doi.org/10.2139/ssrn.3438434>
22. Dey, B., Sorour, K., Filieri, R., (eds.): *ICTs in Developing Countries*. Palgrave Macmillan UK, London (2016). <https://doi.org/10.1057/9781137469502>
23. Vannini, S., Masiero, S., Tandon, A., Wellington, C., Wyers, K., Braa, K.: *Feminist and queer approaches to ICT4D*. *Inf. Technol. Dev.* (2021). Special Issue Call for Papers
24. Gallup: *LGBT Identification Rises to 5.6% in Latest US Estimate*. Gallup Poll (2021)
25. Reed, R.: Dignity in transgender lives: a capabilities approach. *J. Hum. Dev. Capab.* **21**, 36–48 (2020). <https://doi.org/10.1080/19452829.2019.1661982>
26. Bradford, J., Reisner, S.L., Honnold, J.A., Xavier, J.: Experiences of transgender-related discrimination and implications for health: results from the Virginia transgender health initiative study. *Am. J. Public Health* **103**, 1820–1829 (2013). <https://doi.org/10.2105/AJPH.2012.300796>
27. Costa, A.B., et al.: Healthcare needs of and access barriers for brazilian transgender and gender diverse people. *J. Immigr. Minor. Health* **20**(1), 115–123 (2016). <https://doi.org/10.1007/s10903-016-0527-7>
28. Gordon, D., Pratama, M.P.: Mapping discrimination experienced by Indonesian trans\* FtM persons. *J. Homosex* **64**, 1283–1303 (2017). <https://doi.org/10.1080/00918369.2016.1244446>
29. Peltier, E.: *Cameroon Sentences Transgender Women to 5 Years in Prison*. N Y Times (2021)
30. Rani, N., Samuel, A.A.: Reducing transphobia: comparing the efficacy of direct and indirect contact. *Ind. Commer. Train* **51**, 445–460 (2019). <https://doi.org/10.1108/ICT-12-2018-0102>
31. Mcneil, J., Bailey, L., Ellis, S., Regan, M.: *Speaking from the margins: trans mental health and well-being in Ireland* (2013)
32. Murib, Z.: Administering biology: how "bathroom bills" criminalize and stigmatize trans and gender nonconforming people in public space. *Adm. Theory Prax* **42**, 153–171 (2020). <https://doi.org/10.1080/10841806.2019.1659048>
33. Faye, S.: *The Transgender Issue: An Argument for Justice*. Allen Lane, London (2021)

34. Taylor, L.: What is data justice? The case for connecting digital rights and freedoms globally. *Big Data Soc.* **4** (2017). <https://doi.org/10.1177/2053951717736335>
35. Mayer-Schönberger, V., Cukier, K.: *Big data : a revolution that will transform how we live, work, and think* (2013)
36. Bowker, G.C., Star, S.L.: *Sorting things out : classification and its consequences* (1999)
37. Milan, S., Tréré, E., Masiero, S.: Introduction: COVID-19 seen from the land of otherwise. *Covid-19 Margins Pandemic Invisibilities Policies Resist. Datafied Society*, pp. 14–23. Institute of Network Cultures, Amsterdam, NL (2021)
38. Kirkland, A.: Dropdown rights: categorizing transgender discrimination in healthcare technologies. *Soc. Sci. Med.* **289**, 114348 (2021). <https://doi.org/10.1016/j.socscimed.2021.114348>
39. Saraswathi, A., Praveen, P.A.: To analyse the problems of transgender in India/study using new triangular combined block fuzzy cognitive maps. *Int. J. Sci. Eng. Res.* **6**, 186–195 (2015)
40. Costelloe, S.J., Hepburn, S.: Management of transgender patients in laboratory information management systems – moving on from binary and ternary logic. *Ann. Clin. Biochem. Int. J. Lab. Med.* **58**, 264–266 (2021). <https://doi.org/10.1177/0004563220984825>
41. Dhillon, N., Oliffe, J.L., Kelly, M.T., Krist, J.: Bridging barriers to cervical cancer screening in transgender men: a scoping review. *Am. J. Men’s Health* **14** (2020). <https://doi.org/10.1177/1557988320925691>
42. Roznovjak, D., Petroll, A., Cortina, C.S.: Breast cancer risk and screening in transgender individuals. *Curr. Breast Cancer Rep.* **13**(1), 56–61 (2021). <https://doi.org/10.1007/s12609-020-00403-x>
43. D’Ignazio, C., Klein, L.F.: *Data Feminism*. MIT Press, Cambridge (2020)
44. Pandya, A.K., Redcay, A.: Access to health services: barriers faced by the transgender population in India. *J. Gay Lesbian Ment. Health* **25**, 132–54 (2021). <https://doi.org/10.1080/19359705.2020.1850592>
45. Oosterhoff, P., Hoang, T.-A., Trang, Q.: *Negotiating Public and Legal Spaces: The Emergence of an LGBT Movement in Vietnam* (2014). <https://doi.org/10.13140/RG.2.1.3463.9129>
46. Heeks, R., Renken, J.: Data justice for development: what would it mean? *Inf. Dev.* **34**, 90–102 (2018). <https://doi.org/10.1177/0266666916678282>
47. Scheuerman, M.K., Paul, J.M., Brubaker, J.R.: How computers see gender: an evaluation of gender classification in commercial facial analysis services. *Proc. ACM Hum.-Comput. Interact.* **3**, 1–33 (2019). <https://doi.org/10.1145/3359246>
48. Taylor, L., Sharma, G., Martin, A., Jameson, S.: *What does the COVID-19 Response Mean for Global Data Justice? Data Justice COVID-19 Global Perspectives*. Meatspace Press, Manchester (2020)
49. Weitzberg, K., Cheesman, M., Martin, A., Schoemaker, E.: Between surveillance and recognition: rethinking digital identity in aid. *Big Data Soc.* **8** (2021). <https://doi.org/10.1177/20539517211006744>
50. Reisner, S.L., Poteat, T., Keatley, J., Cabral, M., Mothopeng, T., Dunham, E., et al.: Global health burden and needs of transgender populations: a review. *The Lancet* **388**, 412–436 (2016). [https://doi.org/10.1016/S0140-6736\(16\)00684-X](https://doi.org/10.1016/S0140-6736(16)00684-X)
51. Dunne, M.J., Raynor, L.A., Cottrell, E.K., Pinnock, W.J.A.: Interviews with patients and providers on transgender and gender nonconforming health data collection in the electronic health record. *Transgender Health* **2**, 1–7 (2017). <https://doi.org/10.1089/trgh.2016.0041>
52. Floegel, D., Wagner, T.L., Delmonaco, D., Watson, B.M.: Expanding our conceptions of embodied and affective information interactions with queer theory. *Proc. Assoc. Inf. Sci. Technol.* **58**, 582–586 (2021). <https://doi.org/10.1002/pr2.503>
53. Wagner, T.L., Kitzie, V.L., Lookingbill, V.: Transgender and nonbinary individuals and ICT-driven information practices in response to transexclusionary healthcare systems: a qualitative study. *J. Am. Med. Inform. Assoc.* (2021). <https://doi.org/10.1093/jamia/ocab234>

54. Brulé, E., Spiel, K.: Negotiating gender and disability identities in participatory design. In: Proceedings of 9th International Conference on Communities and Technologies - Transforming Communities, New York, NY, USA, pp. 218–227. Association for Computing Machinery (2019). <https://doi.org/10.1145/3328320.3328369>
55. Hicks, M.: Hacking the Cis-tem. *IEEE Ann. Hist. Comput.* **41**, 20–33 (2019). <https://doi.org/10.1109/MAHC.2019.2897667>
56. Noble, S.U.: Algorithms of oppression : how search engines reinforce racism (2018)
57. Spiel, K., Keyes, O., Barlas, P.: Patching gender: non-binary utopias in HCI. In: Extended Abstracts of the 2019 CHI Conference on Human Factors Computer System, Glasgow, Scotland, UK, pp. 1–11. ACM (2019). <https://doi.org/10.1145/3290607.3310425>
58. DeVito, M.A., Walker, A.M., Lustig, C., Ko, A.J., Spiel, K., Ahmed, A.A., et al.: Queer in HCI: supporting LGBTQIA+ researchers and research across domains. In: Extended Abstracts of the 2020 CHI Conference Human Factors Computer System, Honolulu, HI, USA, pp. 1–4. ACM (2020). <https://doi.org/10.1145/3334480.3381058>
59. Costanza-Chock, S.: Design Justice : Community-Led Practices to Build the Worlds We Need. The MIT Press, Cambridge (2020)
60. Erete, S., Israni, A., Dillahunt, T.: An intersectional approach to designing in the margins. *Interactions* **25**, 66–69 (2018). <https://doi.org/10.1145/3194349>
61. Rohm, R., Martins, J.: The LGBTQ+ community during the COVID-19 Pandemic in Brazil. *COVID-19 Margins Pandemic Invisibilities Policies Resist. Datafied Society*, pp. 65–69. Institute of Network Cultures, Amsterdam, NL (2021)
62. Castleberry, J.: Addressing the gender continuum: a concept analysis. *J. Transcult. Nurs.* **30**, 403–409 (2019). <https://doi.org/10.1177/1043659618818722>
63. Butler, J.: *Gender Trouble*. Routledge, London (1990)
64. Lord, C.: Medium: ink on paper. *GLQ J. Lesbian Gay Stud.* **17**, 639–647 (2011). <https://doi.org/10.1215/10642684-1302442>
65. Martin, L.M.: *Everyday Information Architecture*, 1st edn. A Book Apart, New York (2019)
66. Connell, R.: *Southern Theory*. Polity Press, Cambridge (2007)
67. Scheim, A.I., Appenroth, M.N., Beckham, S.W., Goldstein, Z., Grinspan, M.C., Keatley, J.G., et al.: Transgender HIV research: nothing about us without us. *Lancet HIV* **6**, e566–e567 (2019). [https://doi.org/10.1016/S2352-3018\(19\)30269-3](https://doi.org/10.1016/S2352-3018(19)30269-3)
68. Nussbaum, M.: *Creating Capabilities: The Human Development Approach*. Harvard University Press, Cambridge (2011)
69. Pitts-Taylor, V.: A slow and unrewarding and miserable pause in your life”: waiting in medicalized gender transition. *Health Interdiscip. J. Soc. Study Health Illn. Med.* **24**, 646–664 (2020). <https://doi.org/10.1177/1363459319831330>
70. Hofstätter, B., Thaler, A., Jauk, D., En, B., Klaura, I.M.: Irritating, Intervening, Interacting: Doing Queer Science and Technology Studies, vol. 1, p. 35 (2016)