Reflections on the Maturity of the Mobile Communication Technology for Development (M4D) Landscape: 2008-2016

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ABSTRACT The 2018 M4D conference marks a decade of dynamic growth in the Mobile Communication Technology for Development (M4D) discipline. This paper reflects on the developments and maturity of the field based on a systematic literature review of the research papers published in the biennial M4D conference series (2008-2016). The findings offer a comprehensive overview of *what* was studied (application domains), *where* the research took place (geographic locations), by *whom* (the researchers affiliations), how the research was carried out (methodologies) and how the research *contributed* to the maturity of the M4D field. We conclude by summarising the insights gained from our investigation, with the goal of enriching discussions on how M4D research has evolved, where research gaps may exist and what can be gained by retaining a M4D theoretical corpus.

Keywords: M4D maturity, M4D theorization

1. Introduction

M4D is a relatively new field, which evolved due to the unprecedented growth and adoption of mobile technology by individuals and organisations, especially so in the Global South (Niang & Scharff, 2014, p.4). Larsson (2016, p.4) attributes the emergence of M4D as an offshoot of the ICT4D field to the recognition of the explosive uptake and distribution of mobile devices in developing contexts, their supposed ease of use, reach and potential to bridge social, economic and technical differences. The community of M4D scholars and practitioners confronted a swiftly-moving target over the past decade as handset costs dropped and functionality increased (Donner, 2010, p.2). Inexpensive devices, usage-based data pricing, wireless connections, personal/portable/intimate devices, universal appeal, and task-supportive design were all factors stimulating the uptake and use of the mobile internet (Donner, 2015, p.178). At the same time, the constellation of services and applications accessible via the world's mobile networks is broader and more diverse in ways that blur the boundaries between computers and telephony (Donner, 2010, p.2). This leads to particular challenges for ICT4D and M4D practitioners.

At the first Mobile Communication Technology for Development (M4D) conference, held in Sweden, Richard Heeks (Heeks, 2008, p.5) asked whether the conceptual foundations of M4D research had received enough attention and what M4D research was still relevant. The M4D

discourse has evolved since 2008, driven by the evolution of mobile devices, communication platforms, and usage patterns (Larsson, 2016, p.4). Ten years, and five conferences, later it is appropriate to consider how the field has evolved and responded to the challenge of developing the conceptual foundations of M4D research. This was the rationale for our study, which employs a systematic literature review of the research publications in the biennial M4D conference series (2008-2016), primarily to answer Heeks' questions. We provide an overview of previous literature reviews in Section 2 then present our methodology in Section 3, where we also discuss and motivate the foci of the analysis. The findings from literature, the contextualisation and synthesis thereof are discussed in Section 4. We reflect on these findings and limitations of this study in Section 5, before concluding in Section 6.

2. Disciplinary context of M4D

2.1 – M4D research in disciplinary context

The disciplinary foundations are useful in understanding the ontological and epistemological similarities and differences between the disciplines, which, in turn, inform the methodological differences. For example, HCI and HCI4D have some distinct differences. HCI4D research has a strong focus on practicality and places greater emphasis on *in-situ* prototyping and development than does the HCI field (Toyama, 2010, p.25). M4D discussions have been locked within development discourses, primarily because the least developed regions (also referred to as "the Global South") account for the majority of new mobile telephony subscriptions and rapid uptake (Larsson, 2016, p.4). Mobile technology has an unequalled potential to give developing country communities access to information. Such information is a key ingredient in supporting and enabling sustainable human development. There are different views on positioning M4D as a research field. Despite the theoretical and practical continuities between mobiles and other ICTs in "4D" processes, Donner (2010:11) maintains that mobile use does not require an entirely new theoretical corpus and can be mainstreamed into ICT4D research.

Heeks (2018:30) visualised the disciplinary foundations of all branches of development informatics research. His visualisation includes Development Studies; Development Informatics and Technology & Development as being M4D related entities, but excludes HCI, HCI4D and M4D. Abdelnour-Nocera & Densmore (2017:1), however, consider human–computer interaction for development (HCI4D) and participatory design for development (PD4D) to be sub-fields of ICT4D. Some may see PD4D as a methodology rather than a field but M4D is undeniably tightly linked to HCI4D, in the sense that mobile technology is the most widely-used technology in HCI4D research (Dell & Kumar, 2016, p. 2223). We will discuss the relevance of M4D as a research field in Sections 5 and 6 but, based on this discussion, we conclude that findings in the fields of HCI4D and ICT4D are relevant, applicable and pertinent to discussions of the M4D research field in terms of maturity considerations.

2.2 – Previous overviews of M4D research

Van Belle & Mudavanhu (2016, 150) reviewed research on mobile phones and development published in the Information Technologies & International Development (ITID) journal, the Information Technology for Development (ITD) journal and the Electronic Journal of Information Systems in Developing Countries (EJISDC) (2011-2015). They investigated two aspects: (1) the dominant characteristics of research on mobile phones, and (2) the future possible directions for M4D research. According to their study, the top application domains

included: Micro- and small-enterprises and entrepreneurship; Finance; Agriculture/farming; Migration; Health; Fishing; Education (van Belle & Mudavanhu, 2016, p.154).

In a study to identify the traditional development-related areas of research and practice in HCI4D, Dell & Kumar (2016, p. 2224) identified Education, Access and Health, but also observed diversification into areas such as entertainment and sustainability. The review of the M4D biennial conference proceedings (Wamala-Larsson & Svensson, 2015, p.10) recognised mHealth, mLivelihood, mGovernance and mLearning as recurring sectors that have benefitted from the application of mobile technologies in development.

Van Belle & Mudavanhu (2016, p.157) concluded that most of the research on mobile phones and development tends to be empirical. Few studies reflected on the mobile phone for development literature as a whole. The authors advocate for more a reflective theoretical approach into topics such as the meaning of mobile development and its impact. This resonates with a review of the M4D biennial conference proceedings carried out by (Wamala-Larsson & Svensson, 2015, p.10), who argue that we still need to work on developing our understanding of the methods and theories informing the concept of M4D. The findings from these three literature reviews support the rationale of this paper, i.e. to explore how M4D research has evolved and to delineate areas where more research is needed.

3. Methodology

The systematic literature review method generally has three functions: (i) identifying, summarizing and critiquing current theory and methods; (ii) identifying ontological, epistemological and methodological problems and gaps; and (iii) providing evidence for decision-makers when identifying and supporting priority issues (Pickering, Grignon, Steven, Guitart and Byrne, 2014, 1757). This is useful in pinpointing the areas covered by existing research, and also in revealing the gaps, since it approaches the literature from different perspectives and facilitates delivery of new insights (Pickering, et al., 2014, 1761). Grant and Booth (2009) published a typology for distinguishing the connection between the type of literature review and the outcome. Based on their topology of 14 review types, we selected the *systematic review* as a method to systematically search for, appraise and synthesise evidence from literature (Grant & Booth, 2009, p. 95), as most appropriate for our study. In this paper, we also include the results of a qualitative analysis to help make sense of the quantitative findings

3.1 – Themes for analysing the maturity of the M4D field

Previous literature reviews (Section 2.2) informed the structure of our quantitative data capture, in terms of identifying *where* the research was done, *what* the application domains were, *and how* the research was carried out. We thus commenced with the regular, quantitative literature review analysis of the M4D conference proceedings' papers, in terms of the country of study, author affiliations, the application domains and the Google Scholar citations. This affords triangulation with the previous findings and profiles. However, to gain a deeper understanding of the *maturity* of the field, we looked for alternative approaches and themes to support our analysis. We finally fixed on the findings and a set of meta-themes adapted from Bødker's HCI wave classification (Bødker, 2015), as detailed below. Before arriving at these themes, we considered a number of ways of analysing the developments in the M4D field that would serve to reflect its maturity.

Other researchers have carried out studies to gauge their field's maturity levels. Cheong and Shehab argue that the nature of the research published in a field can provide a sense of its progress and maturation (Cheong & Shehab, 2003). Renaud and Flowerday use an analysis of a snapshot of papers published in peer-reviewed human-centred security conferences to serve as an indicator of how that field is maturing (Renaud & Flowerday, 2017, p. 77).

In contemplating the maturity of M4D's closely related ICT4D field, Heeks (2014:24) proposes four *waves* of development informatics research: ***first***: Readiness (1960 - mid 1980) dealing with Policy, Infrastructure and the Digital Divide; ***second***: Availability (mid 1980 - mid 1990) dealing with Implementation and Design; ***third***: Uptake (mid 1990 – mid 2000) dealing with Demand, Usage, Use Divide and ***fourth***: Impact (mid-2000s to mid-2010s) dealing with Micro-Outputs, Outcomes and Development Contribution. We cannot simply appropriate this classification to structure our analysis of the research because, although readiness, availability, uptake and impact are relevant to M4D, these particular categories do not necessarily demonstrate the maturity of the M4D research field as a whole because the focus on mobile devices entail specific assumptions and constraints.

We considered an HCI-related classification, to benefit from M4D's disciplinary connections to HCI. Bødker (2015) suggests that the field of Human-Computer Interaction (HCI) has matured in a succession of waves. The first wave, she explains, focused on the individual. Individual perceptions, cognition and behaviours were tested and modelled. The second wave moved from studying the individual to contemplating social behaviours, agency and interactions within workplaces and with other humans via technology. The focus moved to groups working with applications, adding a social element to the focus of the studies. Context and situational analysis became important. The third wave then broadened the focus even more to address studies of the integration of technology into people's everyday lives. During the third wave, publications are characterised by papers dealing with user experience and meaning making. During this wave studies report on participatory prototyping, experiments and in-the-wild studies.

Renaud and van Biljon (2017) used an adaptation of Bødker's classification (Bødker, 2015) to categorise *mobile phone design guidelines* in terms of waves, in order to reflect the maturity of this HCI field offshoot. Their ***first*** wave was made up of individual, small-scale studies, which laid down foundational principles, the ***second*** wave reported larger-scale studies, with a broader focus. The focus on the individual no longer dominates. Social aspects started to merit inclusion, and initial results were used in further studies – building on the foundations laid during the inception of the new field. The ***third*** wave explicitly built on the extant M4D literature; questioned unwritten assumptions and made recommendations about the way forward.

We needed to identify meta-themes to inform our analysis of the M4D research. We did not search for waves, *per se*, as performed by the aforementioned studies, for a number of reasons. The *first* was that the M4D field is much younger than the other fields, where a wave-like analysis is feasible. The *second* was that the M4D field builds on foundations laid down in other fields and so does not need to do as much groundwork to establish the boundaries as other fields have had to do. This led us to focus on cross-cutting ***meta-themes*** to reflect the maturation of the M4D field. The three meta-themes used to inform our qualitative analysis of the M4D conference papers were:

Theme 1 (*Foundation*): papers that sought to understand the M4D user's needs, context and use of technology. These could be considered *foundational papers*, e.g. Eilu, Baguma & Petterson (2014).

Theme 2 (*Design*): papers that describe the design, implementation and evaluation of applications, benefiting from the findings of Theme 1 papers but also adding to them. These are considered *design papers*, e.g. Atnafu, Workneh and Getachew (2010).

Theme 3 (*Abstraction*): papers that apply existing knowledge to implement mobile technology, replicate that in a new context, or extend existing research. That is, they analyse, synthesise and refine existing research to *abstract* new knowledge. An example is the research carried out by Donner, Verclas, and Toyama (2008)

3.2 – Analysing the Landscape: Proceedings of the M4D Conference series

Table 1 provides an overview of the venues and number of papers in the Research track (short papers excluded). The study was conducted in two phases. During the first phase (*paper selection*), all full research papers from the 2008, 2010, 2012, 2014 and 2016 M4D Proceedings were included, which resulted in 123 papers. Notably, nine of the 2012 papers analyses were based on the abstracts', since the full papers were not included in the proceedings. Two of the 2016 papers were in Portuguese and were excluded from analysis. During the second phase (*coding*), the following information was recorded: title of the paper, name of author(s), research methodology, Google scholar citations, domain and meta-themes. Previous studies classified the papers in terms of quantitative, qualitative or mixed-methods research. To allow finer grained analysis, the conceptual model proposed for ICT4D research by Van Biljon and Alexander (2015, p.94) was used to categorise the methodologies used. The analysis is available from https://goo.gl/DcEZbM.

Table 1: Research papers extracted from M4D Conferences

Year	Location	Papers	Year	Location	Papers
2008	Karlstad, Sweden	*10*	2014	Dakar, Senegal	*16*
2010	Kampala, Uganda	*15*	2016	Maputo, Mozambique	*20*
2012	New Delhi, India	*62*			

4. Findings

4.1 – Quantitative analysis of the M4D Conference Proceedings

Guided by the research questions posed namely, whether the conceptual foundations of M4D research has received enough attention and what M4D research should be done we proceeded to map the M4D landscape in terms of the (1) country of study, (2) the national affiliations of the authors, (3) application domains and (4) methodologies to outline the M4D field in terms of *where* the research was done, by whom, *what* the application domains were, *and how* the research was done. The geographic locations of the projects, and the authors' affiliations, are depicted in Fig. 1.
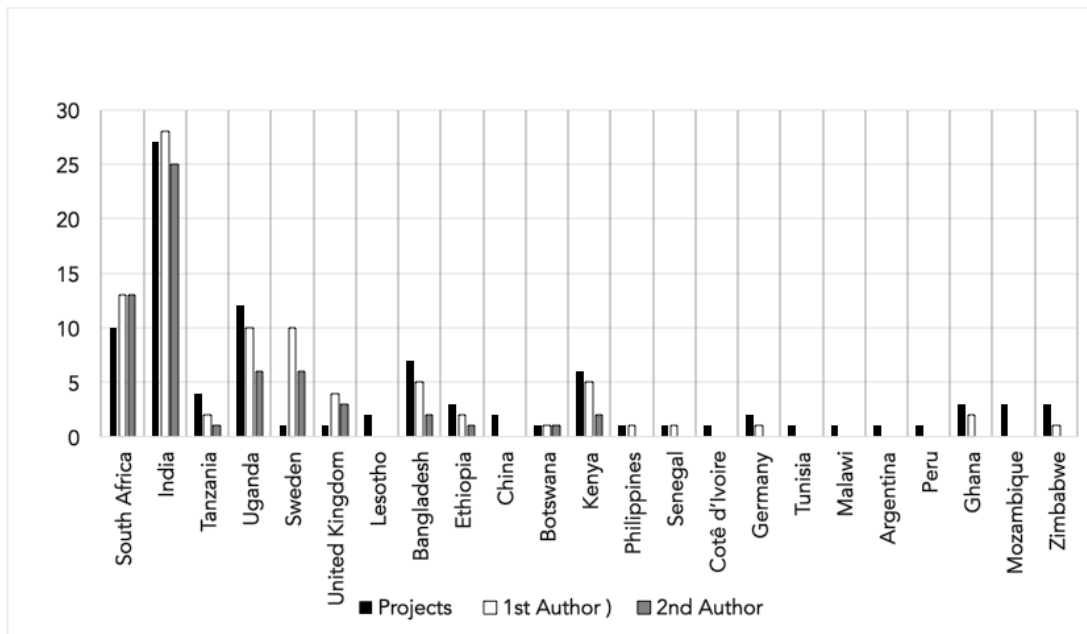
Fig. 1: Number of papers in terms of geographic locations of the projects and the authors'
affiliations

Note that the following observations are based on the M4D data, and cannot be generalised without further investigation. From Fig. 1, we observe that India, South Africa, Uganda, Bangladesh and Kenya contributed most, in terms of where the research was conducted. The findings confirm the results of Van Belle & Mudavanhu, (2016, p.153), who also found that most of the M4D published research is being conducted in the Global South.

We noted that the papers produced in the UK and Sweden were mostly reviews or reflections i.e. not empirical studies. The inter-country collaboration explains why some countries have few projects but a high number of authors. Despite not having hosted an M4D conference, the following countries made notable contributions: Kenya, Bangladesh, Zimbabwe and South Africa. Fig. 2 depicts the Research Domains looking at the yearly differences, to reveal variations across time. It is interesting to note that interest in technical and innovation fields seems to be waning, while health remains a topic of interest. The interest in Education (learning) seems to be increasing, but one would have to take another look in a few years to see whether this is a temporary blip or a trend. Fig. 3 depicts the same information as Fig. 2, but also shows the distribution per domain. Health received the most attention, followed by Empowerment, which hosts all the papers that do not fit into any of the other categories.

Fig. 4 depicts the Publications' Google Scholar Citation Counts, which gives us an indication of the extent to which researchers are building on each other's research in the area. Besides the four papers with more than 20 citations, the results do not provide compelling evidence of researchers using other researchers M4D papers. Making the M4D accessible by providing those in an open repository benefits developing country researchers who may not have access to expensive academic databases but the downside is that the papers are not picked-up by citation database of peer-reviewed literature like Scopus.
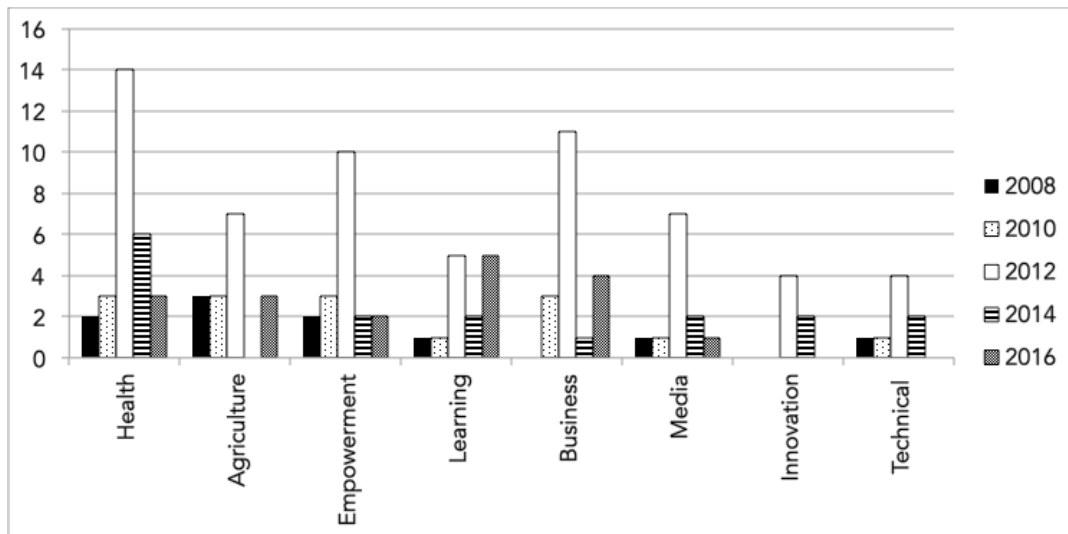
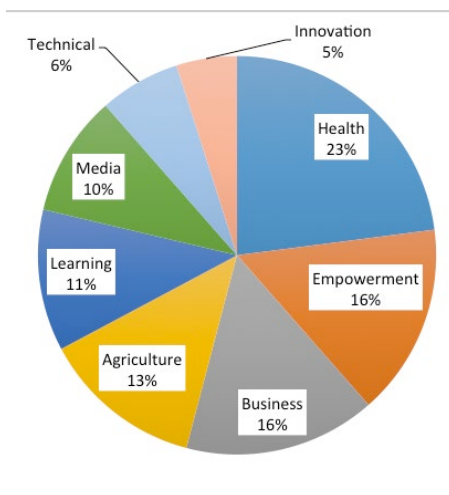*Fig. 2: Research Domains recorded in M4D Proceedings at M4D 2008 to 2016*

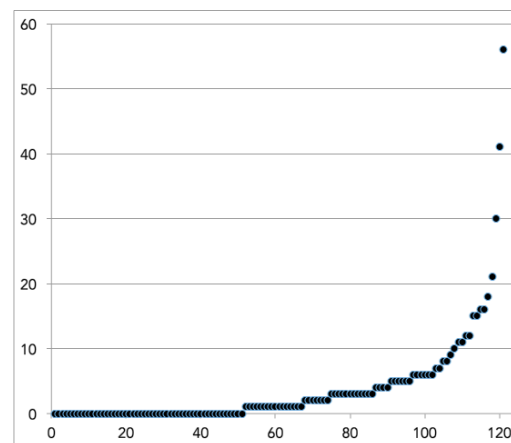*Fig. 3: Research Domains*

Fig. 4: Publications' Google Scholar Citation Count

Fig. 5 shows the number of citations of each year's proceedings' papers. The 2012 citations are fairly proportional to the number of papers whereas the papers in the first year, 2008, have been heavily cited. This could be expected from an inaugural conference where initial enthusiasm for the discipline is high. The low citations for the 2016 papers are understandable due to the time lapse between publication and getting cited and eventually being picked up as a citation, but the low citations of 2014 papers are surprising.
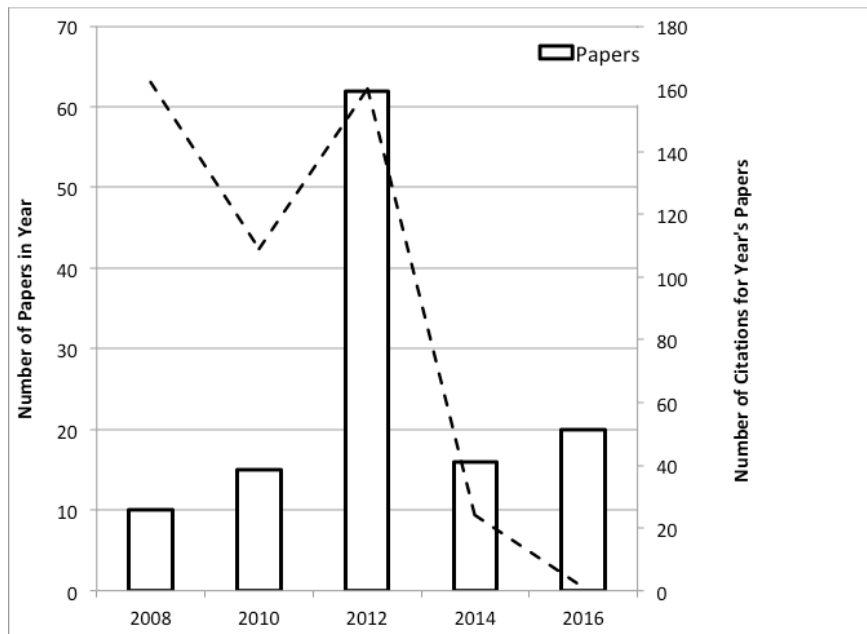
Fig. 5: Papers per Year and Numbers of Citations per Year

4.2 – Qualitative analysis of the M4D Conferences' Proceedings

The research reporting on the philosophical underpinnings and theoretical framing was *ad hoc* and limited, if at all present. This made rigorous capturing and analysing of these aspects impractical. However, the investigation into the use of models and frameworks provided a number of insights. Considering the 123 analysed papers, two proposed frameworks and eight proposed a model as part of their contribution. The methodologies include: Systematic Literature reviews; Design Science Research; Case Study Research; Ethnography; Action Research and Grounded Theory. The data capturing methods included: Surveys; Interviews; Focus groups; Observations; Literature and Document analysis; Prototype development and evaluation. This provides evidence of the scope (sophisticated and diversified methodological development) but no confirmation of depth or contribution to theory building.

The frameworks included the mobile user experience for voice services (Botha, Calteaux, Herselman, Grover and Barnard, 2012) and a framework on supporting the construction of programs on a mobile device (Chao, Blake and Suleman, 2014). This means that a relatively small number of papers (10 of the 123) proposed a theoretical model or framework, and those were all domain specific. Our findings support the argument made by Van Belle and Mudavanhu (2016, p.153) that papers that reflect on key concepts in the M4D field, such as the meanings of development and the impact of mobile phones to the overall development goal, are limited. The findings also seem to resonate with those from HCI4D (Dell & Kumar, 2016, p. 2224) which revealed a focus on action rather than on knowledge creation and theorisation. Taking cognisance of the disciplinary positioning of M4D research, the diversity in related disciplines, such as Development Informatics, ICT4D, HCI4D and HCI (which has a Computer Science base), undoubtedly influence perceptions of how research contributions should be presented. Therefore a lack of models and frameworks may not necessarily imply a lack of theorisation but rather an alternative levels and formats of the contribution e.g. specifications, standards and guidelines.
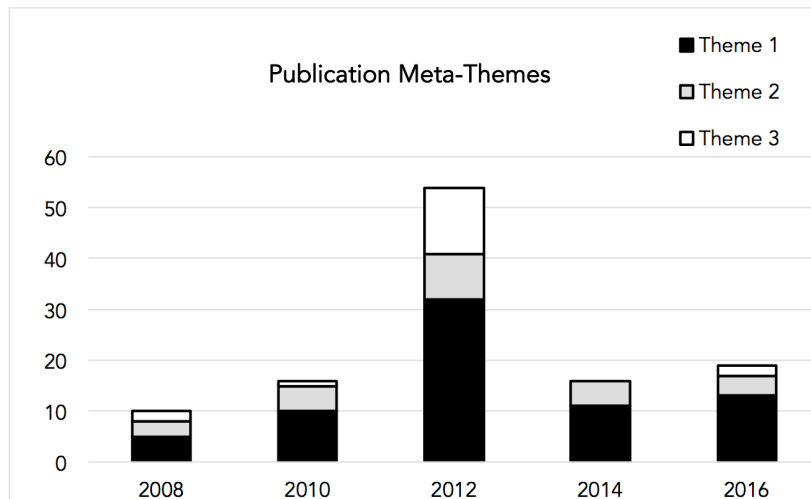
Fig. 6: Publications according to Meta-Themes

The categorisation of papers into themes reveals an interesting profile. It is perhaps to be expected that a relatively new field, such as this one, will see the majority of their papers addressing foundational issues, and indeed this is what we see from Fig. 6. There was a fairly stable number of Theme 2 papers, building (implementing) and evaluating prototypes. The third theme does not seem to have enjoyed much attention, with the exception of the 2012 conference. This, too, might be understandable for such a young field, which needs a critical mass of papers before abstraction and synthesis papers can start to appear.

5. Discussion

We considered the papers published in the M4D conference series as a proxy for Mobile Communication Technology for Development (M4D) publications, and publications themselves as a proxy for research activity. This analysis of the M4D publications in terms of the geographies (*where*), research domains (*why*) and the research methods (*how*) provides a point of departure for discourses on the connections between ICT4D and other related development domains. Our findings confirm and extend earlier studies in terms of the geographic dispersion of M4D research. Much is located in the Global South, the *foci* of research domains is delineated, and we shed new light on the range of research methodologies used. To gain a deeper understanding of the maturity of the field we applied meta-themes adapted from Bødker's HCI wave classification. The findings indicate that researchers have focused on addressing the user's needs, in terms of the specific developmental challenge, i.e. understanding user needs and contexts (Theme 1) and implementing mobile ICT applications to address these needs (Theme 2) but in many cases the findings and insights have not been abstracted and synthesized towards models, frameworks and theories that strengthen the conceptual foundations of the discipline. That explains the small number of Theme 3 papers. This resonates with Toyama's observation that HCI4D research tends to be pragmatic, and focuses on practicality and the potential for genuine impact (Toyama, 2010:24). Having identified some basic characteristics on the development and maturity of M4D, and triangulated those with previous findings, we have to conclude that the conceptual foundations of M4D, as a dynamic and ever diversifying discipline, still has not received enough attention.

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This supports the argument of Wamala-Larsson & Svensson (2015, p.22) that more work is needed to conceptualise the notion of mobile participation, its features, its demands and its shortcomings as well as its flexibility.

Donner (2010, p.10) argues that "*The sooner and more forcefully M4D research is connected to the broader conversations on ICT4D (and on technologies and societies), the stronger it is likely to be*". However, that connection should not be at the expense of valuing, preserving and sharing the knowledge embedded in the M4D literature. We argue that the diversification in the M4D field increases the need to maintain a shared knowledge base. Therefore publication opportunities, events and interactions should support cross-dissemination to ensure that findings of common interest is shared and researchers have the opportunity to build on the extant M4D knowledge and best practices across M4D research domains and application areas.

More research is necessary to inform the structure of the collective M4D knowledge base, identify the unarticulated philosophical and theoretical underpinnings, and demonstrate how those can be presented. This paper provides a point of departure in providing the current domains, meta-themes and methodologies. Furthermore, a comprehensive review of M4D literature is needed to include the publications outside the M4D Conference series and triangulate the findings with the insights presented here.

6. Conclusion

We asked whether the conceptual foundations of M4D research had received enough attention. Our investigation concluded that the conceptual foundations seem to have been developed within each application domain, rather than for M4D as a consolidated field. There are relatively few general studies of the M4D research domain and the models and frameworks that *have* been developed are application domain specific e.g. Health or Education.

Returning to the guiding questions, and what M4D research still needs to be carried out, we conclude that the M4D field has grown and engaged with an extensive range of geographies, technologies, and application domains. Despite the diversification, and perhaps as a consequence thereof, the M4D field has not yet matured in terms of researchers building on other researchers' work.

Furthermore, the focus of M4D (similar to HCI4D) has been to make a genuine (which is often viewed as a practical) development contribution and this might explain why theory building has not manifested as a priority. The philosophical and theoretical underpinnings were under-reported and the methodologies were not always clearly articulated but this pertains to *how* the research was done rather than *what* should be done.

We realised that it would be inappropriate to apply maturity models from other fields to M4D and found the derived meta-themes more useful. Highlighting concurrent theory building (without neglecting the focus on practical relevance) as the next step in the research process could address the longstanding issues of re-inventing the wheel or creating small, unconnected projects of limited impact ('*pilotitis*').

The distinctions between M4D and ICT4D projects continue to blur, and that may cause the priorities of M4D to align with those of ICT4D. However, the unprecedented ubiquity and reach of mobile technology has created unique opportunities that warrant evidence-based

research attention in order to navigate the challenges and optimise the benefits of mobile technology in supporting development.

Despite the noted challenges to growing and maturing M4D, the continued value of M4D as a research field which provides a framework for linking and aligning multi-, inter- and trans-disciplinary research should not be underestimated.

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References

Abdelnour-Nocera, J. & Densmore, M. (2017) A review of perspectives and challenges for international development in information and communication technologies *Annals of the International Communication Association*, **41** (3-4). Pp. 250-257.

Atnafu, S., Workneh, A., & Getachew, Y. (2010) Epidemic and Communicable Disease Surveillance Data Reporting and Medical Cases Communication System In: *Proceedings of the 2nd International Conference on M4D.* Pp. 30–39.

Bødker, S. (2015) Third-wave HCI, 10 years later---participation and sharing *Interactions*, **22**. Pp. 24–31. doi:10.1145/2804405

Botha, A., Calteaux, K., Herselman, M., Grover, A. S., & Barnard, E. (2012) Mobile user experience for voice services: A Theoretical framework In: *Proceedings of the 3rd International Conference on Mobile Communication Technology for Development (M4D 2012). New Delhi, India, Vikas Kumar and Jakob Svensson (eds.) 28-29 February 2012.* Pp. 335–350.

Chao, M., Blake, E., & Suleman, H. (2014) Supporting the Construction of Programs on a Mobile Device: A Scaffolding Framework In: *Proceedings of the 4th International Conference on Mobile Communication Technology for Development (M4D 2014). Dakar, Senegal. Ibrahima Niang Christelle Scharff and Caroline Wamala (eds.) 7-9 April 2014.* Pp. 155–166.

Cheong, Y.-K. & Shehab, R. L. (2003) Building a Web-Features Taxonomy for Structuring Web Design Guidelines *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, **47**. Pp. 1361–1365. doi:10.1177/154193120304701109

Dell, N. & Kumar, N. (2016) The Ins and Outs of HCI for Development In: *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems - CHI '16.* Pp. 2220–2232. doi:10.1145/2858036.2858081

Donner, J. (2010) Framing M4D: The Utility of Continuity and the Dual Heritage Of "Mobiles and Development *The Electronic Journal of Information Systems in Developing Countries*, **44**. Pp. 1–16. doi:10.1002/j.1681-4835.2010.tb00315.x

Donner, J. (2015) *After Access: Inclusion, Development, and a More Mobile Internet,* Cambridge, MA: MIT Press.

Donner, J., Verclas, K., & Toyama, K. (2008) Reflections on MobileActive08 and the M4D Landscape In: *Proceedings of the 1st International Conference on M4D Mobile Communication Technology for Development (M4D 2008). Karlstad University, Sweden. John Sören Pettersson (ed.) 11–12 December.* Pp. 73–83.

Eilu, E., Baguma, R., & Pettersson, J. S. (2014) Persuasion and Acceptance of Mobile Phones as a Voting Tool in Developing Countries. *Proceedings of the 4th International Conference on Mobile Communication for Development (M4D '14,* pp. 83–94. Retrieved from http://www.diva-portal.org/smash/record.jsf?pid=diva2:720818

Grant, M. J. & Booth, A. (2009) A typology of reviews: An analysis of 14 review types and associated methodologies *Health Information and Libraries Journal*, **26**. Pp. 91–108. doi:10.1111/j.1471-1842.2009.00848.x

Heeks, R. (2008) M4D 2008 Foreword In: *Proceedings of the 1st International Conference on M4D Mobile Communication Technology for Development (M4D 2008). Karlstad University, Sweden. John*

Sören Pettersson (ed.) 11–12 December 2008. Pp. 5–6.

Heeks, R. (2014) *Future Priorities for Development Informatics Research from the Post-2015 Development Agenda: Development Informatics*. Retrieved from papers2://publication/uuid/E62B26A8-CEBC-4A60-A869-94B02AB6E969

Heeks, R. (2018) *Information and Communication Technology for Development (ICT4D)* 1st ed. Routledge, New York, USA.

Larsson, C. W. (2016) Foreword: M4D 2016 In: *Proceedings of the 5th International Conference on M4D Mobile Communication Technology for Development (M4D 2016). Orlando P. Zacarias and Caroline W. Larsson (eds.) Maputo, Mozambique, 21-22 October.* Pp. 4–6.

Niang, I. & Scharff, C. (2014) Foreword M4D 2014 *Proceedings of the 4th International Conference on Mobile Communication Technology for Development (M4D 2014). Dakar, Senegal. Ibrahima Niang Christelle Scharff and Caroline Wamala (Eds.) 7-9 April*, Foreword.

Pickering, C., Grignon, J., Steven, R., Guitart, D., & Byrne, J. (2014) Publishing not perishing: how research students transition from novice to knowledgeable using systematic quantitative literature reviews *Studies in Higher Education*. Pp. 1–14. doi:10.1080/03075079.2014.914907

Renaud, K. & Van Biljon, J. (2017) Demarcating mobile phone interface design guidelines to expedite selection, *South African Computer Journal*, **29**(3). Pp. 127-144, ISSN: 1015-7999.

Renaud, K. & Flowerday, S. (2017) Contemplating Human-Centred Security & Privacy Research and Suggesting Future Directions, *Journal of Security and Applications. Special Issue on Human-Centred Security*, **34**. Pp. 76-81.

Toyama, K. (2010) Human – Computer Interaction and Global Development, *Foundations and Trends in Human–Computer Interaction*, **4**. Pp. 1–79. doi:10.1561/1100000021

Van Belle, J.P. & Mudavanhu, S. L. (2016) Proceedings of the 5th International Conference on M4D Mobile Communication Technology for Development (M4D 2016). Orlando P. Zacarias and Caroline W. Larsson (eds.) Maputo, Mozambique, 21-22 October 2016. *A Review of Research on Mobile Phones and Development Published in Three Top ICTD Journals (ITID, EJISDC and ITD) 2011-2015*. Pp. 149–162.

Van Biljon, J. & Alexander, P. M. (2015) A Conceptual Framework for ICT4D In: *ICTs for Inclusive Communities in Developing Societies*, Jacques Steyn and Darelle van Greunen (ed.) Cambridge Scholars Publishing. Pp. 84–106.

Wamala-Larsson, C. & Svensson, J. (2015) Participatory approaches to Development through Mobile Technologies: A review of the M4D biennial conference proceedings In: *Mobile Participation: Access, Interaction and Practices*, C. Wamala-Larsson, C. Scharff, & and J. Hellström (eds.) Pp. 17–54. doi:10.4018/978-1-4666-4169-3.ch011