**Session on Innovation, Technology & Design at the**

**2014 HDCA Conference**

**03PS2.2:**

**TP: Economic underpinnings of social innovation & addressing marginalized groups in society from a CA perspective in times of European crisis**

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| *Time: Wednesday, 03/Sep/2014: 1:40pm - 3:00pm* |

Rafael Ziegler1, Justus Lodemann1, Enrica Chiappero2, Christopher Houghton-Budd3, Nadia von Jacobi2, Alex Nicholls4

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*Panel coordinator: Rafael Ziegler (rziegler@uni-greifswald.de)*  
Description: This panel discusses the conceptual foundations of economic underpinnings of social innovation with a specific focus on innovation addressing and including marginalized and disempowered groups. The European economic and political crisis has further increased the risk for societal groups to be marginalized, and even threatens to undermine the overall stability of the European Union as a transnational, integrative peace-building project. Does social innovation on regional, national and transnational levels provide opportunities to overcome challenges with marginalization as well as address structural transformation issues across Europe (Heiskala 2007)?  
  
Social Innovation roughly speaking concerns a) intentionally carrying out a new idea - not just inventing but innovating, which can take place at various levels, b) changing social relations, configurations and processes, and c) contributing towards reaching social ends, in particular human capabilities. Accordingly social innovation here is defined as “carrying out new ideas (products, services, models, markets, processes) that intentionally seek to improve human capabilities, social relations and the process in which these solutions are carried out” (CRESSI working definition).   
  
As this definition indicates, the capabilities approach can play a descriptive and normative role in the investigation of social innovations both as far as a rich evaluative language for the discussion of ends of social innovations is concerned but also for the study of innovation processes and the role of agency in these processes. To this end, the CA needs to draw on further ideas from sociology and economics. Access to resources has been identified by classic innovation studies as a key issue for innovation processes (Schumpeter 1942/75). However, economic sociology also stresses the need to analyze innovation in terms of the formal and informal rules and institutional structures governing the access to, and the use of scarce resources, as well as the networks within which innovators are located and the cognitive frames that define the nature of innovation in a social context. For the analysis of social change dynamics in markets, Jürgen Beckert has proposed the conceptual schema of a “social grid” consisting of three social forces: institutions, networks, and cognitive frameworks (Beckert 2010). On this account, the social forces are irreducible components co-shaping agency and with it the dynamics of social change (Beckert 2010, see figure 1). In turn, agency is a product of the social forces and ties that enable actors to reproduce, modify or transform the social grid.   
  
The panel will discuss how social innovation can be conceptualized in terms of this social grid schema, and with a specific focus on how the capabilities approach can inform the descriptive and normative analysis of marginalization and inclusion processes that social innovations seek to address. Central questions to be discussed include: What is the role of financial capital – and possibly also other “capitals” for enabling agency in the social grid? How to theorize marginalization from a CA perspective, and how to think about the respective role of cognitive frames, institutions, and actor networks in processes of marginalization and disempowerment (see figure 2)? How to analyze capabilities in relation to individual and collective power within the social grid (Heiskala 2007)? Does the social grid analysis have to be expanded to also include the physical environment (see figure 2, left top), and what could such an extended analyze learn from socio-ecological approaches such as the resilience approach (Gunderson and Holling 2002)? Finally, what are lessons and questions from the CA for the discussion of a fair space for innovation beyond innovation policy for the technical-economic innovation?  
  
A note on the format: the panel is designed as a discussion panel that will promote the conceptual discussion of social innovation and the capabilities approach in the context of the EU-project CRESSI, and at the same time seeks to introduce the topic of social innovation to the HDCA-community. Therefore we would like to invite further conference participants as discussants as soon as the panel and conference participation of potential discussants is confirmed. Discussants we would like to invite include Sabina Alkire (member of the CRESSI advisory board) and Ilse Oosterlaken (who played an important role in developing CRESSI). The panel would be moderated by Professor Alex Nicholls (Oxford University).

**03PS2.6:**

**Technology and design**

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| *Time: Wednesday, 03/Sep/2014: 1:40pm - 3:00pm* |

**The capability approach and different views on technology and poverty reduction**

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This paper discusses both the benefits and the limitations of the capability approach for the critical assessment of technology as an instrument for poverty reduction.   
  
It starts with an outline of a pamphlet which development scholars Melissa Leach and Ian Scoones (2006) published, titled The Slow Race – Making Technology Work for the Poor. It is very helpful in getting a better understanding of different views on the relation between technology and poverty reduction, because it abstracts away from specific disciplinary approaches and all sorts of detailed differences of opinion that one may have about the subject. Instead, it sketches three very broad and general views on the relationship between these two phenomena (poverty reduction and technology). The first view is called “the race to the top”, where technology is appreciated for its role in economic growth and modernization, which is considered an essential means for poverty reduction. The second view is labeled “the race to the universal fix” by Leach and Scoones. The idea here is that we need to focus on technologies which have a direct impact on poverty and which can be rolled out world wide. The One Laptop Per Child Project (OLPC) exemplifies this view very well. The third view is the “slow race”, a view in which it is emphasized that a choice for the best technological solution always needs to be made with an awareness of local cultural, social and institutional realities, and that considers bottom-up, participatory technology development as the way to go. These three races, Leach and Scoones note, “are not mutually exclusive and all are important” (p.14). Yet the first two are, so they observe, very prominently present in policy debates, whereas the third “less glamorous, but ultimately more important race is being overlooked” (p.12).   
  
With its emphasis on the importance of agency and human diversity it seems that the third view is the most natural ‘ally’ of the capability approach. In the first part of this paper I will explain that the capability approach has indeed a lot to offer to those wishing to criticize fixation on the first two races, and to promote the “slow race” instead. In the second part of the paper I will examine in more detail how the capability approach relates to the appropriate technology movement, a more specific perspective on technology and human development which is briefly mentioned by Leach and Scoones as fitting in with the ‘slow race’. On the one hand some scholars have emphasized the commonalities between and compatibility of the capability approach and the appropriate technology movement (Oosterlaken et al, 2012). On the other hand other scholars have emphasized how a capability approach of technology and human development would improve on and go beyond the appropriate technology movement (Fernández-Baldor et al, 2012, 2014) – especially in how it deals with agency and with gender.  
  
There are, however, at least two concerns which may be raised against this whole line of argumentation. The first is that it discusses ‘the’ capability approach, whether in reality there exist many different versions. Only a limited number of claims, so it has been argued by some capability scholars, are shared between all partisans of the approach. The second concern is that the discussion in the paper up to this point insufficiently acknowledges that the capability approach is merely a normative framework and not a theory about empirical reality. It does, for example, not tell us much about the causes of poverty, or the factors which play a role in determining trajectories of technological change and their consequences. Both come down to a concern that the argument so far has been overestimating what the capability approach can do, and underestimating the degree to which people can still differ of opinion about matters even when they all adopt the capability approach as a key normative framework. It would therefore be a mistake, so I will argue in the third part of this paper, to think that the capability approach is incompatible with the ‘race to the top’ or ‘the race to the universal fix’. And if one accepts the claim that functionings and capabilities are the best informative base for questions of well-being, this does not necessarily mean that one has to deal with agency and gender along the lines of the majority of the mainstream capability approach literature.   
  
The last part of this paper is strongly based on work by leading capability scholar Ingrid Robeyns. She has shown (Robeyns, 2008) that one might arrive at a different capability analysis or normative evaluation of certain gender cases, depending on whether one supplements the capability approach with a conservative or feminist gender theory. The capability approach, so she argues, has different features that make it in principle gender-sensitive and useful for feminist research. Yet, she warns, “feminists should be concerned that the capability approach might be interpreted and applied in an androcentric way” (p.101). In a later publication (Robeyns, 2011) she makes a distinction between a narrow and a broad usage of the capability approach. In the narrow usage, she claims, the capability approach is concerned with individual well-being, interpreted in terms of capabilities and functionings. In its wider usage the capability approach is taken to embrace other values as well, such as agency. In a more recent, so far unpublished paper, she describes a “concentric circle account of the capability approach” (Robeyns 2014). According to this account, all varieties of the capability approach share only a limited number of core claims. From this core, Robeyns explains, “the capability approach can be developed in many directions whereby additional commitments may be endorsed.”  
  
In short, this paper is meant to give the reader a better understanding of both the benefits and the limitations of the capability approach for the critical assessment of technology as an instrument for poverty reduction.

**Access to health services for capabilities expansion: The Global Ultrasound for Human Development Program – the role of innovative technologies and protocols**

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As stated by the Nobel Laureate Amartya Sen “The Capability Approach provides the intellectual foundation for human development. This approach considers human well-being, participation and freedom to be central economic and social objectives.” Sen and other human development scholars view development as the “expansion of capabilities” or “positive freedoms” (Sen, 1999). This is why “the capability approach proposes a change – a serious departure – from concentrating on the means of living to the actual opportunities of living in itself” (Sen, 2009: 17). Resources are indeed important for promoting the functionings and capabilities of persons but only as instrumental means for human flourishing. The opportunity to have access to health is, together with education, one of the most relevant capability for its intrinsic and instrumental role (Ruger, 2007). In developing and developed countries the universal access to health is strongly debated in the literature. However, the debate of universal access vs universal coverage do not take enough into account the potential related to new technologies and protocols.

The aim of this paper is to analyze the potential role of innovative technologies and organizational, clinical and training models grounded in the Capability Approach on health accessibility. In particular, we focus on the quality and accessibility to primary and emergency care resource scarce and remote areas.

The paper is structured into four sections. In the first section the role of technologies and new models is analyzed using the capability approach as a grounding framework. In the second section the case study of the Global Ultrasound for Human Development (GLOBUS4HD) “Ecos dos Gerais” Project carried out by the World Interactive Network Focused on Critical UltraSound (WINFOCUS) in partnership with the Secretariat of Health of the State of Minas Gerais (SES/MG) in the Northern meso-region of Minas Gerais and Belo Horizonte is presented. The Project was developed to train medical doctors and regional health coordinators of the Brazilian State of Minas Gerais Health System on Point-of-care Led Ultrasound (PLUS) and Tele-Sonography technologies, as well as on the adaptation of the protocols to these new technologies and on enhancing the overall regional Human Development.

In the fourth section, the main results are reported. According to our findings the GLOBUS4HD “Ecos dos Gerais” Project has developed strategies and processes that fostered individual and collective capabilities following the Sustainable Human Development paradigm and Amartya Sen’s capability approach (1999). In fact, the GLOBUS4HD approach impacted the outcomes at the pre-hospital and intra-hospital levels of the emergency medicine system. In order to reach this goal, the integration of technology and interdisciplinary protocols does not seem sufficient, so that education takes a fundamental role in improving and enhancing the regional and national healthcare system. On the other hand, the new paradigm positively affected the information system (rapid and immediate diagnostic information) and, so, the coordination between all hospitals and health centers and the healthcare organizational models. The new approach may lead, more in general, to an increase of the capacity of coordination in patient referrals.

Moreover we found that the GLOBUS4HD “Ecos dos Gerais” Project has a relevant role for the expansion of the individual health capability – in particular opportunity to access quality ultrasound exams through the public healthcare system (at no out-of-pocket cost)\_– has an impact on individual health as final outcome, generating positive feedback loops in terms of wellbeing (including income i.e. access to other goods and services), higher agency, and individual conversion factors (such as better health personal conditions). Moreover, on the societal side, the actions of the Project have an impact both on the governance of the healthcare system and the hospital service delivery capacity and management. The positive feedback loops increase social empowerment which may affect social and environmental conversion factors as well as better goods and services for the population.

In the last section the elements for future researches are indicated and some conclusions are reported.

**Exploring the Role of the Capability Approach in Design for Well-being**

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*Introduction:*Products and services that are used in daily life, play an important role in shaping and changing the world. The design of these products and services can therefore be truly relevant for poverty alleviation and well-being. When working on poverty alleviation projects, one of the challenges for designers is to obtain a deep insight into their user-groups. IDEO (2008) states that individual interviews are critical to obtain this insight. Several valuable design methods and toolkits, developed for non-governmental organizations, social enterprises and/or community workers, provide guidelines on how to develop an interview approach, how to establish appropriate questions, and how to conduct an interview. They do not, however, explicitly specify which topics to discuss. A valuable addition for designers would be to specify which data they should collect to obtain a comprehensive picture of the well-being of their user-groups.

According to Robeyns (2005), the capability approach offers a broad view towards development, well-being and justice, and takes into account all dimensions of human well-being. Therefore, the capability approach seems promising to play a role in providing designers interview dimensions to obtain deep insight into a developmental context. However, the capability approach has certain characteristics that influence practical application. The approach is underspecified, diverges from everyday language, and includes a broad variety of dimensions that differ per situation. Moreover, the concept of capability is difficult to capture, capabilities have an interdependent nature, depend on personal, social and environmental conversion factors, change over time, and differ per person and per region. It appears to be difficult to operationalize the approach while retaining its conceptual richness (Kleine, 2010). Nevertheless, it is interesting to explore if the comprehensive view the capability approach provides, can be used to obtain the required deep insight into the lives of disadvantaged or marginalized user-groups. This paper focusses specifically on establishing question categories and questions that designers may use while gathering user insights from the local context.

*Method:* While there is a lot of debate about using a list of capabilities, several lists have been established and/or used to practically apply the capability approach. We used a number of lists mentioned by capability approach authors to explore the cohesion and differences between the listed dimensions. We used the ‘find themes’ method from IDEO (2008). First we wrote down all unique dimensions, and then arranged them on the basis of relations. Related dimensions were clustered in the same ‘theme’. The next step was to look for patterns and conflicts. This was done to assess if all themes are on the same level and incommensurable. Eventually, thirteen themes where established: accommodation, products/plants/animals, meaningful work, partnership/family, friends, leisure, mobility, education, health, nutrition, safety, self-determination, and cultural and spiritual life. Robeyns (2006) recommends to establish a list detailing different levels from “ideal theory to more pragmatic lists” (p.356). In our list, the themes represent pragmatic categories, while the clustered capability dimensions – where each category consists of - represent ideal theory. For each capability category we developed a set of questions, by using the set of capability questions developed by Anand and other authors, and by brainstorming with the team. The questions are divided into ideal questions, which represent what we are actually after, and sensitizing questions, which are pragmatic questions that can be used to start the conversation in order to uncover the answers to the ideal questions.

We used these questions to conduct semi-structured interviews with product users in India to uncover their resources (Kleine, 2011), personal, social and environmental conversion factors (Robeyns, 2011) and the existence, sense, use and achievement of choice (Kleine, 2011). These studies have been conducted to get a sense of working with the established categories and questions, and to use the outcomes to improve them. We selected users of four different products and questioned them about their lives before and after obtaining the product. The four products are: (1) the Jaipur Foot Prosthesis of the Jaipur Foot Organization; (2) the clay refrigerator of Mitticool; (3) the Tasar silk reeling machine of PRADAN, and; 4) the clay stove (chulha) of Philips. These products have been specifically designed for a developmental context, and have been implemented in the Indian market. During the study of the Philips Chulha the focus was on conducting many interviews in a short time span (Mink et al., forthcoming). During the other three studies the focus was on generating deep insight into the lives of a limited amount of users. On the basis of these interviews, the categories have been re-grouped and the questions have changed.

*Result:* We established a list of capability categories and related questions, based on literature and practical studies. These categories and questions can be used by designers to conduct a semi-structured interview to explore the design for development context and to obtain a deep insight into the lives of disadvantaged or marginalized user-groups. These insights will assist the designer in creating appropriate solutions for their target group, in order to improve their well-being.

*Conclusion:*The capability approach offers a holistic and comprehensive view on human well-being, and despite its operationalizing problems, the approach offers sufficient guidance to develop topics and questions which designers could use when exploring user needs in a totally different context. The categorization in this paper is based on literature and practice, and is a first attempt to offer designers a grip. However, the list of categories and questions remains open to critique and modification, as it should be, according to Alkire (2007).

**Understanding the opportunities and constraints for technological development in unstable, developing economies: a capabilities perspective on ICT4D in Lebanon**

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**Understanding the opportunities and constraints for technological development in unstable, developing economies: a capabilities perspective on ICT4D in Lebanon**

Recent articles on technology implementation for development have highlighted first, the limitations of a focus on assessing the supply of technology whilst not taking into account sufficiently it contributions to the unequal expansion of capabilities (Fernandez-Baldor et al, 2014) and secondly, the potential of a ‘process approaches (versus project or blueprint approaches) as the basis for development management. The process approach is of interest as it enables an assessment of technological project development and implementation that is informed by context, the relationship between environment and implementation, and idiosyncratic, dynamic and unpredictable elements (see for example, Mosse, 1998).

We consider implementation of information and communication technologies for development (ICT4D) in Lebanon, which highlights the potential of ‘process approach’ thinking. Specifically, Lebanon is a consociational state, *Consociational democracy means government by elite cartel designed to turn a democracy with a fragmented political culture into a stable democracy*” (Liphart, 1969: 216).

Liphart, (1996) identify four principles of a consociational democracy: grand coalition, mutual veto, proportionality, and segmental autonomy .The political leaders of all of the segments of such plural societies jointly govern the country (grand coalition). The mutual or minority veto guarantee prevails: a minority will not be outvoted by a majority when vital interests are at stake (mutual veto). Proportionality is as the basic standard of political representation, for civil service appointments, and the allocation of public funds (Liphart 1996: 500-501). Decision-making authority is delegated to the separate segments as much as possible (segmental autonomy). Nations may choose the consociational option as a means of creating stability in an inherently divided and unstable context, with consociational democracy a social and institutional system that can achieve stability by building political compromise between factions. However, this compromise is not stable because nationalism for example, is not passive and specific groups are likely to want to monopolize state power (e.g. Newman, 2000)

Further, states such a Lebanon are not ‘free agents’ for development. The experience and threat of civil and regional instability and war has created numerous development challenges. Not only there community based differences in what might be construed as ‘legitimate’ paths for ICT4D, but much of this development has been part funded by international donor institutions, many wedded to models of development informed by more traditional blueprint models that have been developed in the context of the assumptive structure of liberal democracy that is likely create tensions with Lebanon’s consociational political context. Unsurprisingly, the government of Lebanon aspires to improve the quality of life of its citizens, and the capabilities approach (CA) provides many insights into what could and has been achieved.

In this paper, we explore the challenges relating to the implementation of ICT4D in Lebanon, from the post-civil war period through to 2013, considering in particular how ICT4D has enabled the expansion of individual freedoms and increasing people choices (Sen, 1992, 1999; 2009) across community divides, and why this expansion has taken root fastest in areas of the public sector, and struggled to establish any footprint at all in others. Technology implementation is explored from the perspectives of historical analysis of government and donor documents and the views of political and administrative actors in the Lebanese government in 2008 (when an e-government strategy unit was established) until the present. We contend that the findings may have implications for those wishing to evaluate ICT4D for developing economies experiencing or under the enduring threat of violence and war and the aspiration of peace and stability.

**04PS1.2: TP:**

**To use or not to use technology: is technology always positive to human development?**

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| *Time: Thursday, 04/Sep/2014: 8:00am - 9:20am* |

**To use or not to use Technology: Is Technology always positive for Human development? Does Design matter?**

Adam Blake1, Marco Haenssgen2, Sammia Poveda3, Dorothea Kleine4

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Papers:

1. *Why Mobile Phone Ownership is a Bad Proxy for Use: A Case Study of Rural India and China, and the Implications for mHealth*, Marco Haenssgen
2. *Boundary objects, the capability approach, and design: How do boundary objects influence the process and intended outcomes of ICT for development (ICT4D) projects?*, Adam Blake
3. *Empowerment and ICT: much more than just skills,* Sammia Poveda
4. *Neither Hamlet nor the Sorcerer’s Apprentice: Using the Choice Framework as a living tool for responsible innovation and participatory design*, Dorothea Kleine

It is hard to imagine our world without any technology. We have grown used to having computers, mobiles, a diversity of digital machines. Many technological and designed products, perhaps most, are developed with the aim of expanding valuable freedoms and powers and have indeed made important positive contributions, many may argue that some of these products actually increase social injustice. Therefore, considering our present time, a time of Crisis, the Technology and Design group would like to discuss the relation of technology and design and its relationship with human development.

The discussion will start with a theoretical paper, by **Adam Blake** that explores the theoretical compatibility and practical value for ICT4D design of the intersection between boundary objects and the CA. This paper argues that effective use of information and communication technologies to aid human development (commonly ‘ICT4D’) requires stakeholder communication and collaboration. These ‘boundary’ interactions are influenced by ‘objects’ such as protocols, processes, paperwork and other things that can aid cooperation without consensus. Can boundary objects be theorised as influencing the effectiveness of the ICT4D design process from a capability approach (CA) perspective? How might the concepts and evaluation frameworks associated with the CA themselves act as boundary objects in this process? This paper will explore the significance of boundary objects as an aid to conceptualising ICT4D project formation from a CA perspective.

Following this presentation, considering ICT are being intensely used in projects as ways to bring efficiency and greater development outcomes, this panel will also discuss some practical examples of ICT projects and their impacts. First, **Marco Haenssgen**’s paper will challenge the mainstream, supply-driven approach to mobile-phone-based health service delivery (“mHealth”). Focusing on upstream elements of mHealth, this paper explores patterns of mobile phone ownership and use and people’s healthcare-seeking behaviour in rural India (Rajasthan) and China (Gansu). The presented findings highlight diverse forms of mobile phone use both across and within these contexts, and that people can be creative users of mobile technology when accessing healthcare. While there is a role to play for mHealth, this paper urges practitioners to understand such upstream factors in order to avoid the potential exacerbation of healthcare inequities.

Second, **Sammia Poveda**’s paper will argue that the way people learn how to use ICT, impacts on the way they relate to it and how they use it for their empowerment. As our world becomes more technological, even jobs that do not require specific training, search for employees with some ICT skills. Consequently, this may cause people to ignore what they would like to achieve in life, and choose to learn ICT skills just to be able to have an income. Thus, having access to free courses may be seen as a way to expand capabilities, however, Freire (author of Pedagogy of the Oppressed 1970), argues that being taught just a few ICT skills needed for your job, knowing the internet does offer many opportunities, is also a way of oppression (Freire & Guimarães, 2012). Therefore, drawing from findings from a study conducted in Brazil, this paper supports the idea that teaching ICT skills should use appropriate pedagogical approaches, envisioning the individual’s freedom of usage above technological proficiency.

After reflecting on the relationship between technology and human development from theoretical and practical perspectives, this panel will conclude with a paper that proposes a tool for planning and evaluation. **Dorothea Kleine**, proposes how to use the Choice Framework as a living tool for responsible innovation and participatory design. This contribution reflects on the potential of using a tool, the Choice Framework (Kleine 2013) to (1) map socio-technical systems, (2) identify and negotiate capabilities sought by local people, (3) assess whether within these systems, technologies can assist in capabilities extension, (4) through participatory design processes, co-produce such technologies and (5) engage in participatory monitoring, evaluation, modification and upkeep of such interventions. Drawing on examples, it will chart a pragmatic yet value-sensitive middle course between enthusiastic try & succeed/fail fast approaches and overly hesitant technoskepsis.

We are looking forward a session in which the use of technology for development purposes is disccused in detail, not only from a theoretical perspective but also from practical terms. Although we believe in the possitive impacts technology can have on society and individuals, we are also aware of its limitations and the possibility for it to enhance inequalities. The most important aim of this session is to reflect critically on the role of ICT in development.

**05PS1.1:**

**Technologies and Human Development**

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| *Time: Friday, 05/Sep/2014: 8:30am - 9:50am* |

**How to Situate Technology in the Capability Approach: The Case of Technologies for Health**

Marco Haenssgen, Proochista Ariana

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Technology is not an inherent analytical category of the Capability Approach. The recent years have therefore seen an increase in writing about how to integrate technology within the basic framework. Despite extensive debate and a number of proposals focusing on applied frameworks (e.g. the sustainable livelihoods framework), the literature has not produced a consensus on how to integrate technology consistently into the Capability Approach. Broadly speaking, most of these authors agree that technology deserves special attention in the CA. But should this attention derive from technology being a special kind of input (like food), or because the idea of “technology” is fundamentally different from the idea of “inputs?”

Technology as a “special input to expand human capabilities” has been the intuitive starting point for almost all existing technology-augmented capability frameworks. However, narrow notions of “technology as an input” are insufficient to appreciate the arguably special characteristics of technological artefacts. Moreover, by conceiving of technology as being merely an input to valued capabilities, the analyst is prone to defining technology as something inherently conducive to human lives. More complex definitions of technology introduce interactions between technology and social norms and other conversion factors. Such broader notions also point at the relationship between technology on the one hand and choice and agency on the other. But also these definitions start from the premise that the main feature of technology is to directly enhance human capabilities. The additional complexity of the concept then only introduces contradictions within the Capability Approach. Still being defined as an input, the question remains as to what, then, is the defining characteristic of technology, and why not other inputs, too, should interact with conversion factors and human agency.

We propose to reconcile the conflicting perspectives by addressing the role of technology on two levels. Firstly, we conceive of “Technology” (i.e. the various ways of applying solutions to given problems) as a group of conversion factors. As such, Technology shares the features of other (e.g. individual or environmental) conversion factors, namely the influence on the translation of inputs into valued capabilities and the interaction with other conversion factors. On the second level, we consider individual technical artefacts (e.g. hammers, mobile phones, or calculators). These artefacts can be considered “technical” because they have a dual nature. On the one hand, they can carry intrinsic characteristics that serve as inputs for valued capabilities. Such characteristics may for example pertain to the symbolic and aesthetic nature of technical objects (i.e. their “generative” dimension). But technical artefacts only considered in their generative capacity are conceptually indistinguishable from other inputs. We argue that the defining feature of technical artefacts is a second dimension: their “transformative” nature (rather than the generative dimension that they share with other inputs). By being used to influence humans’ ability to act on the world, technological objects fulfil functions that are otherwise the domain of conversion factors, namely moderating the translation of inputs into valued capabilities. What counts as technological object (i.e. what becomes part of these techniques to act on the world) is context specific and defined by Technology as a conversion factor. Technical objects therefore acquire their transformative nature from the socio-technical context, and their role is defined in relation to it. In this sense, a technical artefact is different from an ordinary input as it acts on behalf or as extension of the human body in the translation of inputs’ characteristics into valued capabilities. This translation, however, cannot be considered in isolation as it may be more or less expedient than other techniques at people’s disposal. In a nutshell, we maintain that this analytical distinction between generative and transformative qualities of technical objects allows a more nuanced enquiry into the use of technology and its implications for human lives.

We argue that this discussion is non-trivial in that it permits a more nuanced and conservative exploration of the impact of technology on human lives, and a better appreciation of the multiple roles that technology plays. Yet, not unlike the basic framework of the Capability Approach, our augmented framework remains abstract and requires operationalization to the specific case in question. We provide an example within the area of mobile technologies and their role in healthcare access. This operationalization reframes existing theoretical strands of technology adoption and healthcare-seeking behaviour, thereby shifting away from a techno-centric and supply-driven approach to one in which human actions and their objectives are at the centre of the analysis. We demonstrate how this procedure leads us to ask research questions that are fundamentally different from conventional explorations of mobile technology and healthcare access.

**Communication tools for the construction of safe and decent earthen houses in seismic areas**

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It is estimated that half the people in the world live in houses made with adobe (sun dried mud bricks) or rammed earth, mainly because they can’t afford to purchase industrialized construction materials. Additionally, because they are built by the families themselves without any technical assistance, most of these houses lack a reasonable architectural design, they are not comfortable, have poor ventilation and do not provide a sanitary environment to their dwellers. Furthermore, earthen construction is regarded in many communities as a sign of poverty and therefore there is a social stigma attached to it. This situation is aggravated when earthen houses are built without adequate structural reinforcement in developing countries located in seismic areas. As a result, they are structurally weak and every time an earthquake occurs they suffer significant damage or collapse, leading to tragic deaths, injuries and economic loss. Although many economic reinforcement systems for earthen buildings have been developed by engineers at the Pontifical Catholic University of Peru (PUCP) and other institutions, the transfer of safe construction techniques with adobe or rammed earth to the final users has proven to be extremely difficult. This is a complex, multidimensional problem affecting millions of persons around the world, who today live in poverty and under unacceptable seismic risk.

The Pisco (Peru) earthquake of August 15th 2007, which caused the death of almost 600 persons and the destruction of about 50 thousand homes mainly built with adobe, provided an opportunity to try an innovative approach to the reconstruction effort in low-income communities where their adobe houses had been severely damaged or had collapsed due to the seismic action. A pilot reconstruction program was developed by the PUCP and CarePeru (a development ONG) to take advantage of a small reconstruction bonus offered by the Peruvian government to all the families who lost their homes. The pilot program was considered successful: around a thousand persons received classroom instruction, almost three hundred persons received practical training on safe construction with reinforced adobe, and nine improved adobe houses were built and donated to the families with greatest need.

This paper describes the results obtained during a project developed at the PUCP as a sequel of the Pisco pilot reconstruction program, with funds from the Earthquake Engineering Research Institute of California, USA. The project’s objective was to develop better tools for the education and training on the construction of improved adobe houses. These tools were aimed at communities located in seismic areas where building with earth is traditional and is the main available building technique because the families do not have the economic resources to buy industrialized construction materials (such as cement, bricks and reinforcement steel). The project was inspired by the human development capability approach, in the sense that the communities who would benefit from these educational materials should not be mere recipients of aid, but should be agents of their own development through the acquisition of the skills necessary to build safe, sanitary and socially acceptable adobe houses. (It should be clear, however, that these training tools are just one component for the solution of the housing problem. A significant economic and educational effort will always be necessary to acquire the structural reinforcements needed and to educate the families and train the builders in the communities).

A multidisciplinary team was assembled at the PUCP to work on this project. It was composed of a philosopher, a psychologist, an anthropologist, a communicator, three engineers and a student. It was decided to focus on seismic regions in Peru and to develop the following training tools: a construction manual which could be understood by all members of the community, not only by the persons with building experience (almost always men); a video with testimonials of individuals who had built their improved adobe houses (men, women, and youngsters); a technical video to show how to build an improved adobe house, step by step; and a small shaking table to demonstrate in the field the importance of seismic reinforcement for earthen houses.

It is expected that these communication and teaching tools will be distributed and used in all areas where people build with earth (especially in the poorer areas of Peru and other Andean countries), and that they will be useful to families for the construction of decent homes, which they would value for their improved design, seismic safety, and healthier living environment.