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A Capability Maturity Model to assess Government ICT4D Policy

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Abstract

The efforts of a Government to provide ICTs in a developing country are mostly well intended but not always successful. To establish why this happens can be a complex process. Influencing government initiatives are a variety of inhibitors, enablers and influences ranging from the diversity of stakeholders and their cultures and history, to skill levels, existing infrastructure, economic conditions, access, prejudice and politics, and language. All these factors need to be understood and managed before current or future initiatives can hope to be successful. To this end, the purpose of this paper was to develop a Capability Maturity Model for use as a conceptual framework to advance the understanding of researchers and practitioners of Governmental ICT4D policy, and the implementation of that policy. This paper sets up a theoretical model with four levels of maturity, each level consisting of five dimensions. Each of the five dimensions are then discussed and, finally, the use and contribution of the model is outlined.

Keywords

Government ICT4D policy, ICT4D implementation, ICT4D sustainability, performance measures.

1. Introduction

The efforts of a Government to provide ICTs in a developing country are mostly well intended but not always successful (Dodson et al., 2012). To establish why this happens can be a complex process (Best, 2010). A government initiative starts as a top-down process focused on setting and implementing ICT for Development (ICT4D) policy and subsequently measuring whether that has produced satisfactory results. The evaluation introduces a bottom-up perspective which is focused on the extent of the impact on the well-being or quality of life of the recipients of that initiative, which is intangible, long-term and difficult to measure (Ciaghi et al., 2014; Heeks & Molla, 2009). Influencing both perspectives are a variety of inhibitors, enablers, and influences ranging from the diversity of stakeholders and their cultures and history to skill levels, existing infrastructure, economic conditions, access, prejudice, politics, and language (Ciaghi, et al. 2014).

To incorporate both the provider perspective (Government, non-governmental organizations, private for profit, and not for-profit organizations) and user perspective in one model is complex and difficult to operationalize in a research situation. To this end, the purpose of this paper was to develop a Capability Maturity Model (not empirically based) for use as a conceptual framework to advance the understanding of researchers and practitioners of Governmental ICT4D policy and the implementation of that policy. This model is a

contribution to the appeal by Walsham (2013) for research work to be directed toward understanding broader strategic applications of ICT4D.

The paper proceeds as follows. The first section sets up the model with four levels of maturity using five dimensions. Each of the five dimensions is discussed, and finally, the use and contribution of the model is outlined.

2. The CMM Model

There are numerous maturity models for ICT development, and some have been adapted for ICT4D projects (Breytenbach, De Villiers, Jordaan, 2013; Ciaghi, et al., 2014). The model developed here is not a growth or stage model, but a capability maturity model (CMM) along the lines of the Luftman's (2000) Business-IT Alignment Maturity model. This model presents the stages of maturity of an ongoing process of management that is not necessarily irreversible as implied by most models (Gottschalk, 2009).

Maturity in this model is an assessment of the current capability of a Government's overall ICT4D vision, policy, and implementation. It is not an evolutionary model, but a model which recognizes that some dimensions may be at a mature level and others not and that there is constant interaction between all the dimensions. Governments can and do regress, technology and its context can and do change. Attitudes to technology can change and be changed, witness the turn to mobile phones and the abandonment of fixed lines (Avgerou, 2009). Consequently, each maturity dimension can advance or regress from period to period.
The model uses four levels of maturity (Initial/ad hoc, Service, Facilitating, and Empowering) as shown in Table 1, each level consists of five dimensions (Context and scope, Leadership and policy, Structures and processes of implementation, Sustainability, and Evaluation).

Initial/ad hoc	Implies little attention to any of the dimensions resulting in a fragmented policy and implementation uses overlapping and redundant structures. Few measures of performance are considered and little or no action is taken on the results.
Service	Implies a focus on technology resulting in the policy viewing ICT as a facility. Implementation follows the same pattern of viewing ICT as a facility and attention is given to economic sustainability. Measures of performance focus on outputs.
Facilitating	Implies attention to both context and scope. Whilst ICT is seen to be important for development, there is still a leaning towards technology as an enabler. Government has a clear understanding of implementation structures and demonstrates an increasing willingness to collaborate within the sector to reduce costs and improve efficiency. There is an effective regulatory body supported by legislation. Some effort is taken to ensure sustainability but this tends to be directed to increasing access. Performance measures extend to measures of outcomes.
Empowering	Implies an excellent understanding of the ICT4D context within the country and internationally and of the scope and potential scope of technology. ICT seen as an enabler and draws on outcomes to focus on innovation and potential impact on or contribution to development, Government demonstrates an ability to effectively implement plans through a close collaboration with NGOs and business partners. There is an excellent regulatory body supported by effective legislation. Good attention is paid to both economic of sustainability and embeddedness. Performance measures measure outputs and outcomes in their own right and as proxies for the impact on development.

Table 1: The four levels of Government ICT4D Maturity.

2.1Context and Scope

Context defines the understanding of the social, economic, political and cultural context into which the ICT4D initiatives and technologies have been and will be introduced. The scope defines the technological possibilities considered by government and its understanding of that range. Both of these aspects are important (Smeltzer & Paré, 2010; Walsham & Sahay, 2006) and add to the coherence and potential success of a government ICT4D vision and policy.

Technologies interact with their social, economic and cultural context in multiple ways (Walsham & Sahay, 2006). The design assumptions behind the provision of technology to those who have little or no access often draw on Western cultural norms that mismatch the realities of the context in which they live (Heeks, 2010, Silva & Westrup, 2009). This can lead to the exclusion of many from the information society (the digital divide) and from various goods and services based on ICT (digital poverty) (Attwood, Diga, Braathen, 2013).

2.1.1 Context

ICT4D requires clarity on what is meant by development and ICT, as both terms are the subject of debate (Walsham and Sahay, 2006). Few of the papers surveyed by Gomez (2013) had any explicit definition of the term development or its goals or purposes.

Increasingly the term development has come to include economic and social opportunities such as the reduction of poverty and the satisfaction of basic human needs (Hicks & Streeten, 1979). There is a trend to integrate both perspectives (Gomez, 2013) to arrive at a more comprehensive definition of development as the provision of opportunities for the improvement of the quality of life. These opportunities are referred to by Sen (1999) as freedoms – potentials or capabilities – that grant the poor and vulnerable the freedom or self-determination to gratify or satisfy their needs.

Apart from a clear statement of what development means, context and scope should address "how and why ICTs should be used for development" (Andersson, Grönlund & Wicander, 2012), and "who benefits and who is missed out" (Sahay, 2013).

Much of the research in ICT4D is based on the assumption that ICT will somehow produce economic and social gains for the poor (Avgerou, 2009; Ngwenyama, Andoh-Baidoo, Bollou, & Morawczynski, 2006). Ngwenyama et al (2006) argued that it is difficult to separate the need to alleviate hunger, disease, and illiteracy, from ICT. Access to ICT can lead to improved decision-making skills which are considered the hallmark of social upliftment in modern society (Raiti, 2006).

In addition, there needs to be an understanding of the implications of contextual aspects that prevent or hinder use of ICTs such as the attitudes within a community to women using computers (gender norms) (Attwood et al, 2013), the effects of old age, levels of education, location, and even inappropriate software (Walsham and Sahay, 2006; Heeks, 2010). These contextual factors are generally recognized and occur even among the poor in developed countries (Raiti, 2006).

There is often a low level of investment in understanding people's needs before "rushing to help them" (Levine, 2014). Without this investment, even a good understanding of context will miss something. Governments need to consider how ICT can extend opportunity and choice, rather than merely setting targets for provision (Walsham and Sahay, 2006).

2.1.2 Scope

Scope includes considerations of infrastructure (networks, backbone) for fixed and mobile connectivity (telephones, internet and broadband), public access centres, mobile phones and even radio and television. There is an acceptance that many of these elements are converging and entirely new business and technological models could develop (Heeks, 2010). Technology is changing and diffusing so rapidly that researchers cannot simply extrapolate to future situations (Heeks, 2010; Gomez 2013). The scope also covers anticipation of future developments such as the role of social media among the poor (Silva & Westrup, 2009).

However, many of the basic technological needs remain unaddressed in many ICT4D situations. The extent, cost, and quality of connectivity in poorer areas and even among the poor in developed countries is frequently inadequate (Walsham & Sahay, 2006). Many still do not have the ability to make use of the resources of the internet (digital exclusion) (Walsham and Sahay, 2006), and even setting up a mobile phone to access the internet can be challenging to the illiterate (Gitau, Marsden & Donner, 2010).

Scope includes the understanding of the need to collaborate with both public and private sectors to solve the "the large intractable challenges of poverty, education, health and climate change" (Bulloch, 2009, p. 8). This includes engagement with other governmental ministries and agencies who are interested in ICT4D initiatives (e.g. Health and Education), with the ICT community (Thompson & Walsham, 2008), and even the consideration of new implementation approaches and governance (Braathen & Schaaning, 2011).

2.2Leadership and policy

The term leadership was chosen with some reservations as some of the uses of this term in this section are not clearly leadership in the generally accepted sense. In that sense, the term leadership of ICT4D would relate closely to vision – such as an expression of concern for the poor and the providing universal access to ICT so as to improve the quality of their lives (Gini & Green, 2013). From a vision, which defines the imperatives for those responsible for ICT4D, come statements of purpose, legislation, structures, processes and controls, and value systems (Zigarmi, Blanchard, Essary, 2009).

A vision for ICT4D has at heart, a desire for transformation of lives (Ochara & Mawela, 2015). Transformational leaders have an ability to command respect and commitment and to instil a culture of seeing beyond self-interest to the well-being of the larger community (Bellé, 2013). Finally, leadership shows a willingness to change with social, technical and global realities (Zigarmi et al., 2009).

The reference to global realities introduces the form of leadership provided by the leading countries and their agencies, and organizations such as the United Nations, and the World Bank that these countries tend to dominate (Popescu, 2013). These various influences seek to guide, advise, or influence the formulation of policy in developing nations. In the opinion of some, these value-laden influences are not necessarily the best for countries with their unique contexts (Mkandawire, 2010; Thompson, 2008). There is a growing awareness in the ICT4D literature of the importance of policy as part of the success of development initiatives, yet there are few studies of policy formulation in the ICT4D literature (Gomez, 2013; Kendall, Kendall and Kah, 2006).

In many countries, the formulation of government policy starts with green papers (consultative documents), followed by white papers (expressions of policy), and subsequent

legislation involving a network of participants such as government officials, consultants, funders and researchers (Kendall et al., 2006). Heeks (2008) refers to the need to include what he calls 'tribrids', those who understand enough about technology (what is possible), the processes of implementation and evaluation (what is feasible), and development freedoms (what is desirable). These 'tribrids' (leaders) provide support, guidance and influence policy, and often wield a significant influence (Hayes & Westrup, 2013).

Context and scope are an important background to the formulation of policy which needs to be thoughtfully connected to socioeconomic needs, poverty reduction and improvement of the quality of life (Kendall et al. 2006). Thoughtfulness also draws on an understanding of the structures and processes of implementation and, particularly, sustainability (both discussed below). The ICT4D policies of governments can cover a lot of ground but broadly fall into the following groupings, not considered directly related to development as discussed. Note the last three points are not only a focus of policy but also refer to dimensions of maturity.

- The elimination of exclusion of people from the information society by implementing initiatives to provide access to ICT facilities, such as affordable access to telephones and internet, and access to skills training (Dutch & Muddiman, 2001).
- Providing access to e-government, health care, and education, which may require a policy of cooperation and "reorganisation of service processes and citizen services" with different sectors of government (Schuppan, 2009, p.119).
- Adapting to technology changes such as convergence of communication platforms (broadcasting, telecommunications and online) and technologies such as Voice over IP.
- Deciding whether to control the content or to safeguard net neutrality (Raiti, 2006).
- Deciding on the structures and process of implementation including decisions on public or private ownership of telecommunication operators. These will determine the government capacity to implement its policy for development (Edigheji, 2010).
- Seeking to achieve sustainability which has now become an issue of policy (Hayes and Westrup, 2013).
- Designing and monitoring performance measures (Gomez & Pather, 2012).

2.3Structures and processes of implementation

The implementation of ICT4D policy is "normally deeply intertwined with issues of power, politics, donor dependencies, institutional arrangements, and inequities of all sorts" (Walsham and Sahay, 2006, p.19). Implementation is complex and typically involves a network of actors, which involves strategic alliances at regional, national and international levels (Park & Lejano, 2013), and the fusing of public and private sectors (Raiti, 2006). An important aspect of ICT4D is to study these interactions (Sahay and Walsham, 1995), yet research on structures and process of implementation has been limited and tends to take the form of good practice guides (Raiti, 2006).

One approach to implementing ICT4D is what Heeks (2008) calls the passive diffusion view. This neo-liberal view of implementation maintains ICT produces benefits, and that market mechanisms together with the poor's pursuit of benefits will make it happen. Unrestricted use of the market to implement policy can result in for-profit organizations taking advantage of profit opportunities by imposing high tariffs and under-investing in infrastructure in low-profit areas (Thompson, 2008). For-profit organizations are unlikely to take into account customs, values and norms, and languages (Silva & Westrup, 2009). Consequently, policies are often needed for the control and regulation of the conflicts of interest between private gain and public good (Raiti, 2006; Thompson, 2008). It is beyond the scope of this paper to

enter into a detailed discussion of the relative merits and demerits of neo-liberalism, suffice to say that there is no 'one size fits all' solution (Mkandawire, 2010).

A strong trend is to use a mixture of market-oriented organizations, semi-independent government agencies and non-governmental organizations in networks (Hayes & Westrup, 2013). Characteristic of these mixed networks is fragmentation and partitions, and the loss of the overview from the top. Officials of the various bodies and organizations consider themselves accountable to those who elected or appointed them, and as a result, their policies tend to become oriented towards satisfying the interests of those constituencies or stakeholders, and for that matter, themselves, rather than the direct end user (Zigarmi et al., 2009). The challenge for Governmental leadership is to establish appropriate ways to satisfy all the constituencies and stakeholders, as well as the end users, i.e. those in need (Zigarmi et al., 2009). The measures to control and manage these networks include:

- An independent regulator that lays down and regulates the conditions of cooperation in the network.
- A clearly defined set of responsibilities and the elimination of:
    - Exclusive or overlapping jurisdictions of accountability,
    - Conflicting rights and obligations,
    - Incompatible norms and values,
    - Poor exchange of information (Gottschalk, 2009).
- Monitoring the performance of the agencies, bodies, organizations, charities etc. in the network, and making timely interventions when needed.
- Reducing complexity in the network by reducing the number of participants and eliminating intermediaries (van Dijk & Winters-van Beek, 2008).
- Setting up what is most often termed universal service obligations (USO) (Moloney & Church, 2012). USO's subsidised the provision of services in less profitable areas.

Whilst the implementation priorities at governmental level are focused on the above issues, at the community level these measures can fail to achieve sustainability in respect of a direct initiative such as setting up public access computers (PACs). Often this step is delegated to local government bodies or local agencies who do not have the same macro perspective on context and scope, leadership and policy, and the gap between policy and practice at a community level is not bridged (Vaughan, 2011; Zheng & Walsham, 2008).

2.4Sustainability

Sustainability in this model addresses the ongoing and increasing acceptance and use of a government ICT4D initiative by a community or larger group, e.g. rural or urban townships, as a way of life. Sustainability results from a government's ability to develop and implement policy so that initiatives are accepted and continue to exist for the benefit of the target communities.

The objective of ICT4D sustainability can thus be expressed as providing continuing and affordable access to the opportunities presented by ICTs and enabling the ability to recognise and take advantage of them. Following Heeks (2005), sustainability will be discussed under three broad headings – economic sustainability, embeddedness and utility.

2.4.1 Economic sustainability

An ICT4D initiative has economic sustainability (or capacity) if it does not require or be seen to require excessive investments in time, effort or funds (Heeks, 2005). In the case of a direct initiative (such as PACs), it has gained enough economic stability to survive without

significant investment from the government or non-local benefactors (Breytenbach et al., 2013). Economic sustainability can be enhanced by building into the technology operational simplicity, flexibility and scalability, maintainability, and robustness (Ali & Bailur, 2007). A number of resourceful ideas such as solar power, low power consuming devices, low or easy maintenance devices can be used to improve the economic scalability of initiatives (Best, 2010).

2.4.2 Embeddedness

An ICT4D initiative has embeddedness if it gained enough social momentum for users to feel a sense of ownership and pride when it has been institutionalised into the rules and norms, cultures and values of its setting (Ali & Bailur, 2007; Heeks, 2005). Mobile phones have become a social necessity and a rooted initiative (Avgerou, 2009) while public access centres are still struggling to gain embeddedness in most countries (Toyama, 2011).

Whilst embeddedness is a prerequisite to the next level of sustainability, that level, in turn, feeds back into this level. As members of a community or group gain utility from an ICT initiative, so they will encourage and support others to do the same (Vaughan, 2011). The ability to take up the opportunities presented is an individual choice but there is a need for participation (Zheng & Stahl, 2011).

2.4.3 Utility

An ICT4D initiative has utility if a group or community gains and continues to gain benefits from that initiative (Heeks, 2005; Breytenbach et al., 2013). Unless ICT is integrated into the process of living, the digital gap will widen. The intent of an ICT4D initiative is to provide options for the improvement of the quality of poor people's lives, even though it cannot determine whether or how people take up those options (Taylor and Zhang, 2007; Toyama, 2011). Drawing on Sen's (1999) work some have proposed five types of freedom, economic, social and political freedoms, trust relationships and access to security resources. Within these, there are a many possible opportunities (freedoms), including but not limited to social connectedness, social well-being, sense empowerment, gaining knowledge, economic well-being, and ability to exercise political rights (Kivunike, Ekenberg, Danielson, 2009).

2.5Evaluation of performance

Governments, practitioners and researchers are increasingly becoming interested in an evaluation of performance (Propper & Wilson, 2003). Governments have focused on outputs and outcomes (Heinrich, 2002), however, this introduced greater levels of complexity. Further complexity has been introduced by the networks of public and private agencies, organizations and local government bodies used to implement policy.

Apart from complexity, there are other barriers to performance measurement. It is difficult to assess who is the stakeholder that requires the evaluation – the users, the voters, the taxpayers or the politicians. There is also the danger that measures could be manipulated or 'gamed' to produce the best results so as to satisfy stakeholders.

Earlier ICT4D evaluation approaches looked at the supply perspective of access to ICT infrastructure, skills and training support and usage (Madon, 2004), and are still too focused on easily measurable, direct and predominantly economic benefits (Gomez & Pather, 2012; Turpin & Mwenda, 2014). However measuring the tangible elements such as the numbers of fixed or mobile telephone subscriptions or households with computers discloses little about

their impact on society (Taylor and Zhang, 2007), as more access does not necessarily translate into benefits (Gomez & Pather, 2012).

The measures used in the business environment to evaluate ICTs such as service, quality, individual and organizational impacts (DeLone & Mclean, 1992), are not helpful in the evaluation of ICT4D benefits (Gomez & Pather, 2012). Consequently clear, comprehensive and integrated measures of both tangible and intangible impacts, are still a major stumbling block for both developed and developing nations. One intent of this section is to attempt to contribute to the solving of this problem.

Measures of ICT4D initiatives are generally divided into outputs, outcomes and impacts (Gomez & Pather, 2012). Gomez and Pather (2012) concede that the higher level measures are challenging and that most can only be measured at the individual level. Gomez and Pather (2012) suggest that it would be possible to measure social cohesion and strengthening of social fabric at the collective level. This latter observation is an important clue to the suggested solution.

Another set of measures at three levels is the ICT Development Index (IDI) developed by ITU in 2008 (Dobrota, Jeremic & Markovic, 2012). IDI is a composite index combining 11 indicators into one benchmark measure that serves to monitor and compare developments in ICT across countries (Dobrota, Jeremic & Markovic, 2012; ITU, 2014). These measures are considered proxy indicators by the ITU, and this is another important clue to the suggested solution.

Heeks (2010) also suggests three levels of measures which he termed outputs, outcomes and developmental impacts. The important clue from Heeks (2010) is that an impact assessment of an ICT4D project requires both a post hoc and a pre hoc assessment. The post hoc assessment will be largely the measures described in the IDI, but the pre hoc assessment will rely on the sustainability categories described.

A three-level performance measurement system is now developed.

2.5.1 Outputs

Outputs are generally accepted to be quantifiable, observable and measurable (Gomez & Pather, 2012; Propper & Wilson, 2003). Much of governments' efforts are directed to indirect initiatives. Output measures would include:

- Fixed and mobile telephone subscriptions per 100 inhabitants.
- Percentages of households with a computer, and percentages of those with internet access.
- Numbers of individuals using the internet measured by broadband subscriptions per 100 inhabitants.
- Costs to access fixed and mobile telephones and the internet.

Output measures of direct initiatives would include:

- In the case of PACs, the numbers of operating centres and numbers of computers installed and maintained in each centre including libraries.
- In the case of schools, the numbers of computers installed and maintained for school use, and the numbers for student use.

2.5.2 Outcomes

Gomez and Pather (2012) suggest measuring elements such as social cohesion and strengthening of the social fabric at the collective level. The difficulty with this is that one

cannot collate or aggregate direct evidence of this. What one can do is find a way to generalize impacts from measures that indicate embeddedness which can be a proxy for social cohesion and strengthening of social fabric.

Measures of levels of and trends in access and of the level and types of users will be postulated as one way to assess embeddedness (Sey & Fellows, 2011). Measures could include:

- Trends in usage of computers at PACs broken down into types of PACs.
- Statistics of the availability of training and mentoring and the take-up of those facilities.
- Trends in the availability, take-up and use of mobiles, e.g. internet access broken down into areas.
- Trends in internet access, increasing use and increasing the duration of use, more users and increasing home use.

In effect, these are attempts to set up pre hoc measures of impact.

2.5.3 Impacts

Impacts refer to the results of the capability and intent to take-up opportunities offered by ICTs. It is generally accepted that governments cannot measure impacts of ICT4D at an overall level (Ali & Bailur, 2007; Dunscombe, 2006; Gomez & Pather, 2012; Turpin & Mwenda; 2014).

If it is possible to ascertain whether a direct or indirect ICT4D initiative is in place, economically sustainable and embedded, it could be argued that there will be possibilities for impacts. For that reason, the above measures of outputs and outcomes provide evidence of the conditions for impacts. The existence of economic sustainability and embeddedness does not provide choice but does reduce the barriers to choice.

Impacts are facilitated and preceded by transformational aspects such as self-esteem at the individual level, and social cohesion and strengthening of social fabric at the collective level (Gomez & Pather, 2012). These flow from coherent and consistent relations between people and technology resulting in growing levels of self-reliance in the community (Roode, Speight, Pollock & Webber, 2004). The success of initiatives is fostered by a stable network of individuals aligned around the technology or project, i.e. embeddedness.

The contention is that an increasing trend in the take-up and use of an ICT is a proxy for capability and intent as the number of users would not increase if there is no meaningful impact. If an initiative ceases to be sustainable, one reason may be the perception that it is not meeting needs (Ali & Bailur, 2007; Heeks, 2005).

From a macro perspective what governments need to achieve with policies is to create the circumstances in which freedoms can be taken up. Governments cannot guarantee the quality of life, but can attempt to create and maintain environments and technologies so as to provide the best possible opportunities. The first two levels of sustainability are a start. A better education will result in a greater awareness of the possibilities and how to achieve these possibilities.

3. Using the model

This model is not put forward as a tool for a superficial assessment (what is obvious or apparent) of a government ICT4D initiative. Rather it is proposed as a framework to enable

the reflection on the interactions and flow of the five dimensions of that initiative. Insufficient effort at any one of these levels is likely to produce a degree of failure (Dodson et al. 2012). The model "does not extend beyond analysis and description. No causal relationships among phenomena are specified and no predictions are made", making it a theory type 1 according to Gregor (2006, p.620).

To add to the importance of a deep consideration of each dimension, it is pointed out that three of the five dimensions incorporate elements of conflict and power (Leadership and Policy, Structures and Processes of Implementation and Sustainability). Actor-network theory can usefully be applied to an analysis of these levels and the transition dynamics during different implementation phases (Kromidha, 2013). In the terminology of Actor-Network Theory, each of the three levels is an obligatory point of passage. Each level of the model has a focal actor (or leader in the terminology of the model).

For example, actors in Government, NGOs and other organizations interact with their understanding of context and scope to create a vision and policy for ICT4D. Each is vying to achieve goals, e.g. profit, international concepts of development, personal glory. Although Walsham and Sahay (2006) were describing global ERP systems, their description can aptly be applied to this context "heterogeneous networks of human and non-human elements are brought together in a specific global-local combination, linked to national plans for development" (p. 9).

Similarly, at the level of structures and process of implementation, there is potential for conflict and expressions of power. Governments work with for-profit organizations, donors, government institutions and regulatory bodies, and national and international development organizations. Those who should benefit from ICT could get lost in that interaction. Also, there is a potential for the ICT itself as an actor to get overlooked.

Finally, at the level of sustainability, the user finally gets to be an actor. Here there is a top-down network of implementers and bottom-up network of potential beneficiaries. Not only does ICT sometimes get overlooked at this stage but also rules, norms and artefacts (Kromidha, 2013).

The context in the CMM model can be compared to the context of vulnerability which is a micro level context (Dunscombe, 2006). Nonetheless, the macro level shares a concern with the trends in, shocks to, and seasonality of the human, financial, social and physical resources available to the poor and disadvantaged (Dunscombe, 2006). Thus, it is important for governments to ensure that training and technical support, funding, management are in place as these more tangible supports for human and financial capital impact both on sustainability and outcomes and impacts.

4. Conclusion

This CMM provides a conceptual framework which includes five dimensions and is a move to advancing the understanding of researchers and practitioners of Governmental ICT4D policy. It is hoped that this will encourage researchers and practitioners to take a broader view than empirical results at community or individual level, a focus on individual projects, and a preference for what is narrowly descriptive. As Gomez (2013, p.18) states: there is "very little evidence of research that aims at being representative of the diversity and richness of the country as a whole." Hopefully, this framework or model can enable progress towards answering Walsham's (2013) questions:

- "what type of development is being supported,
- which groups benefit and which do not,
- whether the development is sustainable,
- how we should evaluate the development impact" (p. 50).

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