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The DX4D Illusion: Results from a Stakeholder Survey on Digital Transformation for Development

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Abstract

Digital transformation is a buzz term in the development sector but we have heard little or nothing as yet from individual stakeholders. This paper provides an original contribution by presenting results from a survey and workshop held with a range of digital development stakeholders drawn from government, NGOs, the private sector, international development agencies, and research organisations. Guided by debates and issues within existing literature, the survey asked about stakeholder understandings, views and future research priorities regarding DX4D: digital transformation for development.

It found mainly incremental interpretations of transformation when respondents were asked about DX4D definitions, examples and challenges. That worldview is clearly out-of-synch with metamorphic meanings of transformation. Yet, when pushed, stakeholders could differentiate transformative from incremental applications of digital technologies in development, and we found some evidence of pressure to apply the label of transformation to non-transformational initiatives. Alongside, there was clear interest in more DX4D-related evidence and guidance with a research agenda including best practice guidelines, measurement of impact, and investigation of political economy.

A. Introduction

In recent years, there has been growing activity within the development sector under the heading of "digital transformation". Global South governments have developed national digital transformation policies (e.g. DICT 2020, MoE 2023), and development agencies have produced digital transformation strategies and training programmes (e.g. UNHCR 2022, ITU 2024). Alongside this, there has been a growing literature on digital transformation for development, sufficient for that literature to be reviewed (Heeks et al 2023).

The literature is almost universally produced by academics, while policies and strategies are formal documents produced by groups or committees and with specific external purposes in mind. This means that, among all of this output, little has been heard directly from those individuals who are active in the field: their understanding of, and views on, digital transformation. The disintermediated perspective of these stakeholders will be of value to those working in digital development research and practice; for example, enabling them to more-readily work with the stakeholders having understood their views. That understanding, combined with a sense of the knowledge gaps perceived by stakeholders, will also be of value to digital development researchers planning future research on digital transformation for development (DX4D).

On this basis, the authors determined that a survey of digital development stakeholders about digital transformation could be useful. The next section reviews some key debates and issues within the DX4D literature that shaped the basis for the survey. The survey methods are then described. The main section that follows presents the survey findings, and the paper ends with a short discussion and conclusions.

B. Background

Although in existence as a term for many decades, "digital transformation" emerged as a major concept during the 2010s. It was used in both a descriptive sense to represent the digitally-enabled disruptions seen in some sectors, and in a prescriptive sense to argue for proactive changes said to be needed by organisations and nations (Vial 2019, Stark 2020). Those prescriptions were initially "consulting company white papers that focus on large businesses in the global North" (Qureshi 2023: p426; see also Jeronimo et al 2019) but from this epicentre, ideas about digital transformation diffused into the development domain (Qureshi 2023, Iazzolino & Stremlau 2024).

With an argument that the original global North framing may be "unsuited to the development context" (Qureshi 2023: p426), there has been recognition of a need for distinct consideration of the nature of digital transformation for development, and production of some – as yet limited – literature on this topic. As a generality, this DX4D literature has lacked research based on primary data, and in particular we were unable to find any work that reflected the views of development stakeholders about digital transformation (Heeks et al 2023). Hence, the prime motivation for the study reported here.

Beyond this general knowledge gap, we identified from the literature a handful of key issues that we used to shape our stakeholder survey.

One of the most-striking things about the literature on digital transformation for development is widespread lack of clarity about core concepts. Transformation as a term in development is argued to have arisen in specific contrast to more incremental forms of change (Kontinen & Holma 2020), and to be consistent with typical mainstream definitions such as, "The action of changing in form, shape, or appearance; metamorphosis" (OED 2024). Our recent literature review, however, found two-thirds of papers lacked a clear definition of digital transformation (Heeks et al 2023). Of those relatively few that did give a definition, most described transformation as being a change of relatively incremental nature using terms such as "enhancement" or "adjustments".

It is thus rare to find digital transformation in the DX4D literature associated with change described in these radical, disruptive or metamorphic terms, and especially rare was explicit differentiation of digital transformation from more incremental digitalisation. Qureshi (2023: p424) is one of the few examples, stating "Digital transformation goes beyond digitalization to make radical changes to organizational models and social structures" and that there should be a distinction between "transformative rather than just incremental change" (see also Carmody 2024). Even here, though, there is no exploration – beyond some basic sense of a greater or lesser degree of change – of the exact nature of the difference between digital transformation and more incremental digitally-enabled change. Hence, this spectrum of views within the DX4D literature set out the first issues to be investigated with stakeholders: their understanding of digital transformation, and whether and how it might be different from more incremental digitalisation.

Alongside this variety of approaches to the "DX" element of digital transformation for development, we need to take seriously Qureshi's (2023) point that digital transformation in a development context may not the same as the original digital transformation emerging from global North consulting firms. Put another way, we need to interrogate not just the "DX" element but also the "4D" element of digital transformation for development. For some literature, transformation focuses on markets, competitiveness and economic growth (Matthess & Kunkel 2020); a view consistent with both the global North origins of digital transformation, and with a neo-liberal development paradigm (Heeks et al 2022). One antithesis to this would instead see transformation more in light of a structuralist paradigm, with digital technologies as a tool to overturn the historical structures of oppression and inequality within the world (Mhlongo & Dlamini 2022, Priyabadini 2022). And others still take a wide-ranging view with elements of both human and sustainable development paradigms that link digital transformation to a broad swath of the SDGs (Ndemo & Weiss 2017, El-Massah & Mohieldin 2020). From this, we can see the fluidity of digital transformation in being able to serve very different development end-goals and paradigms. This sets a further focus for stakeholder engagement: understanding their perspectives on the "4D" component of DX4D.

Having explored discussions about the nature of digital transformation, we find a related thread in the literature about the current status of digital transformation. Some literature makes a general assumption in its language that digital transformation is something that has

already taken place in some areas, though without specific details (Qureshi 2022, Rothe et al 2023). In other cases, this general assumption is instantiated as macro-level structural changes in economies of the global South in terms of digitally-precipitated changes in economic sectoral mix, patterns of trade, total factor productivity, nature of work and employment, etc (Matthess & Kunkel 2020, Rhee et al 2022, Zhu 2022); or instantiated in terms of change within individual sectors such as finance and education (Mhlanga & Moloi 2020, Behera et al 2024). What has been rarer is instantiation at the micro-level; that is, examples of individual projects or organisations that are digitally transformed and, through this, delivering development goals. Perhaps because of this lack of micro-level instantiation, other writers challenge the idea that digital transformation has already taken place. They, instead, frame digital transformation for development as something on the cusp of happening: an emerging phenomenon "in the early or developing stages" (Ozumba et al 2022); or something for the future: a "potential" phenomenon (Ndemo & Weiss 2017); or even more bluntly as something that has not yet happened (Carmody 2024).

Because of this disparity of views we sought, then, to obtain evidence from those directly connected with digitalisation processes in development to understand their perspective on the current realities of DX4D, including the presence of transformative digitally-based applications and projects.

If digital transformation is yet to fully emerge in a development context, then this might be because of the existence of challenges to that emergence. This brings us to a further divergence within the literature, relating to the nature of those challenges. Some papers identify transformation-specific challenges such as the danger of structural barriers to change (Qureshi 2022) or the need not for general leadership but for transformational leadership (Magesa & Jonathan 2022). Others though – the more widespread view, echoing the incrementalist perspective on DX4D – identify barriers that are generic to ICT4D: lack of internet connectivity in the global South (Conde & Wasiq 2021), the need for general ICT capabilities (Ferede et al 2024), lack of access to finance (Gaglio et al 2022), etc. With question marks over the existence of digital transformation, evidence on this has often been somewhat hypothetical, creating a knowledge gap for insights from development stakeholders about their perceptions of key challenges facing digital transformation for development.

Our final interest for the stakeholder survey related to guidance on future research priorities. What is generally agreed by much of the literature is the need for more research on digital transformation in the context of development (Ndemo & Weiss 2017, Matthess & Kunkel 2020, Heeks et al 2023). However, the writers are academics and suggested topics deriving from academic interests and agendas rather than from practice. We thus wished to hear directly from stakeholders what they felt the DX4D research agenda should be.

C. Methods

The aim of the survey was to understand what digital transformation meant to those working in development, focusing on key issues as drawn above from the literature plus their views on future research priorities. Including some iteration among members of the research team plus an initial piloting with five participants, this aim was ultimately

developed into five survey questions (alongside one confirming that the participant information sheet had been read and consent granted for participation), which were as follows::

1. Definition. How would you define "digital transformation" when applied to development (e.g. in pursuit of the SDGs, or more generally in the "global South")?
2. Example. Can you give an example of actual developmental transformation resulting from digital tech, including an indication of what was transformed?
3. Differentiation. How do you tell the difference between digital transformation and more incremental digitally-enabled change?
4. Policy/Strategy Challenges. What are the two main challenges for effective digital transformation policy / strategy?
5. Research Gap. What are the two main current knowledge gaps around digital transformation for development (i.e. the priorities for future research on this topic)?

In order to ensure a good range of representative views, we divided stakeholders into five groups: government officials from global South countries, senior staff at national and international NGOs focused on the global South, private sector managers or consultants working in global South countries, staff working in international development agencies, and global South-based or -focused researchers. From either prior contacts or LinkedIn profiles, we identified those likely to have some knowledge of digital transformation and approached 15 people in each of first four groups and 10 researchers (given likelihood of a higher response rate from that group because of strong personal contacts). Because of occasional recommendations of other respondents to include, actual numbers approached in mid-2023 were a little higher in some groups. In total, 76 people were approached and 45 responses were received, constituting a response rate of 59%. Numbers approached and responding in each group are shown in Table 1.

Group	**No. respondents approached**	**No. survey responses received**
Government	16	7
NGOs	16	7
Private sector	17	13
Development agencies	17	10
Researchers	10	8
TOTAL	***76***	***45***

Table 1: Overview of Survey

In order to undertake the analysis, each of the authors was asked to propose an analysis schema for all five questions: both themes that could be derived from each of the questions and codes for items within each theme. We then met and discussed the schema and agreed a final schema of themes and an initial coding set. Authors were paired up, with a lead analyst and a co-analyst allocated to each question, looking to not just code but also draw out any higher-level patterns and illustrative quotes.

The resulting analysis forms the main basis for the findings given below but supplemented in two places by data obtained from a workshop held in Accra in March 2024 at the international ICT4D conference. The workshop topic was digital transformation for development and it was attended by 25 digital development staff from national and international development NGOs. They were surveyed about their definition of digital transformation, and also about their views on current digital transformation for development research gaps.

D. Findings

D1. Defining Digital Transformation for Development

As summarised in Table 2, all but three of the survey respondents (so 93%) were able to offer a definition of digital transformation as applied to development, suggesting at least some level of familiarity with the discourse of digital transformation within the development sector. Virtually all of the definitions were positive, with the type of positive change incorporated ranging in level from greater efficiency of business processes through enhancement of individual freedoms and improved product/service delivery by organisations to improvements in the functioning of development sectors up to societal-level inclusion of formerly-marginalised populations. Despite many of the definition responses being paragraph length, only two respondents found space to mention anything about risks or downsides. In both cases, this was the risk that digital transformation would exacerbate inequality.

Digital transformation defined?	Yes: 42 of 45 (93%)	No: 3 of 45 (7%)
Valence of digital transformation	Positive: 40 of 42 (95%)	Negative: 2 of 42 (5%)
Cause of change	Techno-deterministic: 25 of 35 (71%)	Socio-technical: 10 of 35 (29%)

Table 2: Features of DX Definitions

For those respondents who gave some sense of the cause of these changes, the majority (25 of 35: 71%) were techno-deterministic. That is, they solely attributed digital technology as the factor determining outcomes: “integration of digital tools and products into development processes to improve efficiency, effectiveness and innovation”, “a major or radical change at the national level brought by the use and adoption of digital technology in the country”. Given the focus of the question on “digital transformation” this is not surprising but the remainder of respondents did introduce some indication of other determinants. This was not typically specific – “This goes beyond mere use of technology”, “…digital technologies (although the latter alone are not sufficient to successfully carry out the said transformation)” – but other determinants alluded to included human and institutional factors such as skills, values, regulations and policy.

Only rarely were the definitions explicitly linked to a development paradigm but their implicit relation could be interpreted, as summarised in Table 3[1]. Roughly half of the definitions (23 of 44) saw digital transformation as feeding aspects of the human development paradigm; talking about "equality", "inclusivity" or focusing on goals like poverty alleviation or improvements in education and healthcare. This was most often characterised either in general terms at the level of whole societies ("overall development … of a country"; "opportunities for positive change that meet the requirements of a country's citizens") or even "the global South" as a collective; at the level of particular sectors like education and healthcare; or at the level of developing individuals' capabilities and livelihoods.

Underlying development paradigm	Human development: 23 of 44 (52%)	Modernisation: 23 of 44 (52%)	Neo-liberal: 9 of 44 (20%)	Sustainable development: 6 of 44 (14%)
Nature of change	Transformative: 8 of 45 (18%)	Semi-transformative: 16 of 45 (36%)	Non-transformative: 14 of 45 (31%)	Circular: 5 of 45 (11%)

Table 3: Further Features of DX Definitions

Roughly 20% of responses could be linked to the neo-liberal paradigm, with a strong focus on business and the private sector ("Digital transformation is when digital tools and technologies can alter how business is conducted in a more favorable way", "Digital transformation is … usually characterized by creation of new models of business and interaction, lowering of transaction costs and capture of new value") and was often understood to operate at the level of business processes by increasing their efficiency ("Getting more efficient, more economical") or at the level of business models ("organisations and how they can transform their business models and operations using the latest technology"). Despite the growing salience of sustainability, for example in the face of climate change, only six (14%) of respondents linked digital transformation to sustainability, and only two explicitly mentioned climate-related development goals.

Finally, roughly half of the definitions (23 of 44)[2] were linked to a modernisation development paradigm, which encompassed a general belief in the positive developmental value of new technology ("leveraging digital technology… to transform the overall processes for simple, quick and effective implementation", "the application of digital technologies, innovations and data-driven decision processes to improve agricultural productivity, efficiency … for an inclusive agri-food food system", "the leveraging of digital tools … to accelerate the realization of development projects"). As these quotes illustrate, digital transformation through modernisation was particularly understood to operate at the level of processes but also at organisational and sectoral levels.

But what of engagement with the specific notion of transformation?

[1] Including two instances where features but not a definition of DX4D was offered; making 44 responses in all that could be analysed.

[2] The totals here add up to more than 100% because a number of respondents provided definitions that could be related to two development paradigms.

As summarised in Table 3, only eight of those surveyed (18%) gave a definition that could be placed in the transformative category through either the extent of change they described ("radical", "drastic", "revolutionise"), or the metamorphic impact of change reflected in digital transformation producing a new form of system at various levels ("a different country altogether", "new human development patterns", "new ways of being"). Given the self-selecting nature of those attending the workshop on DX4D, the pattern was a little different with half of attendees who responded defining transformation in metamorphic terms ("change from one state to another", "a change in form").

The remaining responses – that is, the great majority – were divided into those we described as "non-transformative" (14 survey respondents and the other half of workshop respondents) and as "semi-transformative" (16 respondents). Non-transformative descriptors were those that were not clearly distinguishable from those which would be used to described incremental change in terms of the extent of change (e.g. "alter", "improve", "evolutionary change") or the impact of change ("more efficient", "to achieve efficiency"). Semi-transformative descriptors lay in between the other two categories and included terms such as "enhance", "reshape", "grow" and "modify".[3]

The most notable finding was thus the very limited extent to which respondents' definitions of digital transformation for development contained clearly transformative descriptors; a perspective that is out-of-synch with transformation as metamorphosis, and which can be summarised in Figure 1.

Figure 1: Two Views of DX4D (adapted from Vlemincx 2022[4])

[3] Of the remainder of survey respondents who provided a definition (recalling that three did not), these were circular; that is, the only descriptor of change they used in the definition was "transformation" (e.g. that digital transformation for development was "inclusive and sustainable digital transformation").

[4] Image adapted by Chris Jordan, Emma Kelly and Richard Heeks of the Global Development Institute, University of Manchester, UK.

D2. How Digital Transformation is Different

While the Figure 1 diagram presents one perspective on the difference between digital transformation and more incremental digitally-enabled change, we wanted the stakeholders' specific view and so they were asked a direct question about this. When pressed in this way, around 80% of respondents did acknowledge a difference[5]. Compared to the definitions of digital transformation, this offered a much better insight into what could be perceived as special about transformation as a type of change.

Expectedly, transformation was differentiated on the basis of the ***extent*** of change involved. Where incremental digitally-enabled change involved "small change", digital transformation involved "a major change". For some, this meant an additive view of digital transformation in which multiple incremental changes would aggregate to create transformation: "digital transformation … is only achieved by series of incremental digital changes"; "incremental digitally-enabled changes … are the necessary stages of the DX, I would believe that by supporting to achieve these incremental changes, it will move toward true transformation".

For others, though, the difference was not extent but the ***scope*** of what was involved in change. Some with a business background expressed this in terms of value chains: "If the technology brings a change across the entire value chain then it's digital transformation; if the changes occur in a minimal portion of a value chain, then it's incremental"; "With digital transformation, the technology is integrated and changes the whole value chain of the business at hand … using the technology to improve work (internally) on just a segment of the business process or the value chain … resembles an incremental digitally-enabled change." This can be summarised as shown in Figure 2.

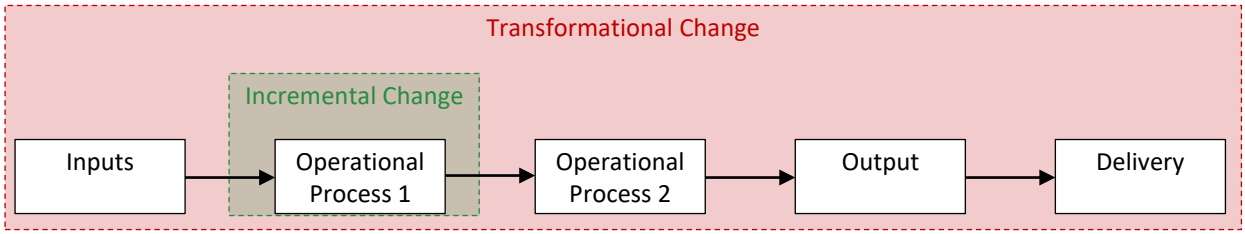

Figure 2: Value Chain-Based View of Incremental vs. Transformational Change

Some respondents framed this slightly differently, as summarised in Figure 3, seeing incremental change as focusing on an individual activity within an organisation or sector whereas digital transformation would be holistic and address multiple or even all elements:

> "Transforming an entire sector vs a single process within it"
> "Digital transformation is holistic, broader and involves a whole of society approach … Incremental digitally-enabled change is more localised"
> "Stand-alone digitalisation" vs "multiple digital technologies should simultaneously be used for developing different components of the given entity"

[5] Roughly one-fifth of respondents did not differentiate: either indirectly by not discussing any difference or by explicitly not differentiating, e.g. "I generally consider digital transformation very broadly and don't differentiate the two"; "incremental change enabled by digital technology represents a primary form of digital transformation".

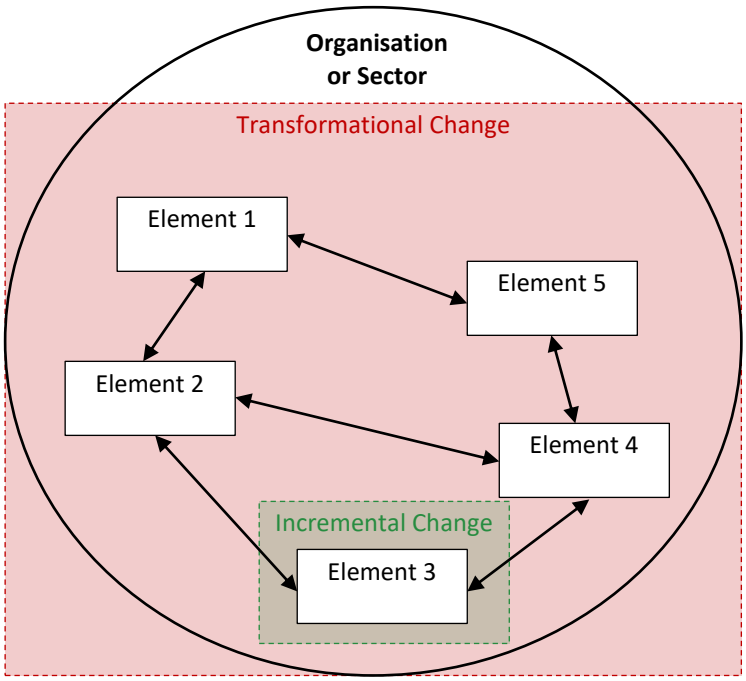

Figure 3: Single / Holistic View of Incremental vs. Transformational Change

Other respondents offered more concrete insights into what those elements or components might be. Where incremental digitally-enabled change encompassed "technology and … process", digital transformation encompassed both of these elements but also "business practice, people, culture, and the ecosystem" or "an organization's operations, culture, and strategy". Thus, "digital transformation should encompass a lot of factors (including how the leadership within the sector [*is*] being applied, culture of organization, etc)". This therefore aligns well with the definition and illustration (see Figure 4) emergent from our earlier review of DX4D literature: "although it necessarily involves technological changes to digital data and systems, digital transformation for development involves and requires broader, parallel transformative changes in structural relations, development processes, formal/informal institutions, and resource distributions" (Heeks et al 2023: p9).

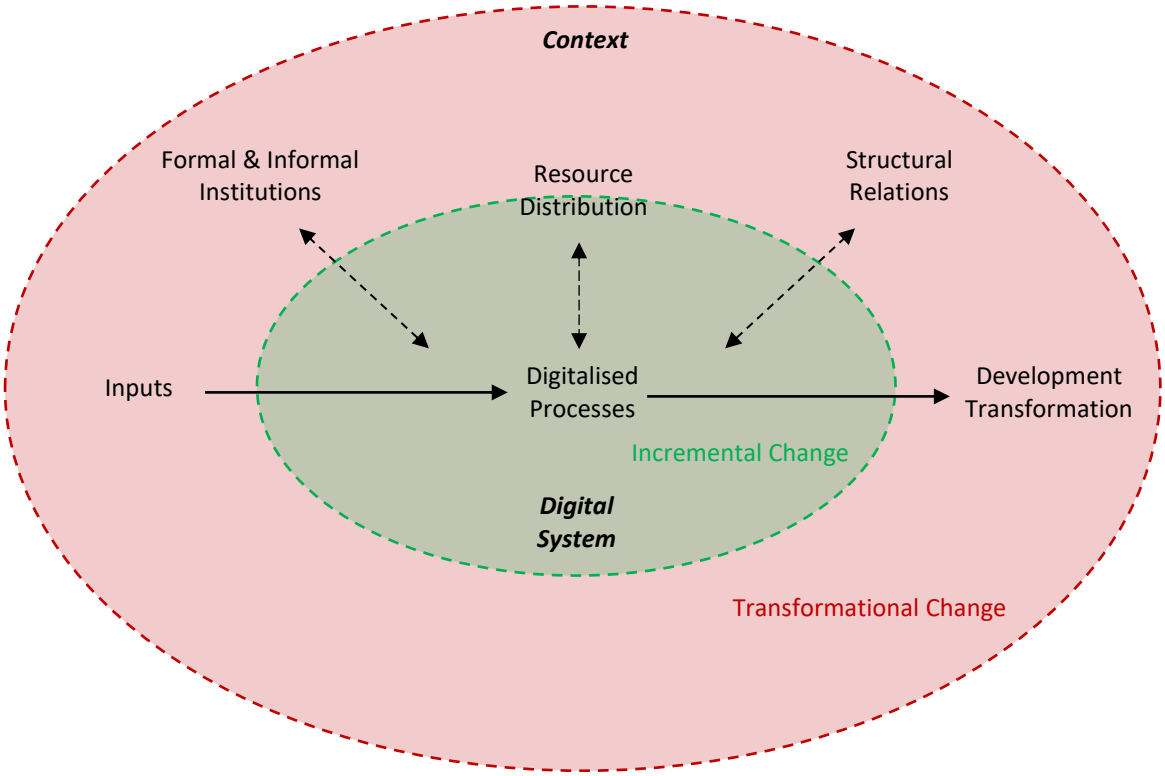

Figure 4: System / Context View of Incremental vs. Transformational Change

Somewhat similar to scope but subtly different were those explanations that focused not so much on what was involved in transformative change but the ***impact*** of that change. The underlying image here was a "disruptive" change from one way of doing things to another, whereas incremental change merely "enhances the existing processes". This was sometimes seen in business process reengineering terms: that digital transformation means "elimination of certain parts of the value chain" whereas incremental digital change "keeps most existing relationships intact". Others expressed the change as more of a paradigm shift in terms of business models. Transformation was variously described as "a new way of doing business", "a fundamental change; not business as usual", "a fundamental rethinking of an organization's business model, products, services, and customer engagement" and that "the incremental digital change can be simple and little modification, while transformation can produce a completely new change, method or approach".

In all then, digital transformation was differentiated from more incremental change in terms of the extent, the scope and the impact of change. This multi-faceted nature of difference was acknowledged in a few instances:

> "Digital transformation and incremental digitally-enabled change can differ in the scope, scale, and impact of the change they bring about"
>
> "Incremental digitally-enabled change is related to the gradual improvements in technology foundations that enable businesses to operate more efficiently. These changes are often smaller and less disruptive, but are enabled by digital technologies. Digital transformation, on the other hand, involves a more significant change to a business process through the use of technology, with a direct impact on

key business indicators. It often involves a larger scope, cultural changes, significant investments, and a bigger impact on the organization as a whole".

D3. Examples of Digital Transformation

When asked for a specific example of developmental transformation enabled by digital technology, most respondents gave an answer – just a couple were explicit that they did not believe they had yet seen anything that could be called a transformative impact achieved via digital technology, and three more gave no answer.

Five clusters of applications emerged as summarised in Table 4: fintech, e-government, agtech, digital health, and community telecentres. As discussed below, in most instances, the related descriptors were not transformative. Therefore, these clusters tell us the domains that respondents associate with digital transformation rather than the domains in which actual transformation has occurred.

Category of digital transformation examples	**No. of Instances**
Fintech	12
e-Government incl. digital ID	11
Agtech	7
Digital health	4
Community telecentres	2

Table 4: Categories of Examples of DX

The largest, with 12 mentions, was fintech with illustrations of what were seen as either digital payments or mobile money systems, such as Yoco in South Africa or Yape in Peru. This included service-specific systems such as those used for public transport in Indonesia and in Kenya. However, by far the most frequently-mentioned example in this category – and the most-mentioned example overall – was m-Pesa, the Kenyan-origin mobile money system.

Various types of e-government system were the next-largest category. Digital identity systems were most-mentioned, sometimes in combination with digital payments such as social protection payment systems. The only recurrent specific instance was the Indian system Aadhaar, either alone or in combination with UPI, the Unified Payments Interface that enables mobile and other digital payments. The other e-government instance mentioned more than once was the digitalisation of passport applications.

The third category – agtech – was largely the domain of private sector activity. In particular, respondents illustrated this with e-commerce platforms such as Ekgaon in India that aim to link farmers to end consumers or intermediaries. We did not undertake a check on all of the examples given by respondents but it was noted that the two other specific instances – Twiga in Kenya and Jumia Food – did not appear to be operational at the time of writing.

Finally, four examples of various kinds of digital health application were offered, such as the global DHIS2 health management information system, and two of entrepreneur-run community telecentres.

However, analysing the examples further, it was hard to associate the wording used with concepts of transformation:

> "using digital technology to either automate some, if not all, processes [*which*] … leads to increase in productivity"
> "if before they had to travel for hours to the nearest city … [*now*] they were able to do it online and save a lot of time and resources"
> "What was transformed: how data from distributions is collected, processed, and used, and when"
> "content is delivered via mobile phone … in the local language"

These and other descriptions linked to most instances of supposed digital transformation did not describe systemic or structural change or disruptive impacts. Instead, they described change restricted to data, technology and processes leading to efficiency impacts of various kinds. This is therefore consistent with the view that "digital-transformation-for-development is a future more than present phenomenon" (Heeks et al 2023: p13). This argument that digital transformation for development has not yet really occurred was explicitly acknowledged by a number of respondents:

> "Most solutions today are incremental changes"
> "I think most of the projects create incremental changes"
> "Most of the changes globally are occurring as incrementally digitally-enabled change"
> "Virtually all change is incremental"

The only potential exception to this universally-incremental picture came with the descriptions attached to mobile money systems; particularly though not exclusively m-Pesa. Alongside descriptions of change in processes – "everybody with a basic phone has access to financial services 24-hours and all those formalities of accessing banking services are no longer in existence" – were some identified structural changes and systemic/sectoral impacts:

> "It forced banks to work with the telcos and collaboratively develop new products … credit, savings, insurance, capital markets and pension products"
> "the intermediaries who are not contributing to provision of the services have been removed"
> "the processes and relationships have been rearranged"
> "inclusion of hundreds of millions of small to large businesses / individuals / entities resulting in a significant reduction of an informal economy … [*with*] spiralling opportunities for access to credit and markets"
> "increased economic growth and improved livelihoods"
> "Financial inclusion achieving … poverty reduction, economic growth, and reducing inequality"

Mobile money systems like m-Pesa not only introduced a new digital system that processed new data in a new way, they also involved broader, parallel contextual changes that can be

understood in terms of the Figure 4 model. There were changes in payment processes: not simply shifting from cash to digital money but introducing new financial processes like those listed above: credit, savings, insurance, etc. New institutions were created such as the more than 150,000 mobile money agents that operate in Kenya, and new financial regulations. The mobile money agents created a whole new structural layer within Kenya's financial ecosystem, as did the new relations noted between banks and telcos. This therefore has transformed that ecosystem / context. Turning to the model outlined in Figure 1, it could thus be argued that m-Pesa is not simply a traditional banking system done faster, like the caterpillar with the rocket pack attached. Instead, it is a butterfly: a completely different way of managing money in society.

D4. Strategic Challenges

Respondents were asked about the main challenges for effective digital transformation policy / strategy. Continuing the recurrent theme of the survey, the vast majority of respondents brought up issues that, while undoubtedly relevant, were generic to ICT4D rather than being transformation-specific (including half of respondents who made no mention of transformation in their responses).

Some generic challenges were "hard" factors with a tangible basis that could apply both within an organisation or within a whole country. There was "weak digital infrastructure" covering everything from foundational telecommunications through cloud and other digital services to devices and applications. There were low levels of "digital literacy and skills". And there was seen to be a lack of financing for human, digital and related investments. Where these challenges were interpreted as contextual, respondents would sometimes relate them to barriers in wider digital policy such as the way in which policy always lags technological change, where "policy/strategy is always one step behind and has a hard time adjusting to the emergence of new technologies", or the gap between policy as written and policy as (not) implemented, with an "inability to execute effective policies or strategies that can promote digital transformation".

These types of policy concerns can be thought of as formal institutional challenges, while other identified generic barriers were "soft" factors that related more to informal institutional issues. Leadership came up multiple times: "a need for a champion, a leader of the initiative with strong conviction to drive the project successfully and sustainability". Likewise, resistance to change including "politicised" resistance from "vested interests, captured regulators, dominant market positions, state-owned incumbents, etc".

The design of digital initiatives was criticised, with problems seen to arise from a variety of archetypal gaps between design and reality. Design of digital transformation was seen as too techno-centric: "digital transformation does not just equal more apps because I think what most people think about digital transformation is about the availability of applications and new systems". There were seen to be dangers of a mismatch to the needs of grassroots users due to "lack of participation of beneficiaries in the planning of digital transformation". Design and discourse driven by the private sector were identified as problematic: "the personnel responsible for digital transformation don't actually know what it is or what it entails and have to depend on profit-driven consulting firms to guide them"; "all the policies

are being influenced by the big companies as you can imagine … and this vision based in the private is influencing the public, it's influencing the policies [*but*] it is only one way to see how digital can be integrated in the society". And there were similar worries about the incompatibility between global North-inspired designs and global South realities:

> "The default tendency for digital designers is to blindly copy and paste from the more developed nations with the belief that digital design is the sole purview of those nations. Instead, what is really required is to seek out global good practices and adapt them to fit into the local context and meet local demand."

Beyond these various generic ICT4D challenges, only eight respondents gave some sense of challenges that were particular to transformational change. The extent of transformational change was seen as a challenge because digital transformation was being misconceptualised as short-term and technocratic, rather than as a process of long-term systemic change. As a result, neither the size nor longevity of required financial resources was available, and it was also hampered by loss of "institutional memory" and the lack of long-term capacity needed to execute a sustained process of change.

The scope or breadth of transformational change "renders it more challenging" because of the number and breadth of stakeholders, with multiple departments within an organisation or multiple organisations across a country having to be involved, e.g. "digital transformation is a multifaceted phenomenon that spans several sectors". Consequent challenges included lack of coherence between the strategies or policies of different elements, and poor "coordination across … institutions responsible for different aspects of digital transformation". Beyond these technical challenges were more political concerns around a lack of "alignment from all impacted stakeholders", meaning the differing interests and power among the range of those who must be involved in transformational change. Echoing the point identified above about design, this was especially raised in relation to public and private organisations where "issues like conflicting interests, short-term political agendas, and the private sector's capacity pose severe challenges in developing partnerships", but also mentioned around differing interests between external donors and local organisations.

Finally, some of the few who mentioned transformation-specific barriers identified the nature of transformational change – particularly its disruptive impact – as a challenge. Disruptive impacts of digital transformation were framed around an exacerbation of inequalities ("increasing the gaps … increasing the differences between people and increasing the … exclusion"), around digital-specific harms such as loss of accountability and "cyberattacks", and around job losses. These were linked to specific resistance to transformational change, particularly "resistance in terms of existing actors fearing extinction of their roles in the process due to digital transformation".

Putting together all of these aspects of transformational change, the locus of leadership was raised as a potential challenge: "It cannot rest with the CXO or Chief Digital Transformation Lead alone and must be championed from the Executive level", as was the lack of leadership capabilities: "it's a challenge that many chiefs in these organisations are blind to the opportunity digital transformation presents; right from defining the required infostructure, enabling platforms, payment systems, skills development and new business process".

However, the extent, scope and impact of transformational change was also seen to discourage the very champions that it required: "Since sustainable digital transformation almost always involves taking risks, this limitation is often an innovation-killer and discourages the change champions and change makers".

D5. Research Gaps

Four main priorities for future research emerged from categorisation of responses from the stakeholder survey and workshop, though they come with the caveat that – in line with the discussion above – knowledge gaps were not always explicitly worded in terms of digital transformation. Indeed, that very issue has been argued as an overarching research priority: that any future research should attend to the transformation-specific (and development-specific) nature of DX4D (Matthess & Kunkel 2020, Heeks et al 2023). Beyond this, the four parts of a future research agenda can be outlined.

i. DX4D Best Practice Guidance

The most-prevalent priority was seen to be the extraction and sharing of "best practices" and "lessons learned" in the execution of digital transformation for development. These were sometimes stated generally e.g. sharing of lessons or success factors from cases of digital transformation to be operationalised via "toolkits", "a compendium of case studies", "a knowledge dashboard", "an observatory of good practices", etc. However, there were also more specific priorities that could be linked to different stages of the lifecycle of digital transformation: how to customise the design of digital transformation from global North to global South or from business to development sectors; how to scale-up successful pilot DX4D projects; how to identify and overcome "the key drivers of resistance to digital transformation"; and how to ensure sustainability of DX4D programmes.

While the guidance sought was sometimes related to individual projects, more often, it was at the level of DX4D organisational strategy. There were calls for across-the-board evaluation of existing "strategic plans" and "agendas" in order to provide guidelines for those who themselves were developing such strategies. There was also a perceived need for practice-based action research to provide recommendations on particular strategic issues such as: measurement of an organisation's digital transformation readiness or maturity; "the timing of digital transformation efforts" in relation to other interventions; "developing a framework for weaving the stand-alone digital interventions into a holistic digital transformation agenda"; and how to build the human capabilities that digital transformation requires.

Particularly for government officials, this strategic upreach went as far as the national level, phrased as "policy", "governance", "standards" or "regulations" that could be used overall to enhance the impact of digital transformation within a country, and to set the specific context within which individual DX4D projects were implemented. Echoing the point on customisation above, there were requests for locally-relevant strategy and policy guidance: "with more input/views from Global South" and "localising the digital transformation approach for specific regions/countries", "not just the prescriptive inherited examples" from the Global North.

One of the concerns raised about DX4D has been the preponderance of guidance about content (e.g. of DX4D project guidelines or of DX4D strategy) with little emphasis given to guidance on process and structure (Heeks et al 2023). The "how to" focus of the stakeholder research priorities described above covered both content and process, but only occasionally included requests that overlapped into structure, such as guidance on how to manage multiple actors within a DX4D ecosystem.

ii. Impact of DX4D

The second main research gap was seen to lie around the evidence of impact of digital transformation: "While there is growing evidence of the potential of digital transformation to promote development outcomes, there is still a lack of systematic and rigorous evaluation of the impact and outcomes of digital transformation initiatives". This was often linked to broad development goals – "governance", "social mobilisation", "democratic process" – and phrased in terms of "positive impact and benefits". However, there was an almost equal recognition that both positives and negatives needed to be evidenced: "the realities of digital transformation to counter the over-optimism" covering "both the opportunities and the risks":

> "I think one of them [*research priorities*] is the approach of digital transformation and how can we measure the development that it's producing but also to check the cost of this digital transformation because we measure Digital Transformation as a good thing but not related with the cost, the cost of exclusion, the cost to the environment, the cost of the women's work."

Study of two more-defined types of impact evaluation were also advocated: actor-specific and technology-specific. There was recognition that evaluation may be required against "the expectation of various actors involved"; in other words, based on the particular goals of all of the stakeholders involved in digital transformation, rather than picking a single supposedly-objective development goal. And there was recognition that impact evidence was needed especially in relation to the technology currently most associated with digital transformation: artificial intelligence.

iii. DX4D Impact—Practice Intersection

The third domain was research gaps that lie at the confluence of impact evidence and practical guidance. Research was seen to be needed that would show how digital transformation could be applied to deliver specific development goals. These were goals that might be regarded as resistant to incremental change such as equality or inclusion of more-marginalised groups including "people with disability", "elderly people", "gender equality", those in low-income communities, and those at the intersectionality of multiple forms of marginalisation. The other impact—practice research gap was guidance on frameworks for measuring the impact of digital transformation. This was argued generically, for use of such frameworks overall within the development sector in order to produce the evidence of impact already noted as a research gap. It was also argued specifically by some that they wanted an impact evaluation framework for their own strategy or policy in order to understand whether or not digital transformation investments could be justified, for instance: in cost-benefit terms; to help "in prioritizing interventions as well as making realistic estimates for investments needed"; and to assist in identification and management of DX4D risks.

iv. Political Economy of DX4D

Lastly, stakeholders raised the need for research on what we can call the political economy of DX4D. This can be seen as implicit within concerns for more research on "inclusive digital transformation" and to understand "Are digital transformation initiatives contributing to the concentration of wealth both locally and globally?". This link between digital transformation and inequality was the individual topic most-identified by respondents as requiring further research, and can be related to the classic "*cui bono*" political economy question that seeks to understand who wins and who loses from digital transformation for development.

Research priorities here were seen as being to not just track impacts of digital transformation on inequality, but also to understand the inclusiveness of DX4D design and implementation processes, e.g. "To what extent are women and marginalised groups involved in digital transformation for development. Who are the actors and is decision-making democratised?". This could be extended to the setting of the DX4D research agenda: "Start with stakeholders to set the agenda; especially those who are excluded – the have-nots. Let them tell us what kind of digital transformation they want, and what digital transformation research should be undertaken".

Alongside this were more explicit calls to look into the deeper, structural connections between digital transformation and inequality. These could be general: "How do the political economy, information and power asymmetry considerations affect digital design?". Or they could look into specific components of power including: control over resources e.g. "Who owns the data?"; epistemic control: "As researchers we have the commitment and responsibility to open this box of digital transformation, analyse the discourse and how it is used, how it is integrated in the state, in schools or academia"; and the incentives and interests guiding those involved in DX4D including the "market interest" of "technology vendors" who have tended to drive both digital transformation agendas and activities. As with questions of impact, the need for political economic analysis of DX4D was seen to operate within sectors, within countries, and in mapping broader patterns of societal and geopolitical change.

E. Discussion and Conclusions

The survey reported here provides a first insight into the views and conceptions of digital development stakeholders about digital transformation for development. It can locate those in relation to the divergence of views on a number of topics shown, as described above, by the DX4D literature to date.

In relation to the 4D element, for example, digital transformation has been linked to a number of different development paradigms. Our survey found this variety mirrored in practice: while human development and modernisation paradigms were dominant underpinnings, digital transformation was also approached from both neo-liberal and sustainable development paradigms.

In relation to the DX element, some writings equate it with radical, transfigurational change but somewhat more often it is described in incremental terms. Our results from

practitioner engagement show quite a strong mismatch between the former metamorphic meaning of transformation, and the dominant worldview among digital development stakeholders. Instead, in terms of defining digital transformation for development, in terms of examples, and in terms of challenges, that dominant worldview was more akin to the incremental perspective in the literature. Digital transformation is therefore seen more as a part of business-as-usual ICT4D than as something disruptively different.

There has been a general assumption within the literature that digital transformation has already taken place. Yet, for all the widespread use of the term "digital transformation" within development, our survey could find little evidence of its actual current existence if a metamorphic understanding was taken on board. At most perhaps, the most-successful instances of mobile money systems like m-Pesa could be included.

Thus we might argue that there are as yet few examples of DX4D and, perhaps linked to this lack of experience, little understanding of digital transformation within the development sector, with stakeholders struggling to come to terms with the transformative potential of digital technologies. Yet, when pressed, almost all participants were able to explain the difference – of extent and/or scope and/or impact – between digital transformation and more incremental digitally-enabled change. This gave a picture that transformation could be understood as a concept but was somehow pushed to the back of the mind in everyday digital practice.

That picture was reinforced to some degree by a few of the workshop participants. They explained that, because of the growing use of digital transformation as a terminology within the development sector, they felt increasing pressure to attach it to organisational initiatives and strategies. At the same time, though, their organisations were not seeking radical, disruptive, metamorphic change. Their way through this dissonant situation was to attach the label of transformation to initiatives and strategies but to define it in non-disruptive terms. This illustrates the phenomenon we have elsewhere labelled "X-washing": attachment of the transformation label to initiatives that are not transformative in the disruptive, metamorphic sense (Heeks 2023).

What, then, of the practical implications of the survey? We end by summarising three different *The Matrix*-labelled strategies that our survey could be used to support:

- Red pill: worldviews need to be altered to match the truth. Mainstream understandings of digital transformation within the development sector are out of synch with the true meaning of transformation. Stakeholders need to be helped to understand what transformation really means in radical and metamorphic terms, and how to achieve it.
- Blue pill: truth needs to be altered to match worldviews. Mainstream understandings of digital transformation within the development sector are out of synch with the metamorphic meaning of transformation. Stakeholders need to be supported with new definitions and guidance on DX4D that encompass a more incremental sense of transformation.
- Purple pill: the gap between two worldviews needs to be navigated. Mainstream understandings of digital transformation within the development sector are out of synch with the metamorphic meaning of transformation. Stakeholders understand this and need to be assisted in navigating the dissonance between the pressure to be

undertaking digital transformation and the reality of their non-transformative initiatives and strategies.

Whichever one of these strategies is seen to best fit, we found a widespread desire for more information, more evidence and more guidance about digital transformation for development. Our stakeholders gave quite a strong steer on what they felt should be future priorities for DX4D research, and we look forward to the research agenda outlined above being taken forward.

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